

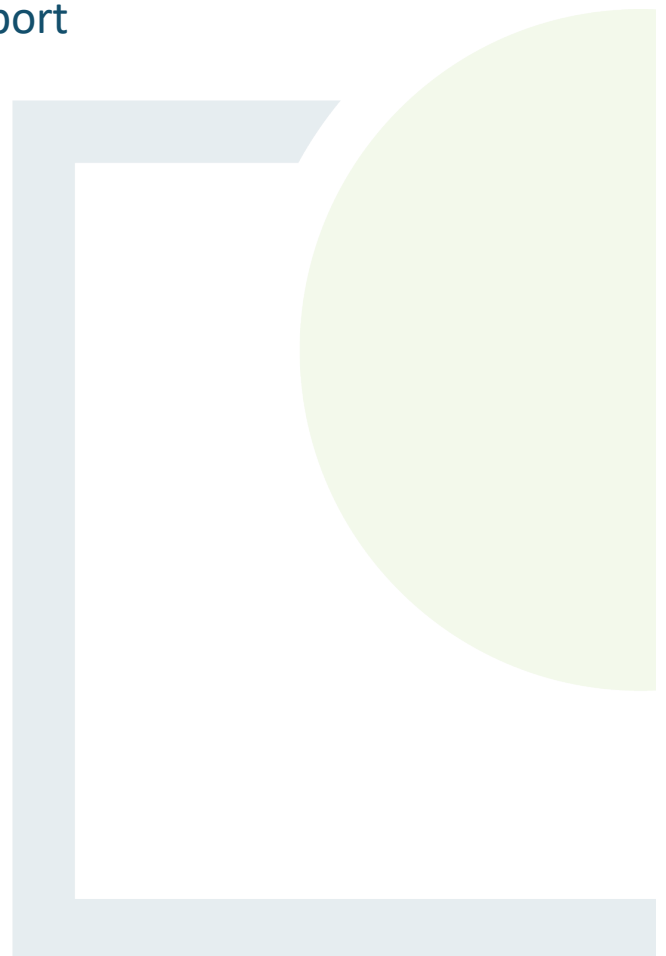


DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

Appendix 3

Existing and Proposed
Development Description

- Appendix 3.1 - Construction Environmental Management Plan
- Appendix 3.2 - Firewater Risk Assessment
- Appendix 3.3 - Letters of Support





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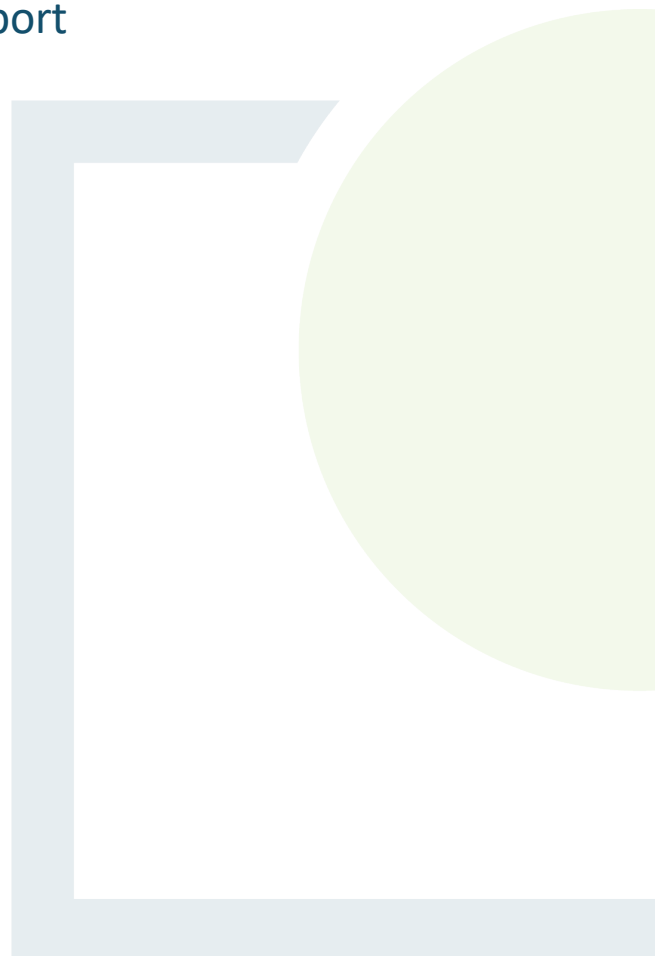
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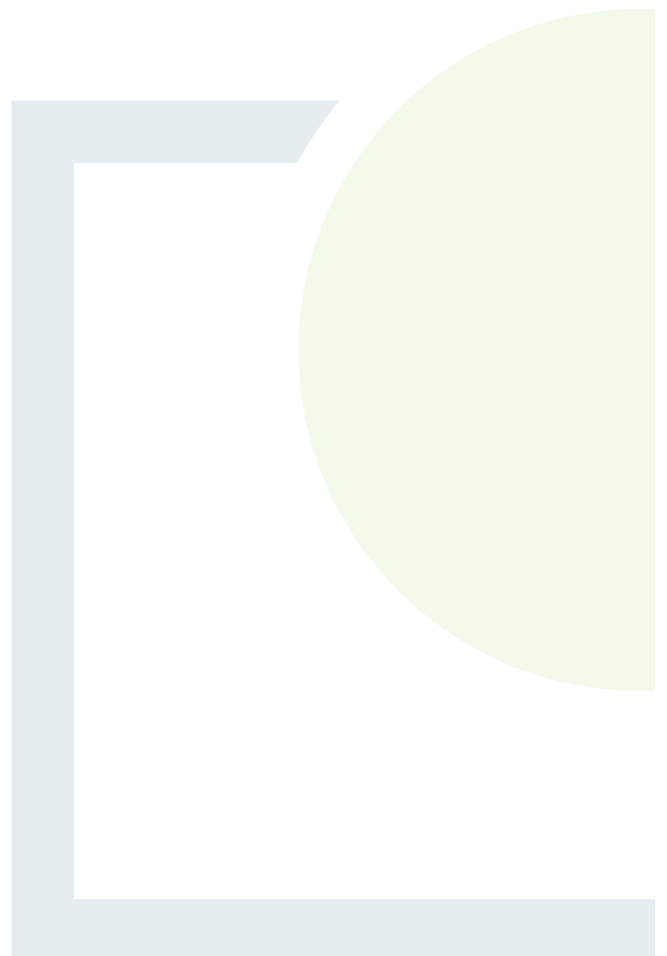




DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

Appendix 3.1

Construction
Environmental
Management Plan



EIAR FOR POWERSTOWN BIOENERGY

Construction Environmental Management Plan

Prepared for:
Greengate Biogas 001 Ltd.



Date: June 2026

Document No:
P24188-FT-EN-ZZ-RP-EN-0020

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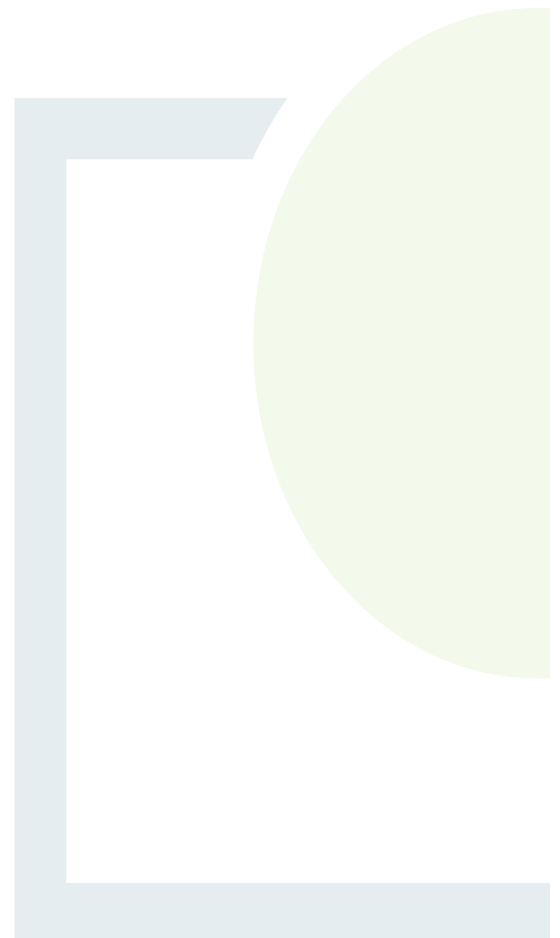


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Appendix A - Resource Waste Management Plan



1. CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

1.1 Introduction and Purpose

This Construction and Environmental Management Plan (CEMP) has been prepared by Fehily Timoney and Company (FT) on behalf of Greengate Biogas 001 Ltd. as part of the Environmental Impact Assessment Report (EIAR) for the proposed development of an anaerobic digestion facility at Powerstown, Milford, Co. Carlow. Details of the proposed development are available in Chapter 3, Description of the Existing and Proposed Development, in Volume 2 of this EIAR.

The CEMP will be updated prior to construction to take account of any relevant conditions attached to the planning permission and will be implemented for the duration of the construction phase of the project. The CEMP will be a live document and will be subject to ongoing review through regular environmental auditing and site inspections and updated as required. For the avoidance of doubt, all measures stipulated in this CEMP will be implemented in full.

The CEMP sets out the key construction and environmental management issues associated with the proposed development and will be developed further at the post-planning and construction stages by the client and on the appointment of the main contractor to the project.

This CEMP sets out the key environmental management issues associated with the construction, operation and decommissioning of the proposed project, to ensure that during these phases of the development, the environment is protected and impacts on the environment are minimised.

The CEMP will form part of the Contractors Works Contract, as set out below, and will be read and implemented onsite in conjunction with industry good practice, published guidance documents and other documents referred to within the CEMP. Following the grant of an IE licence for the proposed development, the CEMP will be updated to incorporate any conditions of the licence pertaining to the construction phase.

1.2 Description of the Proposed Development

This section contains a summary of the existing and proposed development. Refer to Chapter 3, Description of the Existing and Proposed Development, in Volume 2 of this EIAR for further details.

1.2.1 Existing Development

The existing site is an operational quarry. Known as 'Mary Kelly's Pit', it is a 9 hectare partially restored quarry located in Powerstown, County Carlow, situated near Leighlinbridge, Bagenalstown, and Carlow town, and accessed via the L3045 road from the R448. It lies directly south of Carlow County Council's closed Powerstown Landfill and adjacent recycling centre under an EPA licence. The quarry is owned and operated by Kilcarrig Quarries Ltd., it has been partially restored, has perimeter fencing and hedgerows along its boundary, and has two access points: an older gated entrance near the R448 junction associated with a now-restored area and adjacent property (excluded from future development), and a second, gated main entrance further east, which includes a wheel wash facility and is currently in use. Mary Kelly's Pit is currently operated as a sand and gravel quarry and accepts soil and stone for restoration of the former quarry. It operates under planning reference P13/187 and a waste facility permit WFP-CW-22-001-01. Permission is in place to quarry 80,000 tonnes per annum and to import up to 5,000 tonnes per annum of soil and stone for restoration purposes. Actual activity levels in 2025 and 2026 are much lower than these permitted limits.



1.2.2 Proposed Development

The proposed development is an anaerobic digestion facility for the production of 250 GWh per annum of renewable natural gas and biogenic liquefied carbon dioxide from agricultural residues, including liquid farmyard manures and solid farmyard manures, collectively referred to as 'feedstocks'. The proposed development will consist of the following:

- 2 no. site entrances off L3045, and a Weighbridge and Weighbridge Office (Gross Floor Area {GFA} 20 sqm, 3.85 m high).
- Circulation Yard (33,000 sqm) including: a Liquids Reception Building (GFA 735 sqm, 9.25 m high); a Solids Reception Building (GFA 2,386 sqm, 14.25 m high); a Solid Digestate Building (GFA 1,160 sqm, 12.85 m high); an Administration Building (GFA 459 sqm, 5.45 m high with a roof access area at 7.15 m high); a Heating Centre (GFA 1,314 sqm, 15.45 m high), with an exhaust stack (20 m high); 2,200 sqm of roof mounted solar panels on the Heating Centre, Administration Building, Liquids Reception Building and Solids Reception Building; and an Odour Abatement System including a stack (651 sqm, stack 35 m high).
- Bunded Tank Farm (19,075 sqm) including: 6 no. Primary Digesters (28.3 m high); 3 no. Secondary Digesters (28.3 m high); 1 no. Tertiary Digester (18 m high); 1 no. Post Digestion Liquid Digestate Storage Tank (21 m high); 1 no. Liquid Pre-Storage Tank (21 m high); 1 no. Digestate Storage Tank (17.6 m high); 3 no. Pasteurisation Tanks (11.9 m high); and Tank Farm Building (GFA 410 sqm, 5.5 m high).
- Gas Upgrade Area including: a Desulphurisation Plant (10.75 m high); a Gas Upgrade Plant (24.0 m high); a CO₂ Liquefaction plant (13.9 m high); a Biomethane Network Entry Facility (147 sqm, containers 2.975 m high, infrastructure 5.175 m high); and 2 no. Gas Flares Units (11.1 m stack height).
- Drainage Infrastructure and a Storm Water Lagoon (5,733 sqm).
- 1 no. Digestate Loading Tank (3.5 m high); 2 no. Buffer Storage Tanks (5.75 m high); and 2 no. Process and Fire Water Storage Tanks (4.6 m high).
- 2 no. ESB Substations (20 kV substation and a 38 kV substation).
- Ancillary Infrastructure including: Storage of Chemicals; Process and Fire Water Supply; Site Security; Lighting; Landscaping; and Car Parking (48 no. spaces).

The Project includes a gas pipeline for which permission is not being sought. The gas pipeline route is 9.6 km from the anaerobic digestion facility (for which permission is being sought) to an existing Above Ground Installation at Clogrennanne Lime Works, in the townland of Raheendoran, Co. Carlow. The gas pipeline route traverses the following townlands: Powerstown, Orchard, Ballynaboley, Rathvinden, Glebe, Rathornan, Tomard Upper/Lower, Ballygowan, Ballinabranagh, Fonhill and Raheendoran, all of which are within Co. Carlow.

1.3 **Overview of Construction Works**

1.3.1 Construction Programme

It is expected that the construction phase will take approximately 24 months, shown in Figure 1-1.

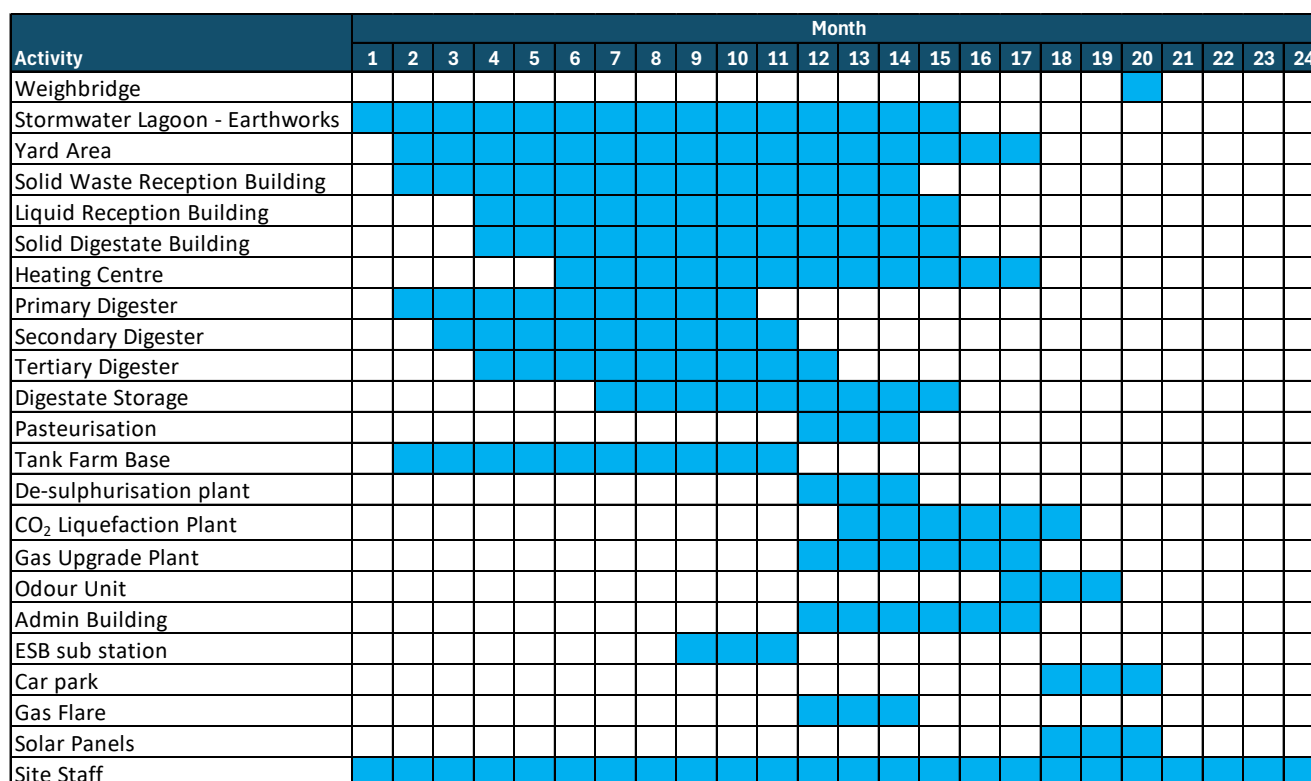


Figure 1-1: Proposed Construction Timeline

1.3.2 Construction Working Hours

- Daytime (07:00 – 18:00)
- Saturdays (08:00 – 14:00)
- No construction activities will take place Sundays or bank holidays

1.3.3 Overview of Construction Methodology

Construction methodology details for the proposed development and proposed gas pipeline are available in Chapter 3, Description of the Proposed Development, in Volume 2 of this EIAR Section 3.5 and 3.6. The contractor will be required to import this detail into the final version of this CEMP.

The key construction elements (listed in chronological construction order) are as follows:

- Advanced Works (site clearance), Site Entrances, and Contractors Compound
- Storm Water Management
- Earthworks
- Solids Reception Building
- Liquids Reception Building
- Solid Digestate Building
- Circulation Yard
- Bunded Tank Farm



- Desulphurisation Plant
- Gas Upgrade Plant
- CO₂ Liquefaction Plant
- Heating Centre
- Biomethane Network Entry Facility
- Administration Building
- Weighbridge and Weighbridge Office
- Mechanical and Electrical

GNI will be responsible for extending the gas pipeline to the proposed development site and a road opening licence will be required to be obtained by GNI from Carlow County Council (CCC) to undertake these works.

It is planned that the gas pipe will be laid in the grass verge alongside the existing road (where possible) or under the existing road itself. The final route will be determined by GNI at detailed design stage.

The pipe will be laid at approximately 100 metres per day by open cut method. Residents affected will be notified by GNI via a letter drop approximately 1 week before the works are due to start with disruption kept to a minimum and access to properties will be maintained.

A site-specific traffic management plan will be prepared by a specialist traffic management team. This will be required by Carlow County Council to obtain the road opening licence. Reinstatement will be as specified by Carlow County Council as a condition of the road opening licence.

The proposed gas pipeline connection will require both standard cut and cover construction (i.e. excavate trench, place pipe, cover pipe and reinstate surface finish) and horizontal directional drilling methods of installation.

1.4 Environmental Management Plan

1.4.1 Introduction

This Environmental Management Plan (EMP) defines the work practices, environmental management procedures and management responsibilities relating to the construction of the proposed development. This plan should be read in conjunction with the EIAR.

This EMP describes how the Contractor for the main construction works will implement a site Environmental Management System (EMS) on this project to meet the specified contractual, regulatory and statutory requirements and identified mitigation measures. This plan will be further developed and expanded following the grant of planning permission and appointment of the Contractor for the main construction works (in accordance with the parameters and measures set out in this EMP). Please note that some items in this plan can only be finalised with appropriate input from the Contractor who will carry out the main construction works and once the planning conditions are known. It is the Contractor's responsibility to implement an effective EMS to ensure that environmental requirements for the construction of this proposed development are met.



All site personnel will be required to be familiar with the EMP's requirements as related to their role on site. The plan describes the project organisation, sets out the environmental procedures that will be adopted on site and outlines the key performance indicators for the site:

- The EMP is a controlled document and will be reviewed and revised as necessary (to comply with planning conditions or other local authority requirements).
- A copy of the EMP will be located on the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of and understand the EMP and its contents.

This section includes the mitigation measures which will be implemented by the contractor and client during the construction, operation and decommissioning of the proposed development as per the EIAR and NIS.

1.4.2 Project Obligations

In the construction of the proposed development there are a number of environmental management obligations on the Applicant and the contractor. As well as statutory obligations, there are several specific obligations set out in the EIAR and NIS. This CEMP will be updated by the main contractor following appointment and will only be revised as set out above. The contractor and all of its sub-contractors will be fully aware of and in compliance with these environmental obligations.

1.4.3 EIAR/NIS Obligations

The EIAR and NIS identified mitigation measures that will be put in place to mitigate the potential environmental impacts arising from construction of the proposed development. Measures identified in the EIAR and NIS are detailed in this CEMP and listed in the Schedule of Commitments which accompany the EIAR. It should be noted that this Schedule of Commitments also includes operational phase and decommissioning phase commitments which are not relevant to the construction phase. The CEMP will be read in conjunction with the EIAR and NIS. In the case of any ambiguity or contradiction between this CEMP and the EIAR and NIS, the EIAR and NIS shall take precedence.

1.4.4 Planning Permission Obligations

All planning conditions attached to the proposed development's planning permission will be adhered to. All pre-commencement planning conditions will be discharged fully by the project owner prior to commencement of construction.

1.4.5 IE Licence Obligations

All IE licence conditions will be adhered to during the construction phase.



1.4.6 Other Obligations

The Applicant and/or Contractor for the main construction works at the proposed development will liaise directly with relevant Bodies in relation to securing any necessary permits to allow the works to take place including for example (non-exhaustive list):

- Commencement notice
- Special Permits in relation to oversized vehicles on public roads (not anticipated)
- Temporary Road Closures (not anticipated)
- Road Opening Licence
- Building control approval
- Tankered wastewater agreement
- Licence, permit or certificate of registration required by any waste collector and waste facility
- Protected Species licence (noting that the need for same has not been identified at planning stage)
- Registration of groundwater abstraction well with EPA

Other consents may be required for Statutory Bodies during the construction of the proposed gas pipeline route in accordance with development consent:

- Road opening licence
- Temporary Road Closures
- Protected Species licence (noting that the need for same has not been identified at planning stage)

The Applicant will also liaise closely with the local residents, especially homeowners and landowners along the local access route in relation to works and all reasonable steps will be taken to minimise the impact of the development on such persons.

A Traffic Management Plan is included in Section 2.

1.4.7 Environmental Management Plan

This section outlines the EMP associated with the proposed development. Table 1-1 below describes the Management Plans that have been prepared as part of the EIAR. The Management Plans should be read in conjunction with the EIAR. The contents of the management plans will be updated for the construction phase in line with any planning conditions that may apply.



Table 1-1: Management Plans

Management Plan	Location	Description
Traffic Management Plan	Section 2	The traffic management plan outlines the procedures to be implemented during the construction stage for traffic management at the proposed development.
Resource and Waste Management Plan	Section 1.5 and Appendix A of this report	It will be the objective of the Applicant in conjunction with the appointed contractor to prevent, reduce, reuse, recycle and recover as much of the waste generated on site as practicable (in accordance with Waste Hierarchy Principles) and to ensure the appropriate transport and management of residual waste off site. This is in line with the National Waste Management Plan for a Circular Economy 2024-2030, and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.
Storm Water Management Plan	Section 1.4.15	The contains methodology for drainage and water quality management.
Biodiversity Enhancement and Management Plan (BEMP)	Section 1.6	The BEMP provides guidance for the creation, maintenance and management of habitat and species enhancement features which will form part of the proposed development. The BEMP has been prepared having regard to 'Planning for development: What to consider and include in Habitat Management Plans' (Nature Scot, 2016). In addition, mitigation measures prescribed in the Natura Impact Statement (NIS) carried out for the proposed development will be implemented in full. For mitigation measures associated with the NIS please refer to the EIAR Schedule of Commitments.
Dust Management Plan	Section 1.7	Provides guidance for the contractor. Due to the topography of the site, dust can be managed effectively.

1.4.8 Environmental Commitments

The Schedule of Commitments is in Chapter 18 of the EIAR. It may be updated during the planning consent process and the Contractor shall include all environmental commitments in the pre- construction version of this report.



1.4.9 Traffic And Transportation

Construction activities have the potential to cause temporary disturbance to local residents and road users. These effects will be managed through the implementation of a Construction Traffic Management Plan (CTMP) and good site practices to minimise disruption.

Key mitigation measures include:

- Preparation and implementation of a Construction Traffic Management Plan (refer to Section 2) prior to commencement of works.
- Use of designated haul routes (via M9 Junction 6, R448 and L3045) for all construction traffic to minimise impacts on local roads.
- Management of HGV movements, including routing, scheduling and driver briefing, to reduce disruption to local residents and businesses.
- Implementation of traffic control measures where required (e.g. signage, temporary traffic management) to maintain road safety and flow.
- Measures to minimise construction-related delays and journey time impacts, including coordination of deliveries and avoidance of peak traffic periods where practicable.
- Control of noise and dust associated with traffic movements, in coordination with relevant sub-plans.
- Maintenance of safe access to residential and commercial properties at all times during construction.
- Communication with local residents and stakeholders regarding construction activities and programme where works may affect access or traffic conditions.

1.4.10 Population and Human Health

A range of standard best practice measures and embedded controls will be implemented to minimise disturbance to local residents, protect amenity, and safeguard human health throughout the works.

Key mitigation measures include:

- Appointment of a Community Liaison Officer (CLO) to provide advance notice of works, respond to queries, and maintain communication with local residents.
- Adoption of defined working hours to minimise disturbance to nearby residents.
- Control of noise, vibration, and dust emissions in accordance with best practice and relevant standards (refer to Section 1.4.13 and Section 1.4.11).
- Use of best practice construction methods to minimise emissions to air and reduce nuisance effects.
- Implementation of dust management measures to ensure compliance with EU air quality standards and protection of human health.
- Management of construction traffic via designated haul routes and the CTMP to reduce disruption and safety risks.
- Maintenance of safe access to residential properties, businesses, and community facilities at all times.
- Provision of clear signage and information in areas affected by construction activities.
- Compliance with all health and safety legislation to protect both site workers and the public.



- Use of site design and layout measures to minimise interaction with sensitive receptors where practicable.
- Implementation of good practice measures such as proper plant maintenance, speed control, and careful operation of equipment to reduce noise and emissions.

1.4.11 Air Quality

1.4.11.1 *Dust Management*

Mitigation measures to reduce dust nuisance and to minimise impact on air quality will be employed during the construction phase of the project as per the Dust Management Plan.

1.4.12 Climate

Mitigation measures for climate will be implemented by the Works Contract, where materials are replaced as per Table 9-16 of Chapter 9 and replicated in Table 1-2.

Table 1-2: Mitigation Measures Materials (Climate)

Unmitigated	Mitigated
Use Electricity to heat the anime and pasteurisation units	Use of biomass boiler to heat the amine and pasteurisation units
No Solar panels	Solar panels (640,000 kWh)
6F1 and cl804 Used	Geogrid used in yard area to reduce volume of virgin aggregate
Potable water used on site	Harvested rainwater and groundwater water from site used
Standard cladding used	Lower carbon cladding used
Standard concrete used	Lower carbon concrete used
Steel Rebar not sized, new rebar used	Steel rebar sized, recycled rebar used
Normal Portal Frames	Low carbon steel (electric arc furnace)
Hot rolled asphalt	Mastic Asphalt
New 6F1 used	Recycled 6F1 used
HGV's not backloaded	HGV's backloaded
Grid electricity uses non renewable energy	Grid electricity uses renewable energy
Concrete piles used	Vibro stone columns used



The following measures will be implemented in addition to the measures outlined in above:

- Reclamation of bare ground.
- Enhancement Planting of 10,665 m² of existing hedgerow (native and local species).
- New planting 395 m² hedgerow (native and local species).
- Planting 27,705 m² of new grassland.
- Use of an on-site borehole for the water supply.

Where the use of the biomass boiler is specified, this will be supplied with biomass from sustainably managed resources such that removal of biomass will be replaced in a manner that represents compliance with the Government of Ireland's commitment to net zero emissions.

1.4.13 Noise and Vibration

The Contractor will be required to:

- Construction operations shall be restricted to between 07:00hrs and 18:00hrs, Monday to Friday, and 08:00hrs to 14:00hrs on Saturdays.
- No construction work is permitted on Sundays or bank holidays. If it is necessary to work outside these hours, any such out of hours working would be agreed in advance with the planning authority and in consultation with the local community.
- Comply with the Construction Noise Threshold Levels (CNTLs) for the construction stage of this development during daytime:
 - Residential receptors: 65 dB LAeq,1hr Daytime
 - Commercial receptors (offices): 75 dB LAeq,1hr Daytime
- Monitor noise levels during the construction phase to demonstrate compliance with the CNTLs at the sensitive receptor locations identified in the EIAR (see Figure 10-1 of Chapter 10 in Volume 2 of this EIAR). Routine monitoring shall be carried out on a quarterly basis in accordance with ISO 1996 Standards Acoustics - Description and Measurement of Environmental Noise, Part 1 (ISO, 2016) and Part 2 (ISO, 2017) and EPA guidance document NG4 2016: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (EPA, 2016).
- Maintain a log of monitoring results.
- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for noise and vibration on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information
- Record any noise or vibration complaints, and record measures taken to address.
- If noise levels are exceeded due to construction activities, the Contractor shall cease the activity/activities identified as causing the exceedance operations and implement a noise management plan to ensure compliance. The Contractor shall inform Carlow County Council of the exceedance and submit the management plan for approval. Additional noise monitoring will be carried out to demonstrate compliance following resumption of activities.



During the construction of the proposed gas pipeline, there is potential for temporary elevated noise levels due to the construction works that has the potential to exceed the noise criteria at up to 85 no. properties within 50 m of the works. However, the impact of these works at any particular receptor will be for a short duration (i.e. 1-2 days) and the following mitigation measures will be implemented.

Where the works may result in noise levels above the 65 dB $L_{Aeq,1hr}$ noise criteria at receptors within 50 m of the route, a temporary noise barrier, screen or enclosure will be used to reduce noise levels below the noise limit, as required.

A noise barrier may provide approximately 5 dB attenuation where the line of sight between the source and receiver is partially obscured and by 10 dB where the line of sight is fully obscured. Noise barriers that fully block the line of sight between the source and receiver will be used at properties within 50 m during the gas connection works and will result in noise attenuation of approximately 10 dB. Noise barriers will have a minimum mass per unit surface area of greater than 7 kg/m², with no gaps at the joints.

Construction work will be confined to daytime hours, therefore no evening or night time CNTLs have been specified.

There are no vibration limits.

The following good practice measures will be implemented, as outlined in Chapter 10, Noise and Vibration, in Volume 2 of this EIAR:

- Proper maintenance of plant will be employed to minimise the noise produced by any site operations. All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the project, with particular attention paid to the lubrication of bearings
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise-sensitive locations.
- A speed limit of 15 km/h will be enforced on-site.
- Drop heights for construction equipment/materials will be minimised.
- Training will be provided by the Site Manager to workers and drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.
- All site staff shall be briefed on noise mitigation measures and the application of best practicable means to be employed to control noise.
- All staff should be briefed on the complaint procedure, the mitigation requirement and their responsibilities to register and escalate complaints received
- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 as amended in 1990 and 1996 (S.I. No. 320 of 1988, S.I. No. 297 of 1990 and S.I. No. 359 of 1996), and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations, 2006 (S.I. No. 371 of 2006).



The general construction works on site will be carried out in accordance with the noise guidance set out in BS 5228-1:2009+A1:2014 (British Standards Institution, 2014):

- All available techniques will be used to minimise, as far as practicable, the level of noise to which operators and others in the neighbourhood of site operations will be exposed.
- Operatives will be trained to employ appropriate techniques to keep site noise to a minimum.
- Employees will be protected from noise impacts. Exposure to high noise levels from plant and power tools will be limited, with noise screens used where possible. Plant and operations will be arranged to minimise impact and protect quiet areas. Sound-reduced equipment and cab insulation will be implemented, and appropriate hearing protection will be provided and worn by operators and employees.
- Quiet working methods will be used where reasonably practicable, including suitable plant selection, reasonable working hours for noisy operations, and efficient execution of tasks.
- Noise will be controlled at source, and its spread will be limited.
- On-site noise levels will be regularly monitored by a qualified person, with an agreed measurement method established before works begin.
- Areas with high noise levels will display prominent warning notices, and ear protection will be provided where necessary.

1.4.14 Biodiversity

1.4.14.1 *General Best Practice Measures*

Standard best practice measures will be carried out during the construction of the project as set out hereunder.

1.4.14.1.1 *General Construction Best Practice*

- Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London (CIRIA, 2001).
- Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London (CIRIA, 2006).
- Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London (CIRIA, 2015).
- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016).
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note) (UK Environment Agency, 2013).
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note) (UK Environment Agency, 2007).
- Guidelines for the treatment of bats during the construction of national road schemes (TII, 2005, reissued 2025).
- Bat mitigation guidelines for Ireland - V2 (Marnell, et al., 2022). (Marnell, et al., 2022).
- UK Bat mitigation guidelines (Reason, et al., 2025).
- Guidelines For the Treatment of Otters Prior to the Construction of National Road Schemes (TII, 2006, reissued 2025).



- Guidelines For the Treatment of Badgers Prior to The Construction of National Road Schemes (TII, 2006, reissued 2025).
- The management of invasive alien plant species on national roads – technical guidance (TII, 2020).

1.4.14.1.2 Best Practice for Protected Species

Badger

Given that badgers can reinhabit setts, and a burrow occupied by rabbits was confirmed on site that may have been a historical sett entrance, a pre-construction survey must include assessment of this burrow.

Given that the burrow is on the bank (approximate 1.5 m above the working level of the site, there is no possibility of inadvertent damage to the burrow. The following will be considered should surveys uncover badger activity:

- As per NRA Guidance, during the breeding season (December to June inclusive) no works will be undertaken within 50 m of an active sett or pile driving within 150 m of active setts.
- All supervision and surveys will be undertaken or supervised by an appropriately qualified ecologist in advance of construction.

The Consenting Authority will be contacted immediately should any of the following events occur:

- A new sett is recorded during any works.
- There is evidence of badger persecution during surveys.

Pre-mitigation monitoring and ecological supervision will ensure correct implementation of badger mitigation measures at construction stage.

Bats

During construction, avoid any excessive light-spill on the linear ecological features surrounding the works areas by using appropriately directed lighting.

The existing lighting plan for the operational biogas facility has considered the light spill to surrounding areas and will include the following measures for bats:

- LED luminaires within the warm light range (2700-3000 Kelvin) should be used for any lights contributing to light spill into the surrounding linear ecological features.
- Use lights with reduced UV, white and blue wave lengths or apply filters to achieve the same. This will also reduce insects swarming the lights.
- Luminaires will be mounted horizontally, with no light output above 90° and/or upward.
- Baffles, hoods or louvres will be considered in addition to the above to achieve zero light-spill on surrounding habitats.
- Reduce reflective surface around lighting.



Birds

Article 19 of the Wildlife Act 1976 (as amended) provides for the protection of wild birds, their nests and eggs. It is an offence to wilfully take or remove the eggs or nest of a protected wild bird; to wilfully destroy, injure or mutilate the eggs or nest of a protected wild bird; and to wilfully disturb a protected wild bird on or near a nest containing eggs or unflown young. The nesting season for breeding birds in Ireland is between the 1st of March and 31st of August (inclusive).

However, under Article 22 of the Wildlife Act, 1976 (as amended) it is not an offence to unintentionally to kill or to injure a protected wild bird or to destroy, injure or mutilate the eggs or nest of a protected wild bird while carrying out building/construction works. As such, a pre-site clearance survey will be carried out immediately prior to any vegetation clearing during the bird nesting season to identify any active nests within the site or along the gas pipeline where vegetation clearance is required and avoid any contraventions of the Wildlife Act. On-site mitigation for the protection of birds and their nests would be prescribed in the event of the occurrence of nesting birds in site clearance areas.

Survey methodology will comprise ground-level walked transects through the areas to be cleared, searching for nests and nesting activity. Survey will be conducted in the morning as there is generally an increase in bird activity (e.g., territorial singing and foraging) during morning hours. While the composition and diversity of all bird species present on site will be recorded, the aim of the survey will be to identify any active nests. Nesting behaviour will be looked for which includes adults bringing food, adults carrying faecal sacs, sounds of young begging for food, adults giving alarm calls or exhibiting agitated behaviour.

Any nests encountered will be documented as follows:

- The nest location (ITM co-ordinate)
- Habitat in which it occurs
- Bird species
- Number of eggs / young
- Nest status – active or inactive (i.e. birds have fledged)
- Adult behaviour at the nest e.g. incubating, building, distraction displays, alarm calls etc.

In the event that a nest or suspected nest is observed, a nest buffer where no site clearance is permitted will be established. A minimum 30m buffer will be established using posts and tape. However, there may be cause to increase the size and shape of the buffer depending on type and amount of surrounding vegetation cover, species' sensitivity to disturbance, rareness of the species in the local/regional area, site topography, and the type and extent of clearing activities that will be occurring next to the buffer.

No clearing activities within the established buffer areas will occur until after the Ornithologist has determined that nesting and fledging are complete, or if the status of the nest has been changed from active to inactive.

Herpetofauna

In the event that construction is required to proceed during the breeding season of common frog (approximately January to midsummer) or smooth newt (approximately February to June), a pre-construction survey will be completed of the pools on site. If these species are present and it is not feasible to delay works until froglets and efts have matured and dispersed from breeding sites, translocation under licence will be completed by a qualified ecologist.



1.4.14.2 Project-Specific Mitigation

During construction phase, the following effects have been identified as being significant and for which specific mitigation is required:

- Loss of bee orchids at the site.
- Spread and establishment of invasive species, Himalayan balsam, within and beyond the proposed development site.
- Impact to aquatic habitats within the River Barrow through watercourse crossings along the gas pipeline and associated potential loss of prey for otter.

Mitigation measures are described below which will avoid, prevent, reduce and, where needed, offset likely significant effects arising in relation to biodiversity from the construction (and decommissioning) and operation of the site and gas pipeline. These mitigation measures shall be implemented in full.

Only those impacts that have been identified as significant require mitigation and are addressed below.

1.4.14.2.1 Measures to Protect Orchids and Greater Knapweed

Orchids

Protection of orchid and greater knapweed plants will require that the mitigation measures detailed below are implemented before vegetation clearance commences under the supervision and direction of an ECoW. In carrying out these activities the following is also undertaken:

- Communicating the importance of the activities that need to be undertaken to the contractor and prevent inadvertent damage to the habitats being retained, compensated or that are part of the orchid donor / receptor sites.

Orchids will be translocated out of the construction footprint of the proposed development. Pending the onset of construction activities, the receptor sites (edges of hedgerows / treelines where orchids will not be over-shadowed) for the local bee orchid populations will be prepared before the first flowering season to ensure that the bee orchids can be relocated directly to receptor sites and reduce handling of the orchids. This will include mimicking the local substrate conditions where the bee orchid was recorded within the receptor site, ensuring well-drained, sandy or loamy substrate enriched with a phosphorus / potassium fertiliser as per recommendations. Areas with drizzled sunlight will be most suitable, so target grassland blocks adjacent to hedgerows, treelines and scrub. prepare the receptor sites as follows:

- Dig a hole twice the size of the root ball and to a depth that will allow the root ball to sit at or just below surface.
- Dig the holes so that plants are spaced 30cm apart.
- Have mulch (bark chips / shredded leaves) available to place over the transplanted bee orchids.
- Have water available for adequate watering



If the receptor sites cannot be prepared in time, then intermediate planting will be required into pots with similarly prepared substrate, which can be left on site but will need to be checked daily to ensure the substrate is adequately moist.

Areas where the orchids were recorded and could be disturbed by construction activities will be cordoned off as a no-go areas before construction commences, to safe guard these areas. The orchids from these areas will be translocated to the prepared receptor sites by an ecologist with experience in habitat translocation, in accordance with proven best practice methods¹ which must involve the translocation of orchid turf to sufficient depth to retain the mycorrhiza and dormant plants to the pre-pared receptor site. Typically, this is 100–300 mm depth in order to maintain associated soil biota. Translocation will be in late summer / early autumn or in spring (pre-flowering) so as to avoid periods of flowering and full dormancy. The following translocation, the receptor site will be monitored and managed by the Ecologist for the duration of operation of the proposed development.

On the gas pipeline route, there will be no temporary storage of materials or equipment for the gas pipeline in any areas along the gas pipeline designated as GS1 or GS2 habitats to protect the orchids associated with these habitats and the habitat characteristics associated with the soil substrate in these habitats.

Greater Knapweed

Individual Greater Knapweed plants were recorded outside of the western boundary of the proposed development site. No works are proposed to take place at this located. However, in order to avoid accidental damage of these plants, the area will be cordoned off as a no-go area before construction commences.

There will be no temporary storage for materials for the gas pipeline along the R448 road near the western boundary of the proposed development site to safeguard the existing greater knapweed plants.

1.4.14.2.2 Spread and Establishment of Invasive Species

This section describes the methodology and management proposed for the treatment and disposal of invasive species at the proposed development site or along the route of the proposed gas pipeline. The European Communities (Bird and Natural Habitat) Regulations 2011 (as amended) make it an offence to plant, disperse, allow or cause to disperse, spread, or otherwise cause to grow any of the scheduled species.

The following document has been used as a reference to assist in the development of this Invasive Species Management Plan

- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. GE-ENV-01105 (TII, 2020)

¹ Including regard to Phillips, R.D., Reiter, N., & Peakall, R. (2020). *Orchid conservation: from theory to practice*. Annals of Botany, 126(3), 345–362. <https://doi.org/10.1093/aob/mcaa093>



The Third Schedule Himalayan balsam and the non-native snowberry were found on the boundary of the proposed development on the earth banks. Snowberry is a non-regulated, non-native species. No other non-native species were found within the proposed development footprint or along the route of the proposed gas pipeline. Two species were recorded in the vicinity of the proposed route (Third Schedule invasive species *Rhododendron ponticum* was recorded in the front garden of a residential property which borders the gas pipeline, at a distance of 18m from the pipeline and Himalayan Balsam, was recorded along the banks of the river Barrow, c. 110m from where the gas pipeline crosses the river).

The Himalayan balsam must be controlled on site as it is listed in Schedule III under Regulations 49 & 50 in the European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (as amended). A single area of growth was observed along the northern boundary of the site.



Plate 1-1: Himalayan balsam recorded within site

All works will be undertaken in accordance with the Transport Infrastructure Ireland guide (TII, 2020) and under the supervision of a suitably qualified ECoW with specialist knowledge in alien invasive plant species management. The mitigation measures focus on the manual and mechanised treatment only. The treatment aims at the prevention of flowering.

Given the location of the plant, mowing is not considered and manual pulling of plants (referred to as 'balsam bashing') is the recommended treatment for site. Himalayan balsam has shallow roots and has no barbs or thorns that make handling dangerous. The following will be undertaken:

- A marker will be placed at the existing area of growth, to make the location known and visible. This will reduce the need to search for the non-flowering plant and improve biosecurity measures (reduce risk of spreading seeds across the area when searching for the plant).
- Balsam bashing (pulling of plants out by the roots) will be completed in late April or early May (when plants are around 1m high for ease of pulling) before flowering.
- Pulled plants will be broken to discourage flowering (plants that have been removed from the ground can still flower if not broken).
- Before leaving the infested area, the soles and edges of shoes will be scrubbed clean of any clinging soil and clothing will be rubbed clean of any cling soil/vegetation.
- The existing seed bank could germinate and balsam bashing needs to be repeated later in the season before the seedlings flower. August is considered a suitable time, but growth of plants in the area should be monitored and balsam bashing timed accordingly before flower buds present themselves.



- Monitoring of the infected site and localised hand pulling should be conducted for at least two years but continue as long as monitoring indicates the need.
- Monitoring of the site for invasive species should be ongoing for the life of the biogas facility. A suitably qualified ECoW with specialist knowledge in alien invasive plant species should be consulted if new infestations or species are noted.
- Broken plant material can be placed in piles to decompose naturally. It can also be disposed of by composting if this can be left undisturbed for at least two years. Plant material can be disposed to a licensed landfill or incineration facility or by shallow or deep burial.

In addition to the above, good biosecurity measures will be established on site. This will include:

- Self-contained wheel washing / equipment washing facilities will be provided at the construction site and washing will be undertaken of all wheels, undercarriages and equipment coming from off-site locations and leaving the site.
- A final visual inspection will be made of all cleaned vehicles / equipment for stubborn debris which will be manually removed.
- The debris will not enter the water drainage features and will be contained on site and treated as invasive plant material to be disposed of at licensed landfill or incineration facility or by shallow or deep burial.

1.4.14.2.3 Protection of Aquatic Ecosystems

The main potential for significant effects during the construction phase on the aquatic environment is via water pollution.

Works adjacent to drains and watercourses including as part of HDD crossings will adhere best practice guidelines for the control of water pollution. The following are additional mitigation measures to protect aquatic ecology:

1. Timing of the Works:

Works within 60m of the drain and watercourse crossings will be carried out outside of the salmonid and lamprey spawning seasons (i.e. works will be confined to between 1st July to 30th September to avoid Atlantic salmon and lamprey species spawning seasons).

2. Measures to prevent Surface water runoff from works areas at/near watercourse crossings:

A double row of silt fences will be established along the perimeter of source areas of contaminated runoff at the following works locations:

- Surrounding the works area at the HDD launch and exit pits for all the drain /waterbody crossings.
- For all in-road open cut crossings of drains and watercourses.

Silt fencing will be installed by the construction contractor in advance of the works. Silt fencing will consist of a UV-stabilized geotextile membrane (e.g., Hy-Tex Terrastop Premium or similar) attached to wooden posts. The fabric will be buried at least 100-250mm below ground level and anchored, with clean drainage stone, to prevent undercutting.



The silt fencing will be left in place until the works are completed (which includes removal of any temporary ground treatment). Silt fences will not be removed during heavy rainfall.

The integrity of the silt fencing will be checked daily and after poor weather conditions (rain or wind) and any failures rectified immediately. Any build-up of sediment along the fence will be removed in accordance with manufacturers requirements.

A record of when it was installed, inspected and removed will be maintained.

3. Measures to prevent frac-out from HDD

Specialist drilling contractors will be employed with experience in working in gravel aquifers for all HDD works.

The Contractor will report daily to the Developer's Engineer and the Engineer will also be present on site to supervise all HDD works.

The HDD works will be informed by detailed geotechnical investigations prior to drilling. Drilling tools and mud programme will be selected to match soil/rock conditions.

The approach to HDD will focus on the three pillars of environmental protection: mechanical stabilisation of borehole integrity, fluid non-toxicity, and physical containment:

- Mechanical Stabilisation - Mechanical Stabilisation in the gravelly, non-cohesive aquifer, will be managed by installing steel conductor casing through the shallow gravels to bypass the cover zone (i.e. the material above the bore depth) where fluid would be most likely to breach the surface. This casing acts as a physical barrier, protecting the riverbed from pressure spikes and ensuring returns are directed back to the entry pit rather than into the sensitive substrate.
- Fluid non-toxicity - The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used). Biocompatible Drilling Fluids (European Standards) utilize NSF/ANSI Standard 60 or CE-marked additives which are high-performance, biodegradable viscosifiers and will be used to provide the necessary "gel strength" to suspend heavy gravel cuttings. Fluid loss will be controlled using biodegradable sealants, which create a thin, flexible filter cake on the borehole wall to prevent fluid migration into the aquifer. These products break down naturally, ensuring no permanent alteration to the hydraulic conductivity of the aquifer. These products break down naturally, ensuring no permanent alteration to the hydraulic conductivity of the aquifer or the delicate micro-habitats of QIs.
- Physical containment - Real-time annular pressure monitoring will be mandatory. By keeping pressures below the Delft Equation limits, operators can detect lost circulation before it becomes a surface fracture blow-out (frac-out release of drilling fluid through cracks/fissures/weaknesses in the substrate).

These mitigation measures will safeguard the upstream and downstream river characteristics and associated ecosystems and the species supported within these ecosystems.

1.4.15 Surface Water, Groundwater and Soil Protection

The proposed development is located within the Water Framework Directive (WFD) Catchment Barrow and Sub-catchment Barrow_SC_100. The closest waterbody proximate to the proposed development is the River Barrow (IE_SE_14B012700) located approximately 300 m west of the site boundary. The WFD surface water status for the River Barrow is 'Moderate' for the 2019-2024 monitoring period, and the river is 'At Risk' to meet the WFD objectives for 2027.



Mitigation by avoidance and design forms the primary control on potential impacts to surface water hydrology and surface water quality. The drainage strategy for the proposed development has been designed to physically interrupt pollution pathways, control runoff rates, and provide multiple, redundant stages of treatment, containment, and isolation prior to any discharge during the operational phase. Although the stormwater management strategy will only be fully implemented on completion of the construction of the drainage networks, a similar strategy will be applied during the construction stage.

1.4.15.1 Storm Water Management Measures During Construction

The storm water lagoon will be the first piece of infrastructure constructed on site. This feature will be utilised during the construction phase. It is described in the following section.

- A forebay will be provided at the lagoon inlet to manage first-flush runoff and capture residual sediment.
- The lagoon will include a settling zone, sufficient storage volume, and a minimum freeboard of 300 mm.
- It will be designed for the 1-in-30-year storm event plus 20 % climate change allowance.
- Due to the quarry setting, the lagoon will operate as a drainless system, with exceedance flows managed by tankering to authorised facility during construction.
- Where monitored parameters indicate contamination or abnormal conditions, the construction contractor shall arrange tankering of potentially contaminated water within the lagoon for further treatment and management at an authorised facility.

During construction, mitigation will focus on controlling sediment mobilisation, managing temporary drainage arrangements, and preventing accidental pollution. The construction of the proposed development includes the construction of the drainage system. There will be no discharge of storm water from the site during the construction phase, all storm water generated will be drained to and contained within the lined storm water lagoon for containment, settlement and tankering off site as required. Monitoring of the storm water within the lagoon will be carried out to determine its suitability to be reused as a construction water supply.

A temporary drainage treatment train will be implemented throughout the construction phase. Surface runoff generated within disturbed areas of the site will be collected and conveyed through a sequence of treatment measures comprising temporary interceptor drains, check dams, sediment traps, the stormwater lagoon forebay and the stormwater lagoon settlement zone prior to storage within the lagoon. The treatment train can be summarised as follows:

Runoff → Temporary Interceptor Drains → Check Dams → Sediment Traps → Lagoon Forebay → Lagoon Settlement Zone

This treatment sequence will progressively reduce flow velocities, promote sediment settlement, capture suspended solids at multiple stages and minimise the risk of polluted runoff entering the stormwater lagoon. The lagoon will provide the final stage of sediment settlement and water quality management prior to reuse on site or removal by tanker where required.



The following measures will also be implemented during construction:

- Phased construction of drainage infrastructure to ensure that permanent drainage and treatment features are operational at the earliest practicable stage. The stormwater lagoon will be constructed in advance of earthworks.
- Installation of temporary sediment control measures, including silt fences, sediment traps, settlement areas, and temporary interceptor drains with check dams.
- Protection of the stormwater lagoon from uncontrolled inflows and excessive sediment loading during early construction phases through the use of temporary diversion ditches, check dams and sediment-control measures.
- Discharge from the stormwater lagoon to sealed tankers for off-site treatment and disposal where water quality monitoring identifies contamination or where excess volumes require removal.
- Water will be treated through a sequence of drainage elements, including the temporary and permanent sediment-control measures described above. The lagoon will provide additional treatment through settlement within the forebay and settlement zone.
- All temporary drainage measures, including interceptor drains, check dams, sediment traps, settlement areas and the stormwater lagoon, will be inspected regularly and following significant rainfall events. Accumulated sediment will be removed as required to maintain the effectiveness of the drainage system and preserve available storage capacity.
- Construction activities will be planned with consideration of forecast weather conditions. Activities with an increased risk of sediment mobilisation may be modified, suspended or rescheduled during periods of prolonged or intense rainfall where necessary to minimise pollution risk.
- Management of excavations and exposed soils to minimise erosion, including temporary stabilisation where required.
- Temporary stockpiles of soil and excavated material will be located away from drainage features where practicable and managed to minimise erosion and sediment runoff. Additional protection measures will be implemented where required during periods of prolonged or intense rainfall.
- Storage of fuels, oils and chemicals in bunded, sealed and designated areas, with refuelling restricted to controlled locations.
- Provision of spill kits and training of construction personnel in spill response procedures.
- An emergency pollution response procedure will be implemented on site. In the event of a spill, leak or other pollution incident, the source will be isolated immediately, contaminated material will be contained and recovered, and any contaminated water will be removed from site by an authorised contractor for treatment and disposal at an appropriately authorised facility.
- Strict control of concrete works to prevent alkaline runoff. All concrete wash out water will be collected in a dedicated tank and transported off Site by a permitted contractor to an authorised private WWTP.
- No direct discharge of stormwater to groundwater, surface water bodies or off-site drainage systems will occur during the construction phase.
- Protection of watercourse crossings along the gas pipeline route, with works undertaken at existing culverts or bridges in accordance with Inland Fisheries Ireland (IFI) guidance and OPW.



1.4.15.2 Horizontal Directional Drilling (HDD)

Specific mitigation measures will also be implemented during Horizontal Directional Drilling (HDD) activities associated with:

- Crossing ID B2-The River Barrow crossing.
- Crossing ID B5 and B6 Land Drains
- Crossing ID B7- M9 Motorway crossing.

The HDD crossings have been selected as mitigation-by-design measures to avoid direct in-stream works and minimise disturbance to sensitive hydrological and ecological receptors. GNI will prepare a method statement for HDD at each of the proposed locations. The method statement will define the sequence of events and shall incorporate environmental controls.

The following mitigation measures will be implemented during HDD works:

- The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance.
- There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone.
- HDD Work Areas will incorporate bunded storage and containment measures to prevent accidental discharge of contaminants to surrounding lands, drains or watercourses. Refuelling activities associated with HDD works will only occur in designated areas with appropriate spill containment measures.
- Spill kits and emergency response equipment will be available at all HDD Work Areas throughout the construction phase.
- HDD drilling fluid storage tanks and associated infrastructure will be located within contained areas with secondary containment measures.
- Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before being taken off-site.
- Daily inspections of HDD Work Areas, drilling fluid systems and containment infrastructure will be undertaken during active drilling operations.
- Before any ground works are undertaken, double silt fencing will be placed upslope of the watercourse channel along the 15m buffer zone boundary.
- Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the watercourse.
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered.
- The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages.
- Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area.
- If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works). This will be completed using a shallow swale and sump down slope of the disturbed ground and water will be pumped to a proposed percolation area at least 50 m from the watercourse.



- The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing.
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain.
- Works shall not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse.
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied.
- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion.
- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated.
- There will be no batching or storage of cement allowed at the watercourse crossing.
- There will be no refuelling allowed within 100 m of the watercourse crossing.
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.
- All HDD Work Areas associated with the River Barrow crossing will remain outside the River Barrow and River Nore SAC boundary, mapped flood extents and the river corridor itself.
- A minimum stand-off distance of 10 m will be maintained between HDD Work Areas and the SAC boundary and Flood Zone B/extreme flood extents.
- No direct in-stream works will be undertaken within the River Barrow, the other streams or associated drainage channels.
- Bentonite-based drilling fluids will be managed within a closed-loop containment system to prevent uncontrolled discharge to the environment.
- Measures will be implemented to monitor and manage the risk of inadvertent drilling fluid return ("frac-out").
- In the event of an accidental drilling fluid release, works will cease immediately and emergency containment and clean-up procedures will be implemented.
- Surface water runoff generated within HDD Work Areas will be managed through temporary drainage controls and sediment management measures.
- Excavated materials generated during HDD activities will be stored away from watercourses and protected from rainfall runoff generation.
- Reinstatement works will be undertaken following completion of HDD activities to restore disturbed areas.
- HDD works beneath the River Barrow and the other streams will be undertaken in accordance with relevant Inland Fisheries Ireland guidance documents and best practice measures for works adjacent to watercourses.



- Mechanical Stabilisation will be required where HDD is proposed in gravelly, non-cohesive subsoils. This will be managed by installing steel conductor casing through the shallow gravels to bypass the cover zone (i.e. the material above the bore depth) where fluid would be most likely to breach the surface. This casing acts as a physical barrier, protecting the riverbed from pressure spikes and ensuring returns are directed back to the entry pit rather than into the sensitive substrate. Note that mechanical stabilisation may only be needed on the River Barrow crossing.

Fracture Blow-out (Frac-out) Prevention and Contingency Plan:

- The drilling fluid/bentonite will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used). Biocompatible Drilling Fluids (European Standards) utilize NSF/ANSI Standard 60 or CE-marked additives which are high-performance, biodegradable viscosifiers and will be used to provide the necessary "gel strength" to suspend heavy gravel cuttings. Fluid loss will be controlled using biodegradable sealants, which create a thin, flexible filter cake on the borehole wall to prevent fluid migration into the aquifer. These products break down naturally, ensuring no permanent alteration to the hydraulic conductivity of the aquifer.

Real-time annular pressure monitoring will be mandatory. By keeping pressures below the Delft Equation limits, operators can detect lost circulation before it becomes a surface fracture blow-out (frac-out release of drilling fluid through cracks/fissures/weaknesses in the substrate).

- The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage;
- One or more lines of silt fencing will be placed between the works area and the adjacent river;
- Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility;
- Adequately sized skips will be used where temporary storage of arisings are required;
- The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;
- This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped;
- Any frac-out material will be contained and removed off-site;
- The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and,
- If the risk of further frac-out is high, a new drilling alignment will be sought at the crossing location.

1.4.15.3 Control and Management of Water / Groundwater Protection

There will be no direct discharge to groundwater during the construction phase of the proposed development.

There may be a temporary increase in the exposure of the underlying shallow groundwater during excavation works, in which case:

- Storm water runoff will be prevented from entering open excavations with sandbags or other approved methods proposed by the appointed contractor.



- The appointed contractor will ensure that machinery does not enter the groundwater if encountered during construction.
- Where dewatering of shallow groundwater is required or where storm water runoff must be pumped from the excavations, water will be managed in accordance with best practice standards (i.e. groundwater control design and practice (CIRIA, 2016), this CEMP and regulatory consents to minimise the potential effect on the local groundwater flow regime of the underlying aquifer.
- Excess water will be pumped to the permanent storm water lagoon location to be stored before being tankered off-site.
- All sanitary foul water will be tankered off site for treatment at a private wastewater treatment plant.
- Given the vulnerability of the underlying groundwater at the site, the construction methodology will adhere to guidance (CIRIA, 2023) (BSI, 2026) or similar best practices.
- The construction method will include procedures to prevent any potential effect on water quality. This includes measures to stop surface runoff or other fluids from entering open excavations and the surrounding formation.
- When lubricants, drilling fluids, or additives are required, the contractor will use biodegradable, and non-hazardous compounds under controlled conditions.
- Unauthorised discharge of water (groundwater / surface water runoff) to ground, drains or watercourses will not be permitted.
- Stockpiles of loose materials pending re-use onsite will be sealed/covered for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains along the gas pipeline route. To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff.
- Where required, silt fences will be erected at the toe of stockpiles to prevent run-off. The silt fences will be monitored daily by the appointed contractor, and silt will be removed as required.
- Where cast-in-place concrete is required (i.e., building foundations), all work will be carried out in dry conditions.
- All ready-mixed concrete will be delivered to the Site by truck.
- Concrete batching will take place offsite, wash down and wash out of concrete trucks will take place into a container located within a controlled bunded area which will then be emptied into a skip for appropriate compliant removal offsite in accordance with all relevant waste management legislation.
- Where concrete shuttering is used, any excess concrete is not to be disposed of onsite. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

The proposed pipeline route and internal cable trenches could provide preferential pathways for groundwater and contaminant movement. As such;

- Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods, to avoid acting as a conduit for storm water flows.
- Clay plugs (or other low permeability material) will be installed at intervals along the trench to stop/inhibit water movement



A regular review of weather forecast will take place, insofar as possible, ground excavation works will be scheduled during period of dry weather to minimise potential for silt laden runoff into the storm water management system.

Handling of Fuels, Chemicals, and Materials

- Fuel storage areas and refuelling points will be bunded and located away from storm water drainage and features.
- The bunds will comply with the Environmental Protection Agency guidelines (EPA, 2013).
- All tank and drum storage areas will be bunded to a volume not less than the greater of the following:
 - 110% of the capacity of the largest tank or drum within the bunded area or
 - 25% of the total volume of substance that could be stored within the bunded area
- Fuel will be transported to the site in dedicated mobile units based on supply requirements.
- A dedicated fuel filling point will be established onsite within the compound, where all equipment will be brought for refuelling.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition.
- Any equipment not meeting the required standard will not be permitted for use within the proposed development Site.
- Only emergency breakdown maintenance will be carried out on-site.
- Drip trays and spill kits will be available on-site to ensure that any spills from vehicles are contained and removed off-site.
- Spill kits will be made available onsite and identified with signage for use in the event of an environmental spill or leak.
- A spill kit will be kept in close proximity to the fuel storage area for use in the event of any incident during refuelling or maintenance works. Heavy machinery used on the Site will also be equipped with its own spill kit.
- Where portable generators or similar fuel containing equipment is used during the construction phase of the proposed development, they will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times
- Good housekeeping (e.g., site clean-ups, use of disposal bins, etc.) will be implemented on the site.

1.4.15.4 Importation of Aggregates and Materials

Contract and procurement procedures will ensure that all imported aggregates and materials required for the construction phase of the proposed development will be sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations. The importation of aggregates and materials will be subject to management and control procedures which will include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the proposed development. Therefore, any unsuitable material will be identified prior to unloading / placement onsite.



1.4.15.5 Reuse of Soils

Soil and subsoil materials to be reused within the proposed development (i.e., for landscaping on site) will be subject to an assessment of their suitability of for use in accordance with engineering and environmental specification for the proposed development.

Soil excavated from trenches along the proposed gas pipeline route will be taken to a licenced or permitted facility for disposal or recycling where required. If feasible, the upper layers of tarmac and asphalt will be excavated separately to the lower engineered fill layers. The lower engineered fill layers will be reused. The tarmac/asphalt layers will be taken to a licenced facility for disposal or recycling.

All temporary cuts/excavations will be carried out such that they are stable or adequately supported. Gravel fill will be used to provide additional support to temporary cuts/excavations where appropriate. Unstable temporary cuts/excavations will not be left unsupported. Where appropriate and necessary, temporary cuts and excavations will be protected against the ingress of water or erosion.

1.4.15.6 Protection of Soils

The extent of the required work area and the bulk excavation at the site will be minimised to prevent unnecessary excavation of soil and tracking over soil and subsoil outside of the excavation work areas as a result of compaction and rutting from construction traffic.

Dedicated internal haul routes will be established and maintained by the contractor to prevent tracking over unprotected soils. Movement of vehicle onsite will be restricted during and after periods of heavy rainfall.

1.4.15.7 Export of Soil and Waste

Where required, surplus materials or materials not suitable for reuse will require removal offsite in accordance with the procedures outlined in the RWMP and all statutory legislation. It will be the Contractor's responsibility to either; obtain a waste collection permit or, to engage specialist waste service contractors who will possess the requisite authorisations, for the collection and movement of waste off-site.

The re-use of soil and subsoil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus material not suitable for re-use as a by-product and other waste materials arising from the construction phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential effects at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

Materials and waste will be documented prior to leaving the site and pipeline route. All information will be entered into a waste management register kept on the site.



1.4.15.8 Control and Management of Stockpiles

Stockpiles of loose materials pending re-use onsite will be sealed/covered for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains along the gas pipeline route. To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff. Where required, silt fences will be erected at the toe of stockpiles to prevent run-off. The silt fences will be monitored daily by the appointed contractor, and silt will be removed as required. In accordance with guidelines (Inland Fisheries Ireland, 2016), stockpiles will not be allowed within 30m of any open watercourses or drainage.

1.4.15.9 Concrete Works

The cementitious grout and other concrete works during the construction phase will avoid any contamination of ground or groundwater through the use of appropriate design and methods implemented by the Contractor and in accordance with this CEMP and relevant industry standards.

Where cast-in-place concrete is required (i.e., building foundations), all work will be carried out in dry conditions and be effectively isolated from any groundwater.

All ready-mixed concrete will be delivered to the Site by truck. Concrete batching will take place offsite, wash down and wash out of concrete trucks will take place into a container located within a controlled bunded area which will then be emptied into a skip for appropriate compliant removal offsite in accordance with all relevant waste management legislation. Where concrete shuttering is used, any excess concrete is not to be disposed of onsite. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

1.4.15.10 Handling of Fuels, Chemicals and Materials

The Contractor's construction compound will be located on site for the duration of the project and shall primarily consist of site offices and associated welfare facilities, car parking facilities, materials drop-off and storage areas and set down areas for HGVs.

Fuel will be transported to the site in dedicated mobile units based on supply requirements. Fuelling and lubrication of equipment will be conducted in accordance with the procedures outlined in this CEMP, within a designated area of the compound, clearly marked and situated away from any drains. A dedicated fuel filling point will be established onsite within the compound, where all equipment will be brought for refuelling.

Fuel storage areas and refuelling points will be bunded and located away from storm water drainage and features. The bunds will comply with the Environmental Protection Agency guidelines (EPA, 2013). All tank and drum storage areas will be bunded to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area or
- 25% of the total volume of substance that could be stored within the bunded area

The appointed contractor will maintain an emergency response action plan and emergency procedures will be developed by the appointed contractor in advance of any works commencing. Construction staff will be familiar with the emergency response plan.



Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the proposed development Site. Only emergency breakdown maintenance will be carried out on-site. Drip trays and spill kits will be available on-site to ensure that any spills from vehicles are contained and removed off-site.

Spill kits will be made available onsite and identified with signage for use in the event of an environmental spill or leak. A spill kit will be kept in close proximity to the fuel storage area for use in the event of any incident during refuelling or maintenance works. Heavy machinery used on the Site will also be equipped with its own spill kit.

Where portable generators or similar fuel containing equipment is used during the construction phase of the proposed development, they will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times

In addition, good housekeeping (e.g., site clean-ups, use of disposal bins, etc.) will be implemented on the site.

1.4.16 Material Assets

All existing utilities will be identified, protected, and managed to avoid disruption during construction. Temporary utility requirements will be provided without impacting existing services.

Measures will include:

- Undertake utility mapping and verification prior to excavation (records review, utility surveys, and permit-to-dig system).
- Clearly mark and protect all known services on site.
- Maintain ongoing liaison with utility providers (e.g. ESB, Irish Water, telecoms).
- Implement a permit-to-work/permit-to-dig system for all ground-breaking activities.
- Provide temporary service connections (power, water, drainage) through planned arrangements to avoid overloading or interfering with existing infrastructure.
- Prepare and implement an Emergency Response Procedure for accidental service strikes.

Works interfacing with the proposed gas pipeline will comply fully with Gas Networks Ireland (GNI) specifications and requirements. Measures will include:

- Adherence to GNI standards for:
 - Service protection measures
 - Safe separation distances
 - Road crossing techniques
 - Reinstatement of surfaces and verges
- Coordinate all works with Gas Networks Ireland as the statutory undertaker.
- Ensure that any works affecting the pipeline route are subject to GNI approval and permitting.
- Maintain exclusion zones and supervision when working near gas infrastructure.



1.4.17 Cultural Heritage

The ground levels within the proposed development site have been reduced down into natural subsoil levels as a result of quarrying works, which included a number of phases of archaeological monitoring of advance topsoil stripping. It is concluded that the quarried area within the boundary of the proposed development site does not retain the potential to contain any unrecorded archaeological remains and no mitigation measures are, therefore, required within the site.

Key cultural heritage mitigation measures for the gas pipeline route include:

- Appointment of a suitably qualified and National Monument Service licensed archaeologist to oversee relevant works.
- Constant archaeological monitoring of high-sensitivity sections of the pipeline route, including supervised stripping and inspection prior to trenching.
- The constant monitoring of ground works within this area will be carried out between Chainages 1100.0m to 1550.0m.
- The constant monitoring of ground works within this area will be carried out between Chainages 7100.0m to 7500.0m.
- Archaeological watching brief along remaining sections of the route, with monitoring intensity adjusted based on risk.
- Implementation of a stop-work procedure in the event of archaeological discovery, including notification to the NMS and agreement of appropriate mitigation (preservation in situ or by record).
- Protection of architectural heritage features (including protected structures and water pump) through clearly defined exclusion zones and no-entry areas.
- Inclusion of cultural heritage constraints and procedures in site inductions for all personnel.
- Maintenance of archaeological records and reporting in accordance with licence requirements.

1.4.18 Landscape and Visual

Construction phase effects on visual amenity and vegetation will be minimised through the implementation of good site management practices and specific protection measures. These measures will ensure that the site is well organised, visually contained, and that retained trees and hedgerows are safeguarded in accordance with recognised standards.

Key mitigation measures include:

- Erection of perimeter hoarding/fencing to contain construction activities and reduce visual impact.
- Implementation of good housekeeping practices, including keeping the site tidy and free of waste, debris, and excess materials.
- Control of dust, mud, and dirt to minimise impacts on surrounding areas and public roads.
- Careful storage of materials and siting of compounds to avoid unnecessary visual clutter and environmental disturbance.
- Management of deliveries, traffic, and on-site parking to ensure safe and orderly site operation.
- Sensitive site lighting design and control to minimise light spill and visual intrusion.



- Protection of retained trees and hedgerows in accordance with BS5837:2012 – Trees in Relation to Design, Demolition and Construction - Recommendations (British Standards, 2012).
- Installation of tree protection fencing and exclusion zones prior to construction, with no storage of materials, excavation, or trafficking permitted within these areas.

1.5 Resource and Waste Management Plan

It will be the objective of the Applicant in conjunction with the appointed contractor to prevent, reduce, reuse, recycle and recover as much of the waste generated on site as practicable (in accordance with Waste Hierarchy Principles) and to ensure the appropriate transport and management of residual waste off site. This is in line with the National Waste Management Plan for a Circular Economy 2024-2030, and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended.

1.5.1 Assignment of Responsible Personnel

It will be the responsibility of the contractor for the construction works (when appointed) to nominate a suitable Resource Manager who will have overall responsibility for the management of waste. The Resource Manager will have responsibility to instruct all site personnel including sub-contractors to comply with on-site requirements.

1.5.2 Waste Generated

Waste materials generated on-site during the construction of the proposed development will be handled and managed in accordance with the requirements of the Waste Management Act 1996, as amended, and associated Regulations. All waste will be stored in segregated waste containers at the temporary construction compound and collected separately by appropriately licensed waste contractors. All waste materials transferred off-site for disposal or recovery will be taken only to suitably permitted/licensed waste facilities.

The re-use of soil and subsoil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus material not suitable for re-use as a by-product and other waste materials arising from the construction phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential effects at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

Materials and waste will be documented prior to leaving the site and pipeline route. All information will be entered into a waste management register kept on the site.



1.5.3 Waste Management During the Construction Phase

Any waste generated during construction will be collected, source separated and stored in dedicated receptacles at the temporary compound. Typical categories of waste generated during the construction of this type of project:

- Food waste for workers
- Construction and demolition waste
- Waste oil / hydrocarbons
- Paper/ cardboard / plastic wrapping
- Timber
- Sanitary waste

Where waste is generated, every effort will be made to separate and segregate the different waste streams, insofar as practicable.

1.5.4 Resource and Waste Management Plan

Materials and waste generated at the proposed development will be managed in accordance with a Resource and Waste Management Plan (RWMP) prepared for the construction phase of the proposed development. The RWMP is included in Appendix A. This will be finalised by the appointed contractor.

The RWMP is designed to maximise recycling, reuse, and recovery of waste, prioritizing diversion from landfills whenever possible. The RWMP will align with the EPA Waste Hierarchy Principles by effectively managing materials to reduce unnecessary use of new products, optimize the use of secondary materials, and promote on site reuse to prevent waste generation. Additionally, the RWMP will provide guidance for the appropriate collection and transport of material and waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and / or water).

1.5.5 Training

Copies of the CEMP and RWMP will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of these plans and informed of the responsibilities that fall upon them as a consequence of its provisions.

It will be the responsibility of the contractors' appointed Resource Manager to ensure that all personnel are made aware of their responsibilities under the plan via a toolbox talk or otherwise.

1.6 Biodiversity Enhancement Management Plan

Refer to the BEMP included as Appendix 11.4 in Volume 3 of this EIAR.



1.7 Dust Management Plan

This Dust Management Plan (DMP) outlines the sources of dust during the works, identifies measures to minimise dust during the works and the complaints procedure for dust. The following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (Dublin City Council, 2018) (Dun Laoghaire Rathdown County Council, 2022) the UK (IAQM, 2024), (BRE, 2003), (The Scottish Office, 1996), (UK ODPM) and the USA (USEPA, 1997).

Table 1-3: Construction Dust Management Measures

Mitigation Type	Location	Description of Mitigation or Monitoring Measures
Communications	Construction Compound/Site Boundary and throughout (as required)	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. Display the head or regional office contact information
Construction Works Area Management	Construction Compound/Site Boundary and throughout (as required)	Storage areas/containers with loose dust-generating material will be covered to prevent wind whipping. Cutting, grinding or sawing equipment will be fitted with or used in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. Equipment will be readily available in the construction works areas site to clean any dry spillages. Spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.
Site Management	Construction Compound/Site Boundary and throughout (as required)	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
Operating Vehicles / Machinery	Construction Compound/Site Boundary and throughout (as required)	All vehicles engines will be switched off when stationary – no idling vehicles. Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. Impose and signpost a maximum-speed-limit of 25 kmph on surfaced and 15 kmph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate) Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)



Mitigation Type	Location	Description of Mitigation or Monitoring Measures
Construction Activities	Areas where construction is required	Avoid scabbling (roughening of concrete surfaces) if possible. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.
Measures specific to trackout (transport of dust and dirt from the construction works areas onto the public road network)	Construction Compound/Site Boundary and throughout (as required)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Record all inspections of haul routes and any subsequent action in a site log book. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. Access gates to be located at least 10 m from receptors where possible.
Monitoring	Construction Compound/Site Boundary and throughout (as required)	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.



2. TRAFFIC MANAGEMENT PLAN

The transport of materials on and off site will give rise to increased traffic and associated impacts. However, due to the very nature of construction these impacts will be temporary.

Public perception of the construction phase will be influenced primarily from the impact of traffic movements. The degree of traffic disturbance caused by the construction phase depends on the volume of material imported / exported, the associated civil engineering requirements and the length of the construction period.

Construction traffic will require regular access to the site at varying times throughout the construction phase.

Traffic management procedures to manage traffic effectively on site and in the immediate vicinity of the development, to ensure the continued movement of traffic on the public roads and to minimise disturbance during the transportation of materials.

There will be ample capacity on local roads to carry the deliveries associated with the temporary short-term and relatively limited construction activities associated with the proposed development.

This additional traffic will include:

- Construction worker vehicles.
- Delivery vehicles carrying construction materials and equipment.

The following measures will be implemented to manage the impact of traffic on the receiving environment during the construction phase:

- Advance notification to local residents, landowners, businesses, emergency services, and public transport operators regarding construction activities, road closures, and diversions.
- Provision of clear communication channels, including site notices, updates, and a dedicated contact point/community liaison officer.
- Maintenance of local and emergency access at all times, with clearly defined temporary access routes where required.
- Implementation of agreed construction traffic routes (haul routes) avoiding sensitive receptors and unsuitable roads.
- Provision of approved diversion routes with clear directional signage where temporary closures are required.
- Installation of temporary traffic management measures, including warning signage, diversion signage, temporary signals, stop/go systems, and lane closures where necessary.
- Introduction of temporary speed limits and traffic calming measures to ensure road user safety.
- Scheduling of construction traffic and deliveries outside peak hours where practicable to minimise congestion.
- Designation of on-site loading/unloading areas and worker parking to prevent obstruction of public roads.
- Implementation of wheel washing and road cleaning measures to prevent mud and debris on the public road network.



- Enforcement of a construction vehicle driver code of conduct, including safe driving practices and avoidance of unnecessary idling.
- Provision of safe and clearly marked pedestrian and cyclist routes, including temporary footpaths, crossings, and segregation from construction traffic.
- Ongoing monitoring of traffic impacts, with procedures for recording, managing, and responding to complaints.
- Regular review and updating of the Traffic Management Plan as construction progresses.
- Implementation of measures to reduce traffic-related environmental impacts, including dust and noise control.
- Establishment of incident and emergency response procedures, including coordination with emergency services in the event of accidents or disruption.
- Compliance with all relevant local authority requirements, permits, and road authority conditions.
- Coordination with other nearby developments or utility works to minimise cumulative traffic impacts.
- Public roads shall be kept free of mud, dust, spillages and debris from the site, construction plant or haulage vehicles. Periodic road sweeping, as necessary, shall be put in place at the site entry/exit points.
- The roads at the site entrance, shall be kept free of dust, spillages and debris. Regular watering of the access road will take place as necessary and the applicant will liaise with adjacent sites to avoid undue or unnecessary truck movements during un-social hours.

2.1.1 Site Access

Access to the construction site will only be to authorised persons. During afterhours, security will be employed by the main contractors to ensure no unauthorised access.

The proposed construction entrance/exit shall be located along the L3045 local road. This local road will be accessed via the former N9 national primary road, now the R448, a high-quality dual carriageway situated less than 100 m from the first site entrance and less than 200 m from the main site entrance, both on the L3045. The R448 is linked to the M9 motorway, which is 1.2 km from the proposed site entrance (420 m north, as the crow flies). Considering the rural location of the site, impacts to traffic along the local roads resulting from the movement of construction traffic should be low.

The contractor is required to ensure the provision of adequate guarding and lighting. Traffic signs should be placed in advance of the works area on both sides to ensure adequate warning to the general public and maintained, when necessary, they should be operated as reasonably required for the safe guidance or direction of the public with regard to the needs of people with disabilities. The main contractor will comply with Regulation 97 of the Safety, Health, and Welfare at Work (Construction) Regulations 2013.

2.1.1.1 *Deliveries to the Site*

Material deliveries to the site will be coordinated as to avoid peak traffic hours associated with the neighbouring estates which could be expected around regular commuting times in the morning and evening.

2.1.2 Traffic Management Speed Limits

All contractors/sub-contractors will be instructed to adhere to the local legal speed limits during induction and training.



Vehicular movements in sensitive locations, such as local community areas, will be restricted to 50 km/h. This is of particular importance during installation and construction of the gas pipeline. In residential areas, a speed limit of 30 km/h will be implemented and will apply only to construction traffic, not to general traffic.

2.1.3 Road Condition

The following additional measures will be taken to ensure that the site, public roads and surroundings are kept to a high standard of cleanliness:

- Wheel washing will be established for all site traffic entering and leaving the proposed site to prevent carry of soil or solids off-site.
- A regular program of site tidying will be established to ensure a safe and orderly site.
- Food waste will be strictly controlled on all parts of the site.
- Mud spillages on roads and footpaths outside the site will be cleaned regularly and will not be allowed to accumulate.

2.1.4 Enforcement

The main contractors shall ensure that:

- All loads leaving the site shall be inspected and, where necessary, securely covered to minimise dust and material loss during transport
- All waste or loose materials shall be transported in:
 - Covered vehicles with secured tarpaulins, or
 - Fully enclosed units, as appropriate
- Measures shall be taken to prevent tracking of mud and debris onto the public road, including:
 - Provision of wheel washing facilities, where required
 - Regular visual inspection of haul routes
- A truck-mounted vacuum mechanical road sweeper shall be deployed on haul routes as required to maintain road cleanliness
- Any material deposited on the public road shall be removed promptly
- Construction traffic shall adhere to designated haul routes and avoid sensitive areas where practicable
- Drivers shall comply with a code of conduct, including speed limits, safe driving practices, and avoidance of unnecessary idling.

2.1.5 Emergency Procedures

The main contractor shall ensure that unobstructed access is provided to all emergency vehicles along all routes and site accesses. The contractor shall provide to the local authorities and emergency services the contact details of the contractor's personnel responsible for construction traffic management. Emergency response procedures will be followed on site in case of an emergency.



2.1.6 Communication

The main contractor shall ensure that close communication with Carlow County Council and emergency services is maintained throughout the construction phase.



3. SAFETY AND HEALTH MANAGEMENT PLAN

3.1 Introduction

This Safety and Health Management Plan (SHMP) defines the work practices, procedures and management responsibilities relating to the management of health and safety during the design, construction and operation of the proposed development and shall be read in conjunction with the Preliminary Safety & Health Plan prepared for the project by the Project Supervisor for the Design Process. The Safety and Health Management Plan shall be finalised in accordance with this plan following the appointment of the contractor for the construction works.

This SHMP describes how the contractor for the construction works will implement a site safety management system (SMS) on this project to meet the specified contractual, regulatory and statutory requirements, environmental impact statement mitigation measures and planning conditions. It is the contractor's responsibility to implement an effective safety management system to ensure that the developer's safety requirements for the construction of this project are met.

All site personnel will be required to be familiar with the requirements of the safety management plan as related to their role on site. The plan describes the project organisation and sets out the health and safety procedures that will be adopted on site:

- The Safety and Health Plan is a controlled document and will be reviewed and revised as necessary.
- A copy of the Safety and Health Plan will be located on/near the site H&S notice board.
- All employees, suppliers and contractors whose work activities cause/could cause impacts on the environment will be made aware of the SHMP and its contents.

3.2 Project Obligations with Respect to Health and Safety

The construction of the proposed development will impose numerous safety management obligations on the developer, designer and contractor. These obligations are set out below. The contractor for the construction works and all of its sub-contractors are to ensure that they are fully aware of and in compliance with these safety obligations.

3.2.1 Statutory Obligations

The Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 place a responsibility on the Developer (In this case the Applicant) as the "Client", the Designer, the Project Supervisors and the Contractor.

The Developer/ Employer must:

- Appoint a competent and adequately resourced Project Supervisor for the Design Phase (PSDP).
- Appoint a competent and adequately resourced Supervisor for the Construction Stage (PSCS).
- Be satisfied that each designer and contractor appointed has adequate training, knowledge, experience and resources for the work to be performed.
- Co-operate with the project supervisor and supply necessary information.
- Keep and make available the safety file for the completed structure.



- Provide a copy of the safety and health plan prepared by the PSDP to every person tendering for the project.
- Notify the Authority of the appointment of the PSDP.

Designers must:

- Identify any hazards that their design may present during construction and subsequent maintenance.
- Eliminate the hazards or reduce the risk.
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan.
- Co-operate with other designers and the PSDP or PSCP.
- Take account of any existing safety and health plan or safety file.
- Comply with directions issued by the PSDP or PSCS.

The PSDP must:

- Identify hazards arising from the design or from the technical, organisational, planning or time related aspects of the project.
- Where possible, eliminate the hazards or reduce the risks.
- Communicate necessary control measure, design assumptions or remaining risks to the PSCS so they can be dealt with in the safety and health plan.
- Ensure that the work of designers is coordinated to ensure safety.
- Organise co-operation between designers.
- Prepare a written safety and health plan for any project and deliver it to the client prior to tender.
- Prepare a safety file for the completed structure and give it to the client.

The PSCS must:

- Co-ordinate the identification of hazards, the elimination of the hazards or the reduction of risks during construction.
- Develop the Safety and Health Plan initially prepared by the PSDP before construction commences.
- Co-ordinate the implementation of the construction regulations by contractors.
- Organise cooperation between contractors and the provision of information.
- Co-ordinate the reporting of accidents to the Authority.
- Notify the Authority before construction commences.
- Provide information to the site safety representative.
- Co-ordinate the checking of stage working procedures.
- Co-ordinate measures to restrict entry on to the site.
- Co-ordinate the provision and maintenance of welfare facilities.



- Co-ordinate arrangements to ensure that craft, general construction workers and security workers have a Safety Awareness card, e.g. Safe Pass and a Construction Skills card where required.
- Co-ordinate the appointment of a site safety representative where there are more than 20 persons on site.
- Appoint a safety adviser where there are more than 100 on site.
- Provide all necessary safety file information to the PSDP.
- Monitor the compliance of contractors and others and take corrective action where necessary.
- Notify the Authority and the client of non-compliance with any written directions issued.

The Contractor must:

- Co-operate with the PSCS.
- Promptly provide the PSCS with information required for the safety file.
- Comply with directions of the project supervisors.
- Report accidents to the Authority and to the PSCS where an employee cannot perform their normal work for more than 3 days.
- Comply with site rules and the safety and health plan and ensure that your employees comply.
- Identify hazards, eliminate the hazards or reduce risks during construction.
- Facilitate the site safety representative.
- Ensure that relevant workers have a safety awareness card and a construction skills card where required.
- Provide workers with site specific induction.
- Appoint a safety officer where there are more than 20 on site or 30 employed.
- Consult workers with site specific induction.
- Monitor compliance and take corrective action.

Consequently, at all stages of the project there are statutory requirements for the management of safety, health and welfare of all involved in or affected by the development. As previously outlined, this CEMP and specifically the Safety and Health Management Plan addresses key construction management issues associated with the proposed development. This plan will be developed further at the construction stage, on the appointment of the Contractor for the main construction works.

3.2.2 The Preliminary Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013, a Preliminary Safety & Health Plan will be required as part of the design process. This plan will be further developed by the PSCS on appointment and maintained as a live document during construction and commissioning of the proposed development.



The safety and health plan is required to include the following information:

- A general description of the project.
- Details of other work activities taking place on site.
- Works involving particular risks.
- The timescale for the project and the basis on which the time frame was established.
- Conclusions drawn by designers and the PSDP having taken into account the General Principles of Prevention and any relevant Safety and Health Plan or Safety File; and
- The location of electricity, water and sewage connections so as to facilitate early establishment of welfare facilities.

In accordance with the PSDP's procedures, the Preliminary Safety & Health Plan for the proposed development should include the following sections and subsections to ensure that the PSCS is aware of the health and safety issues at tender stage and enable them to price accordingly:

Preamble:

- 1 General Project Information:
 - 1.1 Title
 - 1.2 Description of Project
 - 1.3 Employer
 - 1.4 Designers/Other Consultants
 - 1.5 Project Supervisor Design Process
 - 1.6 Drawings, Specifications and Other Documents
 - 1.7 Intended Contract Commencement Date
 - 1.8 Intended Contract Completion Date
 - 1.9 Basis for Contract Duration
 - 1.10 Restrictions on Working Hours
 - 1.11 Notification of Project
 - 1.12 Termination of the PSCS Appointment
- 2 The Existing Environment:
 - 2.1 Site Location
 - 2.2 Relevant Adjoining Land Uses
 - 2.3 Site Restrictions
 - 2.4 Restrictions on Access
 - 2.5 Hazardous Area Classification
 - 2.6 Existing Services
 - 2.7 Ground Conditions
 - 2.8 Existing Hazards
 - 2.9 Liaison with Statutory Bodies



- 3 Other Work Activities:
 - 3.1 Other Contracts Which May Affect Work
 - 3.2 Occupation of Site
 - 3.3 Building Activities
 - 3.4 Other Work Activities
 - 3.5 Emergency Procedures in Place on Site
- 4 Particular and Residual Risks:
 - 4.1 Works Which Puts Persons at Work at Risk
 - 4.2 Work Which Puts Persons at Risk from Chemical or Biological Substances
 - 4.3 Work with Ionising Radiation
 - 4.4 Work near High Voltage Power Lines
 - 4.5 Work Exposing Persons at Work to the Risk of Drowning
 - 4.6 Work on Wells, Underground Earthworks and Tunnels
 - 4.7 Work Carried Out by Divers at Work Having a System of Air Supply
 - 4.8 Work Carried Out in a Caisson with a Compressed Air Atmosphere
 - 4.9 Work Involving the Use of Explosives
 - 4.10 Work Involving the Assembly or Dismantling of Heavy Prefabricated Components
 - 4.11 Work Involving Hazardous Material
 - 4.12 Residual Risks
- 5 Additional Information:
 - 5.1 Existing Documents
 - 5.2 Site Possession
 - 5.3 Site Rules
 - 5.4 Site Specific Safety Objectives
 - 5.5 Phasing of Works
 - 5.6 Permits/Authorisation Required
 - 5.7 Maintenance
 - 5.8 Continuing Liaison
 - 5.9 Specific Recommendations
- 6 Information Required for Safety File:
 - 6.1 Information Required for Safety File from PSCS



3.2.3 The Management of Health and Safety during the Construction Phase

The selection criteria for the Contractor for the works will be based on the ability to construct the works in a manner that will not endanger the safety, health and welfare of any parties and competence to fulfil the role of PSCS.

The contract will be awarded on the basis of assessment of the candidates against relevant health and safety criteria including experience of similar projects, knowledge of the construction processes involved and training of their management and staff who will be involved in carrying out the works.

3.2.4 The Construction Stage Safety and Health Plan

In accordance with the requirements of the Safety, Health & Welfare at Work (Construction) Regulations 2013, the preliminary Safety & Health Plan prepared by the PSDP will be further developed by the PSCS before the commencement of the construction work and updated on a regular basis during the construction phase of the project.

The document will include the following sections and subsections to ensure the management of health and safety during the construction phase of the project:

1. Description of Project:

- project description and programme details
- details of client, PSDP and PSCS, designers
- contractor and other consultants
- extent and location of existing records and plans
- arrangements for communicating with Contractors, PSDP and others as appropriate

2. Communication and Management of the Work:

- management structure and responsibilities
- safety and health goals for the project and arrangements for monitoring and review of safety and health performance
- arrangements for
 - regular liaison between parties on site
 - consultation with the workforce
 - the exchange of design information between the Client, Designers, Project Supervisor for the Design Process, Project Supervisor Construction Stage and Contractors on site
 - handling design changes during the project
 - the selection and control of contractors
 - the exchange of safety and health information between contractors
 - security, site induction, and on-site training
 - welfare facilities and first aid
 - the production and approval of risk assessments and method statements
 - the reporting and investigation of accidents and other incidents (including near misses)



- site rules
- fire and emergency procedures

3. Arrangements for Controlling Significant Site Risks:

- safety risks:
 - services, including temporary electrical installations
 - preventing falls
 - work with or near fragile materials
 - control of lifting operations
 - dealing with services (water, electricity and gas)
 - the maintenance of plant and equipment
 - poor ground conditions
 - traffic routes and segregation of vehicles and pedestrians
 - storage of hazardous materials
 - dealing with existing unstable structures
 - accommodating adjacent land use
 - other significant safety risks
- health risks:
 - dealing with contaminated land
 - manual handling
 - use of hazardous substances
 - reducing noise and vibration
 - other significant health risks

The construction stage safety and health plan will be maintained on site by the PSCS and will be communicated to all relevant parties on an ongoing basis through inductions, site safety meetings and tool box talks etc. as required.



4. EMERGENCY RESPONSE PLAN

This chapter of the CEMP presents an Emergency Response Plan for the proposed development. The Emergency Response Plan shall be finalised in accordance with this outline plan following the appointment of the contractor for the construction works and following detailed design development.

This Emergency Response Plan contains predetermined guidelines and procedures to ensure the safety, health and welfare of everybody involved in the project and to protect the environment during the construction phase of the proposed development. This plan outlines the immediate response to an emergency or disaster situation and will be developed by the construction works contractor and PSCS as part of their construction stage Safety and Health Plan.

An emergency is any disruptive or harmful event that endangers people, environment, property or assets. Emergencies can be small, as in a fire contained by employees using firefighting equipment or large, as in a disaster resulting from a storm.

In the context of the proposed development, examples of Emergency Response Plan emergency events are:

- Medical emergency
- Overheated equipment
- Chemical and fuel spill
- Fire
- Loss of power
- Vehicle incidents
- Feedstock or digestate spill (during operational phase)
- Explosion (during operational phase)

Example sources of emergency or disaster events are:

- Unstable/inappropriate stockpiles on site
- Faulty or incorrect use of equipment
- Falls from height
- Smoking
- Storm/adverse weather
- Power failure
- Fuel spill
- Road failure
- Serious vehicle collisions or overturning



4.1 Emergency Response Plan

An emergency response plan deals with the immediate physical effects of a disaster and outlines the initial response.

4.1.1 Emergency Response Liaison

The contractor/PSCS will designate an individual to serve as the Emergency Response Liaison for this project. The emergency response liaison will coordinate the emergency response for the duration of any emergency at or nearby the project site.

Carlow County Council, An Garda Síochána and the HSE Ambulance Co-ordinator will be provided with the construction programme and the onsite contact information from the Emergency Response Liaison prior to construction.

The Emergency Response Liaison will be immediately reachable at all times during project construction. The Liaison will coordinate with the above agencies to establish emergency procedures for access to and within the site in the event of an emergency.

4.1.2 Reporting Emergencies

In the event of fire, storm, flood, serious injury or other emergency, contact:

ALL ON SITE EMERGENCIES DIAL 112 or 999

4.1.3 Designated Responder

A map depicting the location with the emergency meeting point will be furnished to Carlow County Council Fire Department and HSE ambulance co-ordinators.

Upon arrival on the scene, the senior EMS Officer will set up the incident command structure. The Emergency Response Liaison and all contractor's personnel will cooperate with directions of the incident commander and assist as directed.

The nearest emergency services, ambulance and Accident & Emergency (A&E) facilities are:

Service:	Contact Details:	
Accident & Emergency (A&E)	St. Lukes Hospital, Kilkenny	056 771 7004
Ambulance Service	Dial 112 or 999	
Fire Services	Dial 112 or 999	
Garda Station	Carlow Garda Station	059 913 6620
	Bagenalstown/Muinebheag	059 977 4120

Each member of the contractor's site team who are First-Aid and Cardiopulmonary Resuscitation (CPR) trained personnel will be identifiable with a hard hat sticker indicating their training.



4.1.4 Emergency Alarm

The emergency alarm will be raised on site as soon as an emergency situation is detected, the alarm will be identified (contractor to check those that apply):

Air Horn		Radio		Voice		Hand Signals		Siren	

4.1.5 Emergency Reporting

In the event of an emergency the nearest supervisor with radio equipment/mobile phone will be notified. The degree of emergency will be reported to the Emergency Response Liaison who will contact the Emergency Services and request the appropriate emergency service.

4.1.6 Medical Protocol

In the event of a major medical emergency, the emergency centre (112/999) will be notified, and an ambulance and emergency medical team will respond to the scene. All major medical cases require professional (ambulance) transportation. In the event of a minor medical case, the affected employee can be transported via company vehicle in the escort of a foreman or site engineer (with first aid training).

4.1.7 Emergency Response

Upon notification, the Emergency Response Liaison will respond to the emergency scene and manage emergency operations:

1. Assess hazards and make the area safe – If you cannot enter the area without risking your safety, don't do it, call the Emergency Services immediately and wait for them. If you think you can safely enter the area, look around the emergency scene for anything that can be dangerous or hazardous to you, the casualty, or anyone else at the scene. Bystanders can help with making the area safe. First aid kits will be available on site. Operators that have been first aid/CPR/AED trained will be listed on site and easily identifiable by a hard hat sticker.
2. Take charge of the situation – if you are the first-aid provider on the scene act fast. If someone is already in charge, briefly introduce yourself and see if that person needs any help. If there is any chance the casualty could have a head or spinal injury, tell them not to move.
3. Get Consent – always identify yourself as a first-aid provider and offer to help. Always ask for consent before touching a conscious adult casualty and always ask for consent from a parent or guardian before touching an unconscious or conscious child or infant. With an unconscious adult casualty consent is implied as it is generally accepted that most people want to live. Remember to protect yourself first by wearing gloves and eye protection.
4. Assess Responsiveness – is the casualty conscious or unconscious? Note their response while you are asking them for their consent. If they respond, continue with the primary survey, and if they don't respond, be aware that an unconscious casualty is or has the potential of being a breathing emergency.



5. Call out for help – this will attract bystanders. Help is always useful in an emergency situation. Someone can be called over the phone for medical help. Others can bring blankets if needed, get water, etc. A bystander can help with any of the following:

- Make the area safe
- Find all the casualties
- Find the first aid kit, or any useful medical supplies
- Control the crowd
- Call for medical help
- Help give first aid, under your direction
- Gather and protect the casualty's belongings
- Take notes, gather information, be a witness
- Reassure the casualty's relatives
- Lead the ambulance attendants to the scene of the emergency
- Notify Emergency Services as soon as you can. Either send a bystander or call yourself

In the event of a major medical emergency, the Emergency Response Liaison, as the person-in-charge of the emergency scene, will dispatch someone to the site access point nearest the emergency scene to direct and lead arriving outside responders to the emergency scene. The designated meeting point will be agreed prior to the commencement of construction. Emergency personnel will be met at this meeting point which has been communicated by management during the 999 call. The emergency personnel escort will use the hazard lights on their vehicles so they are easily identified.

4.1.8 Escape and Evacuation Procedure

Dependent upon the degree of the emergency and if safe to do so, employees will evacuate to the designated assembly area where the designated wardens shall account for all employees and determine if anyone still remains within the emergency scene.

4.1.9 Prevention of Illness/Injury due to Weather/Elements

All employees will have access to shelter and heat in the event of inclement weather.

Employees will have access to at least a litre of water at all times.

Weather forecast will be discussed every morning with the crews. Weather conditions and forecast will be monitored regularly by management.

No employee will work alone. A buddy system will be used so employees can contact a supervisor in case of an emergency.



4.1.10 Environmental Emergency Procedure

An emergency preparedness and response procedure is required to prevent environmental pollution incidents. This will include for fire.

Suitable spill kits and absorbent material for dealing with oil spills will be maintained on site. In the event of pollution or potential risk of pollution, the Local Authority should be informed immediately.

4.1.11 Emergency Response Plan – Haul Routes

Emergency Response Procedure relating to transportation of plant, equipment and materials to the site will be developed by the contractor during the construction phase of the development.



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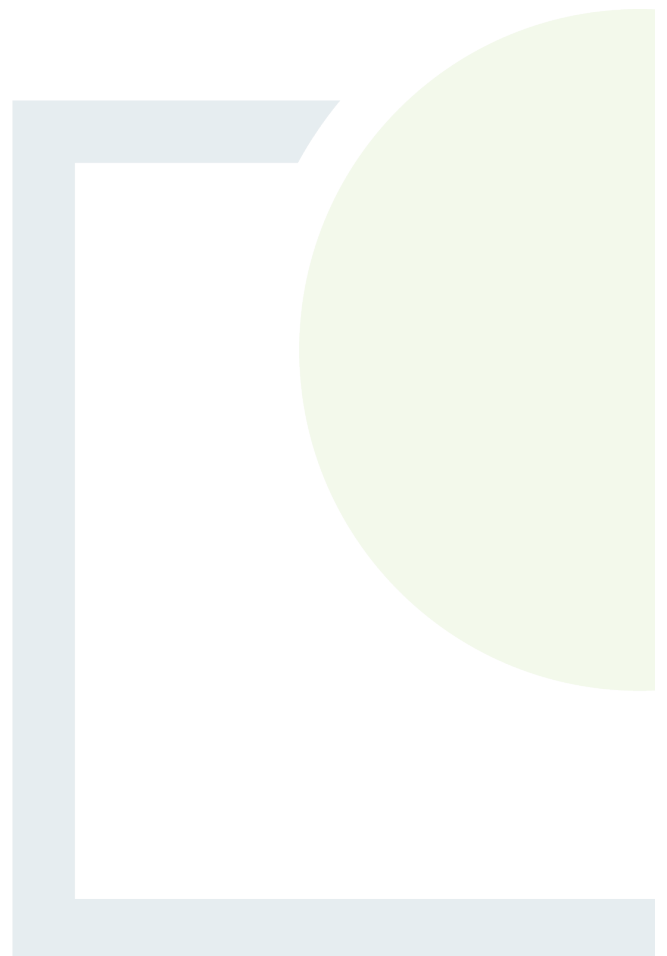
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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX **A**

Resource Waste Management Plan



EIAR FOR POWERSTOWN BIOENERGY

RESOURCE WASTE MANAGEMENT PLAN

Prepared for:

Greengate Biogas 001 Ltd



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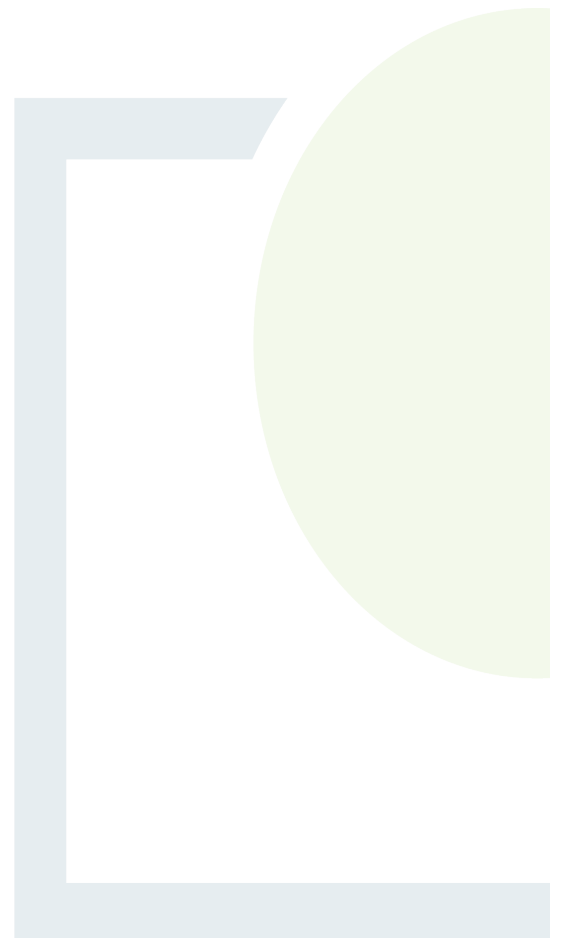


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GLOSSARY

Term	Definition	Source
By-Product	A substance or object, resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste but as being a by-product only if the following conditions are met: (a) further use of the substance or object is certain; (b) the substance or object can be used directly without any further processing other than normal industrial practice; (c) the substance or object is produced as an integral part of a production process; and (d) further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.	(EPA, 2021)
Disposal	Means any operation which is not recovery, even where the operation has as a secondary consequence the reclamation of substances or energy.	Waste Directive (European Commission, 2008)
Economic Operator	See Producer.	Waste Directive (European Commission, 2008)
End-of-Waste	Waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following conditions: • the substance or object is to be used for specific purposes • a market or demand exists for such a substance or object • the substance or object fulfils the technical requirements for the • specific purposes and meets the existing legislation and standards • applicable to products • the use of the substance or object will not lead to overall adverse environmental or human health impacts • the use of the substance or object will not lead to overall adverse environmental or human health impacts	(EPA, 2021)

Term	Definition	Source
Prevention	Measures taken before a substance, material or product has become waste, that reduce: (a) the quantity of waste, including through the re-use of products or the extension of the life span of products; (b) the adverse impacts of the generated waste on the environment and human health; or (c) the content of harmful substances in materials and products.	Waste Directive (European Commission, 2008)
Producer	Product or By-Product generator	FT
Product	All material that is deliberately created in a production process. In many cases it is possible to identify one (or more) 'primary' products, this or these being the principal material(s) produced.	(European Commission, 2013)
Recovery	Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations.	Waste Directive (European Commission, 2008)
Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. it includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.	Waste Directive (European Commission, 2008)
Reclaimed Asphalt Pavement (RAP)/ Reclaimed Asphalt	Reclaimed asphalt pavement (RAP) is defined as removed pavement materials containing asphalt and aggregates. Also referred to as Reclaimed Asphalt.	(US Federal Highway Administration, 2011)
Re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.	Waste Directive (European Commission, 2008)
Road Plannings	Produced when the surface layer of a tarmac road is removed.	(Scottish Borders Council)
Uncontaminated soil	Virgin soils, or soils which do not exhibit any of the 'properties of waste which render it hazardous'	(European Commission, 2013)
Waste	Means any substance or object which the holder discards or intends or is required to discard.	Waste Directive (European Commission, 2008)
Waste Producer/Waste Holder	Anyone who produces waste	Waste Directive (European Commission, 2008)



1. INTRODUCTION

This plan has been prepared in accordance with the Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects (EPA, 2021). It is Appendix A of Appendix 3.1 Construction Environmental Management Plan (CEMP) of Volume 3 of this EIAR.

This Resource and Waste Management Plan (RWMP) has been prepared to implement principles of the Circular Economy Action Plan under the EU Green Deal by avoiding using unnecessary resources in the first place and once used, to continue to use those resources. The RWMP seeks to recognise the value of all materials and prevent them becoming waste. Where waste is unavoidable the RWMP will ensure that the management of waste during the operational phase of the proposed scheme is undertaken in accordance with the current legal and industry standards, including: The Waste Management Act 1996-2011 as amended and associated Regulations, Protection of the Environment Act 2003 as amended, and the Litter Pollution Act 2003 as amended. This plan aims to ensure maximum recycling, reuse, and recovery of waste with diversion from landfill wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

The purpose of this RWMP is to examine all resources required and generated by the construction of Powerstown Bioenergy (the proposed scheme) and the proposed gas pipeline to establish opportunities to minimise use of new resources, to prevent waste and to keep any new resources in flow. This plan is aimed at promoting resource value, prevention, reduction, reuse, and recycling of material during the construction and demolition works.

This plan is limited to solid wastes; wastewater is dealt with separately.

1.1 Legislation and Guidance

This document complies with or notes the contents and recommendations of the following legislation and guidance. Please note that the EPA is actively working on publications in the area of by-products and end of waste guidance as is the Southern Waste Management Region and so the contractor shall check for relevant updates:

- Waste Framework Directive 2008/98/EC (European Parliament, Council of the European Union, 2008)
- Landfill Directive 1999/31/EC (Council of the European Union, 1999)
- Annex II to Directive 1999/31/EC (the Landfill Directive), Council Decision of 19 December 2002 (203/33/EC), criteria and procedures for the acceptance of waste at landfills outlined therein will be applied to any waste dispatched off-site. This includes basic characterisation of the materials, testing for total pollutant content and leaching behaviour, and on-site verification prior to dispatch
- European Communities (Waste Directive) Regulations, 2020 (as amended) (Government of Ireland, 2020)
- The Waste Management (Permit) Regulations, 1988 (S.I. No. 165 of 1998) (Government of Ireland, 1988)
- The Waste Management (Collection Permit) Regulations, 2001 (S.I. No. 402 of 2001) (Government of Ireland, 2001)
- The Local Government (Water Pollution) Acts, 1977 & 1990 (Government of Ireland, 1990)



- The Waste Management Act, 1996 and amendments (Government of Ireland, 2022)
- Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
- Waste Management (Trans frontier Shipment of Waste) Regulations, 1998 (S.I. No. 149 of 1998)
A Resource Opportunity – Waste Management Policy in Ireland (Department of the Environmental, Climate and Communications, 2012)
- Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects (EPA, 2021)
- National Hazardous Waste Management Plan 2021 – 2027 (EPA, 2021)
- National By-Product Criteria (Site Won Asphalt) BP-N001/2023 establishing detailed criteria on the application of the conditions of Regulation 27(1)(a) – (d) when making the decision that site-won asphalt can be regarded as a by-product under Regulation 27 of the European Union (Waste Directive) Regulations 2011 – 2020, (EPA, 2023)
- National By-Product Criteria for Greenfield Soil and Stone BP-N002.2024 (EPA, 2024)
- By-Product Guidance Note, A Guide to by-products and submitting a by-product notification under Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) draft (EPA, 2020)
- A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2020 – 2025, (Department of Communications, Climate Action, and Environment, 2020)
- Waste Minimisation in Construction (SPU SP 133), (Construction Industry Research and Information Association (CIRIA), 1997)
- Waste Classification, List of Waste and Determining if Waste is Hazardous or Non-hazardous (EPA, 2018)
- Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed (EPA, 2013).

Under the Waste Directive, waste means any substance or object which the holder discards or intends or is required to discard. This definition is a key element of materials management. To prevent waste and to facilitate reuse, the contractors on site should plan to prevent discarding unless it is required to discard.

1.2 RWMP

This is a draft plan, prepared for planning consent stage. It aims to set the objectives for the development. A RWMP should be a specific, targeted, 'stand-alone' plan to ensure that all of the mitigation measures, obligations, requirements, and constraints regarding resources and waste identified in all relevant documents and planning conditions are fully implemented under the construction contract. This plan should be updated following detail design and issued with the Contract documents. The successful contractor shall be required to take this draft RWMP and produce a final version based on the proposed construction contract. This has been specifically prepared for the construction of the proposed development and that contract administered by the Applicant. GNI will be responsible for the appointment of the contractor for the construction of the proposed gas pipeline. It should be prepared in accordance with guidance (EPA, 2021).

This RWMP has been prepared by Tanya Ruddy, Chartered Waste Manager (MCIWM) and Chartered Scientist (CSci).

A separate waste management plan is not required, this RWMP should contain all relevant information for the management of materials and wastes for the construction phase of the proposed development.



1.3 Complimentary Documents

Please note that in the event that there are any conflicts between details for waste management in the CEMP and the RWMP, the RWMP should take preference.

1.4 Description of the Proposed Development

The proposed development is described in detail in Chapter 3 of this EIAR and is summarised in the CEMP. When the Contractor is preparing the RWMP for approval at pre construction stage, the description shall be included in this section for information.

The proposed development consists of a commercial-scale anaerobic digestion (AD) facility producing 250 GWh/year of renewable natural gas (RNG) and biogenic CO₂, located at Mary Kelly's Pit, Powerstown, Co. Carlow. The site is a 9 ha former sand and gravel quarry, partially restored and currently operating at low intensity.

It is an anaerobic digestion (AD) facility including solids reception building, liquids reception building, digestate storage, tank farm, gas upgrading, CO₂ liquefaction, heating centre, administration building, weighbridge, drainage infrastructure and ancillary works.

Construction duration is 24 months. The construction activities shall include earthworks, portal-frame buildings, tank farm construction, M&E installation and a gas pipeline (by GNI).



2. MATERIALS

2.1 Excavation & Earthworks

The existing site is a partially restored sand and gravel quarry. Earthworks are required to reprofile to site for the proposed development. This will involve the excavation and reprofiling on site of approximately 98,900 m³. Of this, approximately 93,900 m³ will be retained on site with an excess of 5,000 m³ for export off site.

Management approach:

- Maximise reuse on site for embankments, formation layers, landscaping.
- Export only material that cannot be reused on site.
- The Contractor shall identify opportunities to exported soil for reuse elsewhere to be classified under Article 27 as a by-product. This shall be done in advance of earthworks at pre construction stage. Where there are no reuse opportunities, it shall be exported as an excess material, i.e. a waste for recovery.

2.2 Construction Materials Waste

Based on Table 3-11 (Use of Natural Resources) of the EIAR, construction materials include:

- Concrete
- Reinforcing steel
- Structural steel
- Cladding panels
- Aggregates
- Precast concrete elements
- M&E components
- Pipework
- Sand
- Hot rolled asphalt

The Contractor shall use the materials as listed in Chapter 9 Climate/Chapter 18 Schedule of Commitments which have been selected to mitigate carbon emissions.



The likely waste streams are:

Waste Type	EW Code	Examples
Concrete waste	17 01 01	offcuts, washout
Metals	17 04	rebar, steel offcuts
Timber	17 02 01	pallets, formwork
Plastics	17 02 03	packaging
Mixed C&D	17 09 04	general construction waste
Hazardous	17 06 05*	insulation, adhesives (small quantities)

The Applicants Contractor shall populate this table with quantities and materials at pre construction stage.

2.2.1 Pipeline Construction Waste (GNI)

Reproduced from Table 3-12 of the EIAR, the construction materials for the gas pipeline are listed here.

Category	Element	Quantity	Units
Construction	Gas Pipes	9.6	km
	Sand	6,998,400	kg
	Subbase CI 804	5,182,704	kg
	HRA	5,414,400	kg

GNI's Contractor shall populate this table with quantities and materials at pre construction stage.

Waste streams will include:

- Surplus excavated material
- Asphalt planings
- Pipe offcuts
- Bentonite-free drilling mud (HDD uses biodegradable ClearBore™)



3. MATERIALS MANAGEMENT

3.1 Prevention and Minimisation

Contractor to outline measures to prevent and minimise both resource utilisation and waste generation.

3.1.1 Prevention

Design state prevention has been carried out to mitigate the volume of resources used during the construction of the proposed development. These are listed in Chapter 9, Climate, in Volume 2 of the EIAR. The Contractor shall identify further opportunities at detail design stage. Prevention opportunities include:

- Just-in-time delivery scheduling.
- Segregated storage areas for materials.
- Reuse of excavated soil on site.
- Reuse of formwork where possible.

3.1.2 Minimisation

Contractor to complete and the shall off mandatory contractor training on waste minimisation at construction stage.

3.2 Reuse

The Contractor is required to identify opportunities to reuse materials generated on the proposed scheme and to consider reuse of imported by-products or end of waste materials.

3.2.1 Offsite Reuse/Article 27

Article 27 of the European Communities (Waste Directive) Regulations (European Communities, 2011). makes a key distinction between the regulatory regime for substances that are defined as a 'waste' and those that are instead viewed as a 'by-product'. By-products may be reused off-site, thereby encouraging the prevention of waste and contributing to the development of a circular economy. Article 27 will be used where a subject or object produced can be demonstrated by a 'legal person' to meet the following conditions:

- Further use of the substance or object is certain.
- The substance or object can be used directly without any further processing other than normal industrial practice.
- The substance or object is produced as an integral part of the production process.
- Further use is lawful in that the substance or object fulfils all relevant product, environmental, and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.



In cases where the construction process has the potential to generate materials that are not required on site, the Contractor will consider the suitability of generating a by-product and therefore preventing waste generation. Potential for the generation of by-products from construction include clean soil and stone and site won asphalt during the construction of the proposed pipeline route by GNI. The producer of the by-product, i.e. the contractor will be responsible for the preparation of an Article 27 Notification to the EPA including identification of the receiver. This is a self-policing process, and the contractor does not need to await approval of the notification but must satisfy the EPA that the movement of by-product is compliant with legislation and guidance. There are national by-product criteria for site won asphalt and for soil and stone:

- BP-N001/2023 (EPA, 2023)
- BP-No.002/2024 (EPA, 2024)

It is an objective of the project to find suitable reuse opportunities for all clean excavated soil and stone.

There is limited potential for the reuse of by-products from elsewhere on site, but the Contractor should consider this during procurement of materials.

3.2.2 End of Waste/Article 28

Article 28 of the European Communities (Waste Directive) Regulations (European Communities, 2011) may be used when a waste has undergone a recycling or other recovery operation is considered to have ceased to be waste and complies with the following:

- The substance or object is to be used for specific purposes.
- A market or demand exists for such a substance or object.
- The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products.
- The use of the substance or object will not lead to overall adverse environmental or human health impacts.

Where waste has been generated on site, but is deemed suitable to replace a material elsewhere, the Producer/Contractor can apply for an end of waste determination. At this stage in the project, one material has been identified as potential for end of waste determination.

There is limited potential for use of end of waste materials as secondary materials on site due to nature of construction materials required. Preparation of an application for end-of-waste status to the EPA is very specific and is something that is more suited to a sector wide material than a project material.



3.2.3 Site Won Asphalt

Site won reclaimed asphalt can be used on site or can be transferred off site as a by-product. In both cases there is guidance that the Contractor shall follow:

- Management of Materials Arising from Roadworks (County and City Management Association, 2020) see Appendix 1
- National By-Product Criteria (Site Won Asphalt) BP-N001/2023 establishing detailed criteria on the application of the conditions of Regulation 27(1)(a) – (d) when making the decision that site-won asphalt can be regarded as a by-product under Regulation 27 of the European Union (Waste Directive) Regulations 2011 – 2020 (EPA, 2023)

3.3 Reuse of Site Hoarding (if required)

The contractor should seek to reuse site hoarding if it is required from a previous contract, and again after use for this proposed scheme.

3.4 Recycling and Recovery

The Contractor shall list waste materials that shall be segregated for recovery and recycling. The contractor shall set targets for recovery and recycling, not the waste management sub-contractor. This will ensure best practice above lump sum pricing for management of all waste materials. Those targets shall at a minimum comply with national legislation.

The Contractor will be required to have on-site segregation with dedicated skips/containers for:

- Soil & stone
- Concrete
- Metals
- Timber
- Plastics
- Mixed recyclables
- Hazardous waste (bunded)

Storage Requirements

- All waste stored on hardstanding.
- Hazardous waste stored in bunded, locked containers.
- Waste signage in accordance with EPA RWMP guidelines.



Tracking & Documentation

- The Contractor shall engage Waste Collection Permit (WCP) hauliers only.
- All movements off site shall be recorded.
- Monthly reporting of waste generation to the PSDP/PSCS.
- The Contractor shall ensure that any waste transported off site is to an appropriately authorised facility permitted or licensed to accept that waste stream.

3.5 Waste Disposal

Disposal of materials shall be minimised to the greatest extent possible. Only when there is no other option, material may be disposed of to a licensed landfill or licensed waste to energy plant.

3.6 Supply Chain and Green Procurement

The Contractor shall demonstrate management of their supply chain to prevent waste, optimise materials and reduce carbon.

3.7 Off-Site Construction

The Contractor shall consider the benefits of offsite construction for specific elements of the proposed development to minimise materials transported to site and to prevent waste.

3.8 Materials Optimisation

Contractor shall detail opportunities to optimise materials and reduce carbon and virgin aggregates.

3.9 Key Performance Indicators

The contractor shall proposed key performance indicators for the scheme.

At a minimum the contractor shall comply with national targets for recovery, recycling and disposal, whereby Ireland must have a 70% recovery rate for Construction and Demolition Waste to meet EU standards (Environmental Protection Agency, 2023).

Category	Target
Reuse of excavated material	>90%
Recycling of construction waste	>70%
Landfill disposal	<10%
Hazardous waste	100% compliant disposal



4. ROLES AND RESPONSIBILITIES

4.1 Client

The Applicant Greengate Biogas 001 Ltd. is the client.

4.2 RWMP Team

Client and Contractor to engage with the Southern Waste Management Region to identify any external opportunities to reuse of materials on other schemes in the region. It shall be a condition of contract that this draft RWMP is updated and submitted for approval prior to construction.

4.3 Contractor

Following development consent, a tendering process will be undertaken to select a contractor.

The contractor shall nominate a suitably qualified person with experience of preparation of RWMPs in accordance with guidance (EPA, 2021) and working knowledge of waste legislation and national policy with responsibility for this RWMP and a Chartered Waste Manager. Within this outline document, the role is referred to as the Environmental Manager.

The Contractor shall be responsible for resource and waste management for the proposed scheme and shall be the Producer (see Glossary) of any by-products generated on the scheme.

The Contractor shall be responsible for:

Training & Communication

- Toolbox talks on waste segregation.
- Induction training for all workers.
- Weekly site walkovers to check compliance.

Monitoring & Reporting

- Monthly waste summary reports.
- Tracking against targets.
- Corrective actions where targets not met.
- Final Construction Waste Audit submitted to the planning authority.



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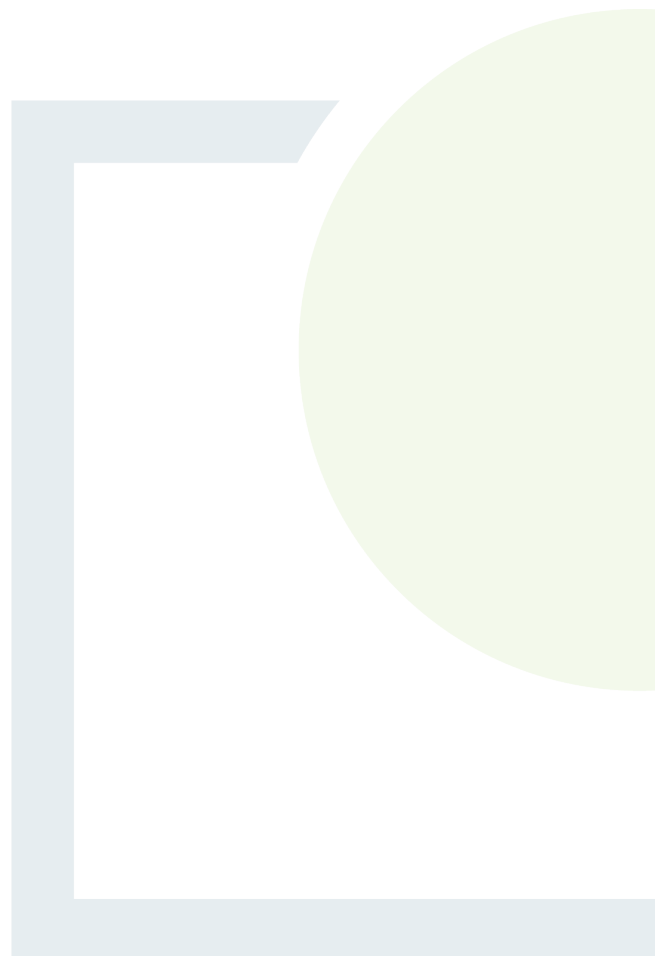




DESIGNING AND DELIVERING
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Appendix 3.2

Firewater Risk Assessment Report



FIREWATER RISK ASSESSMENT REPORT FOR POWERSTOWN BIOENERGY

FIREWATER RISK ASSESSMENT REPORT

Prepared for:
Greengate Biogas 001 Ltd.



Date: June 2026

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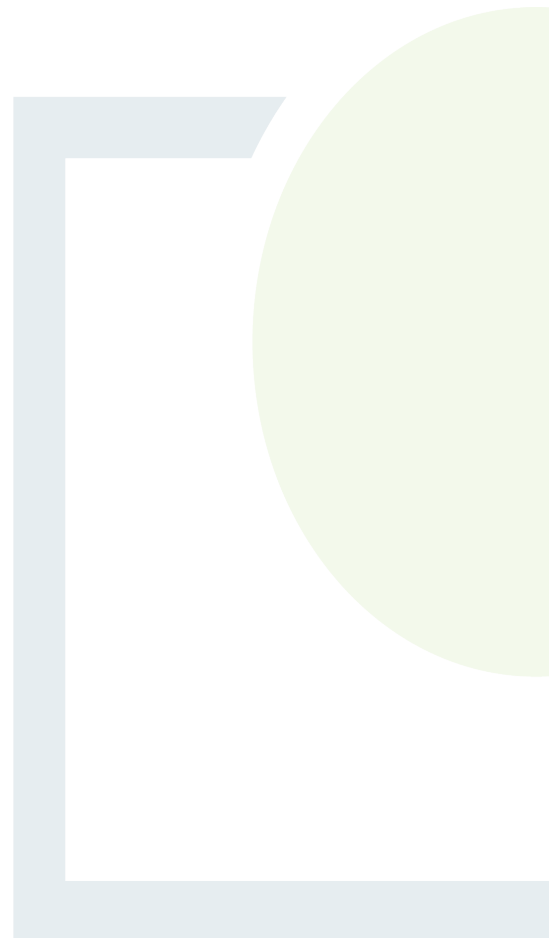


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1. INTRODUCTION

1.1 Introduction, Scope and Purpose

Greengate Biogas 001 Ltd. is seeking consent to develop an Anaerobic Digestion (AD) plant located in Powerstown, Carlow, Ireland (Powerstown Bioenergy). A site location map is presented in Figure 1-1. Fehily Timoney & Company (FT) has prepared this Firewater Risk Assessment (FWRA) report in support of the planning application and the Industrial Emissions (IE) licence application for the proposed development.

The FWRA should be read in conjunction with the Environmental Impact Assessment Report Volumes 1-4. This FWRA is Appendix 3.2 in Volume 3 of the EIAR. An Industrial Emissions (IE) licence issued by the EPA will be required to operate proposed development. This FWRA will accompany the IE licence application to the EPA.

In accordance with the Chemicals Act (Control of Major Accidents Involving Dangerous Substances) Regulations 2015 (COMAH), which implement the Seveso III Directive, a Seveso lower tier site notification to the Health Safety Authority (HSA) for the storage of ≥ 50 t of natural gas is required. A land use planning assessment is being submitted with the planning application to An Coimisiún Pleanála who will then refer it to the HSA. Such facilities generally require firewater retention, due to the large quantities of dangerous substances present on site.

The term “firewater” as used in this report, specifically relates to the liquid that arises from water, foam, rainwater or other substances that have been used for firefighting purposes, and is likely to contain polluting matter, particularly arising from them having come into contact with combustion products.

Firewater arising from a fire incident can contain concentrations of substances which may be harmful to the aquatic environment, and if it is allowed to enter soil, drains or watercourses in an uncontrolled manner, it has the potential to cause environmental damage. The term “firewater” is also used to describe clean water that is held in tanks or other structures, which is intended to act as a water supply for firefighting purposes in the event of a fire.

The purpose of this report is to assess the firewater retention requirements for the facility and confirm that the design of the facility will meet these retention requirements. The purpose of this report is not to determine the firefighting water supply required in the event of a fire (See Section 3.4 for firefighting water supply requirements).

This assessment was undertaken in accordance with the Guidance on Retention Requirements for Firewater Run-Off (EPA, 2019).

Before undertaking the FWRA, the facility is assessed against the two qualifying criteria thresholds;

1. the quantity of environmentally hazardous materials on facility, and
2. the potential to pollute environmental receptors.

If both criteria thresholds are met, provision of firewater retention at the facility is automatically required. However, if the facility is below these threshold criteria, firewater retention is not automatically required and the FWRA is undertaken to determine the facility-specific requirements.



The types and quantities of materials stored on facility and connections to potential receptors are identified to facilitate the assessment against the qualifying criteria. The proposed fire management and firefighting strategies for the facility are identified to prepare the FWRA.

A Microsoft Excel based FWRA tool is used to undertake the FWRA for each zone, to determine if firewater retention is required. The FWRA evaluates the significance of a fire event and the environmental hazard potential to determine the firewater run-off risk and if retention is required.

The FWRA tool is used to calculate the volume of firewater retention required for the zones identified. Finally, the design of the facility is reviewed to determine if sufficient capacity for firewater retention requirements is available and recommend any amendments as necessary to meet these requirements.

The report is presented as follows:

- Facility Overview
- Proposed Fire Management and Firefighting Strategies
- Materials Assessment
- Firewater Risk Assessment
- Retention Capacity Calculations
- Design of Firewater Retention Systems
- Summary and conclusion

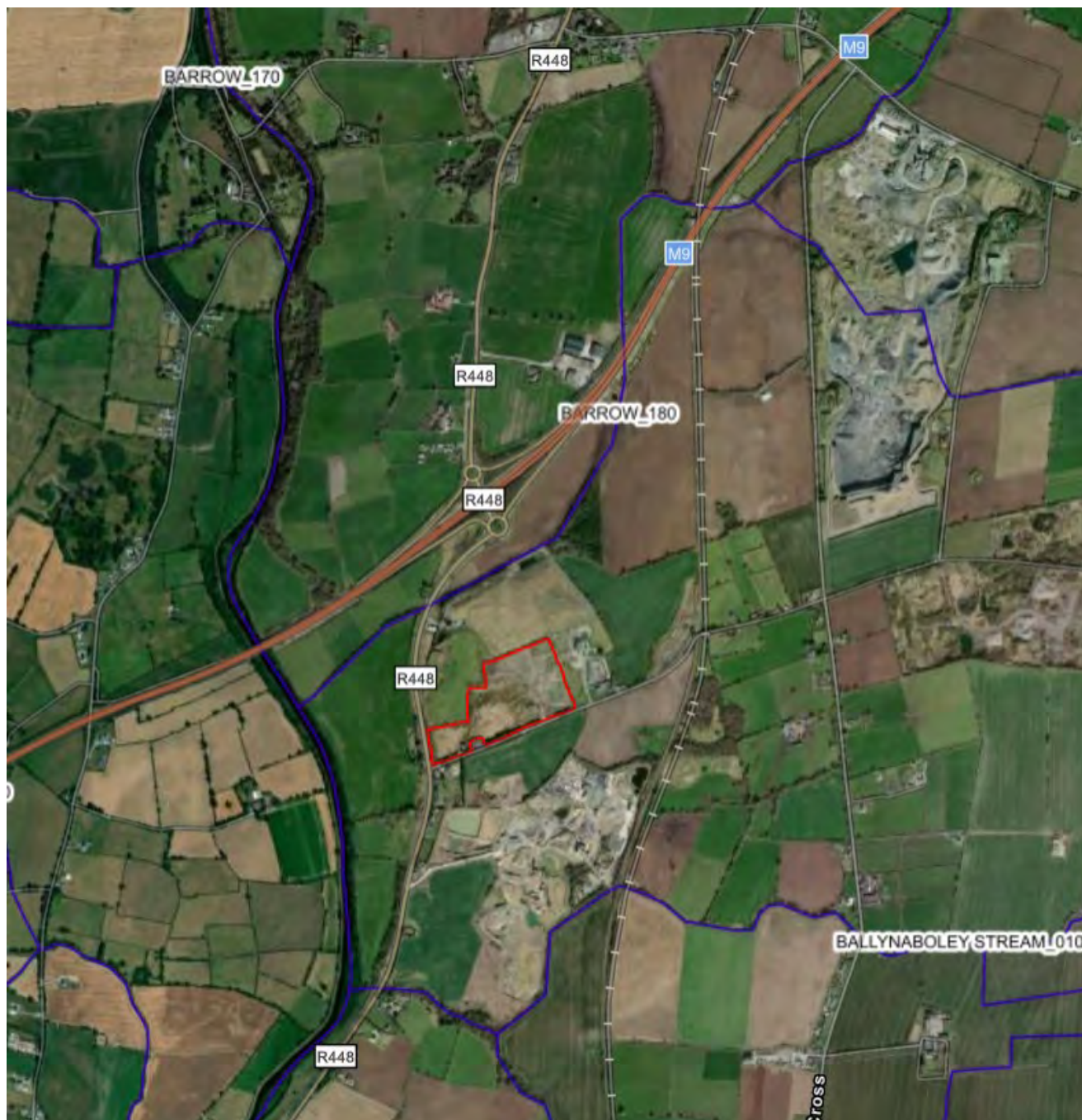


Figure 1-1: Site Location Map



1.2 Statement of Authority

This Fire Risk Assessment Report has been prepared by Mr James O'Neill. James is a Chartered Engineer and a Associate Director with Fehily Timoney and Company with 17 years post qualification experience working on waste management and landfill related projects. James holds an MSc. in Civil Engineering from Trinity College Dublin (2009) and a BEng (Hons) in Civil Engineering from University College Dublin (2008). James is a Chartered Member of the Institute of Engineers Ireland and a Chartered Waste Manager with the Chartered Institute of Wastes Management. James' primary experience relates to the resource and waste management sector, in particular waste infrastructure design including anaerobic digestion, environmental & operational management of waste processing facilities, landfill remediation and aftercare works, remediation of contaminated lands, leachate and landfill gas management and civic amenity site design. James was responsible for the preparation of the drawings in Volume 3 of this EIAR. He has experience in similar roles on other AD plants, renewable energy infrastructure and strategic infrastructure developments.

James has completed training in "Fire Prevention & Mitigation on Waste Facilities" provided by the Chartered Institute of Wastes Management (CIWM)

James has previously prepared Fire Risk Assessment reports for 12 no. licensed facilities in accordance with the guidelines (EPA, 2019).



2. FACILITY OVERVIEW

This section presents an overview of the activities of the proposed development, to explain facility infrastructure, operations, processes and materials that will be used at the proposed development to inform the preparation of the FWRA. The location of the proposed development is described to gain an understanding of the potential receptors of firewater run-off in the unlikely event of a fire.

2.1 Location of the Proposed Development

The site is located at Powerstown, Milford, County Carlow, approximately 2.5 km north of Leighlinbridge, approximately 6 km north of Bagenalstown, approximately 2.5 km north-west of Nurney village, 8.6 km south of Carlow and 15 km south-west of Tullow.

The site is located along the L3045, which is accessed from the R448 Carlow to Kilkenny Road. The site is located directly to the south of Carlow County Council's closed Powerstown Landfill site and to the west of the operational Recycling Centre, co-located on the landfill site both of which are under an EPA licence (Waste Licence no. W0025-04).

The following features are near the site:

- M9 Motorway (Junction 6) 420 m north
- Powerstown Stream 200m north
- Railway Line (Dublin to Waterford) 320 m east
- River Barrow SAC Boundary 20m west
- River Barrow, 300m west
- 38 kV Powerline 2.5 km west
- Nearest Seveso Site c.7 km south¹
- Powerstown Landfill (closed and restored) and Recycling Centre (operational) immediately north and east EPA Licence 20025-02
- GNI Cork Dublin gas distribution pipeline running south north c3km west

¹ Lower Tier: Royal Oak Distillery Ltd Clorusk Lower, Royal Oak, Bagenalstown, Co. Carlow



2.2 Description of the Proposed Development

The proposed development is an anaerobic digestion (AD) facility for the production of 250 GWh per annum (p.a.) of renewable natural gas (RNG) and biogenic liquefied carbon dioxide (biogenic CO₂) from agricultural residues, including liquid farmyard manures (LFYM) and Solid Farmyard Manures (SFYM), collectively referred to as "feedstocks".

The proposed development includes the following;

- Site Entrance and Access
- Weighbridge and Weighbridge Office
- Circulation Yard
- Liquids Reception Building
- Solids Reception Building
- Solid Digestate Building
- Bunded Tank Farm
- Odour Abatement System
- Heating Centre with exhaust stack
- Gas Upgrade Plant
- Drainage Infrastructure
- Process And Fire Water Storage Tanks
- ESB Substation (2 No.)
- Ancillary Infrastructure

A consultation with Carlow County Fire and Rescue Services (CCFRS) was conducted at pre-application stage to confirm the requirements for fire suppression and firefighting measures on the site which were incorporated into the design. The proposed development has been designed to ensure there is adequate fire separation between buildings, appropriately fire rated walls within buildings, emergency services access, firewater supply /capacity and firewater retention capacity. Following grant of planning, an application for an IE licence to operate will be submitted to the EPA. Detailed design will be carried out to facilitate the appointment of a contractor. Finally specified engineering works approval will be required as a condition of the IE licence from the EPA for infrastructure at the proposed development.

The existing and proposed development are described in Chapter 3 of Volume 2 of this EIAR.

Drawings of the existing and proposed facility are included in Volume 4.

Drawing No.s P24188-FT-XX-XX-DR-CE-0110 to 0113 show the proposed site layout plan.

2.3 Operation of the Proposed Development

The primary objective of the project is to convert agricultural residuals (LFYM and SFYM) into renewable energy. It is proposed that the proposed development will accept up to 663,000 tpa of agricultural residues into the proposed facility to generate an estimated 41,250,000 Nm³/yr of raw biogas, 23,500,000 Nm³/yr of RNG and 30,000 tonne/yr of liquefied CO₂.



The process flow for the proposed development is shown in Figure 2-1 and will broadly comprise the following stages.

- The liquid and solid manures i.e. feedstocks, will arrive at the facility before being directed to the solids reception or liquids reception building. Solid feedstocks arriving in articulated or rigid body tipping trailers will reverse into the solid reception building to unload into the solids bunker. Liquid feedstocks will be delivered to the liquids reception building by specialised articulated vacuum tankers.
- Two dedicated overhead gantry cranes will be used to mix and load solid wastes deposited in the solids bunker. The overhead cranes will feed one of four bio mixers located to either side (2 x 2) of the solids bunker.
- Liquid feedstocks will be pumped from the specialised articulated vacuum tankers to the liquid pre storage tank.
- Liquid feedstocks will be pumped from the pre storage tanks to the primary digestion tanks via a set of heat exchangers. All process tanks are located in a tank farm bund.
- Solid feedstock will be conveyed from the bio mixers to a hammermill. The hammermill will pulverise the solid feedstock breaking it into smaller particle sizes. Solid feedstock will be diluted with digestate to allow for pumping to the primary digestion tanks.
- The primary digestion phase will be undertaken in the six primary steel digestion tanks.
- The secondary digestion phase will be undertaken in the three secondary concrete digestion tanks.
- The tertiary digestion phase will be undertaken in a tertiary concrete digestion tank.
- Post digestion all digestate shall be pasteurised in accordance with S.I. No. 187/2014 - European Union (Animal By-Products) Regulations 2014.
- Post pasteurisation the spent feedstock mix called digestate shall be separated into liquid digestate and solid digestate. Separation shall be done by screw press separation. Solid digestate will be conveyed away from the screw presses and dropped to the floor of the solids digestate building. Liquid digestate will be returned to the digestate storage tank, located in the bunded tank farm.
- From the digestate storage tank liquid digestate will be pumped to a digestate loading tank (DLT). Liquid digestate will be pumped from the DLT to an articulated vacuum tanker
- Raw biogas will be collected from all primary digestion, secondary digestion, tertiary digestion and post storage tanks for upgrading to biomethane and biogenic CO₂.
- The raw biogas will then undergo a biogas upgrading process whereby the raw biogas will be separated into biomethane and biogenic CO₂ by an Amine separator.
- Biogenic CO₂ then undergoes CO₂ liquefaction; the CO₂ is compressed and cooled forming liquid CO₂. This liquid CO₂ is stored in insulated tanks for transport offsite as a food grade CO₂ product.
- Biomethane will be fed to a Gas Networks Ireland BNEF located onsite from where it will be transferred via a proposed gas pipeline to the proposed grid connection point located offsite.

The operation of the proposed development is described in more detail in Chapter 3 of Volume 2 of this EIAR.

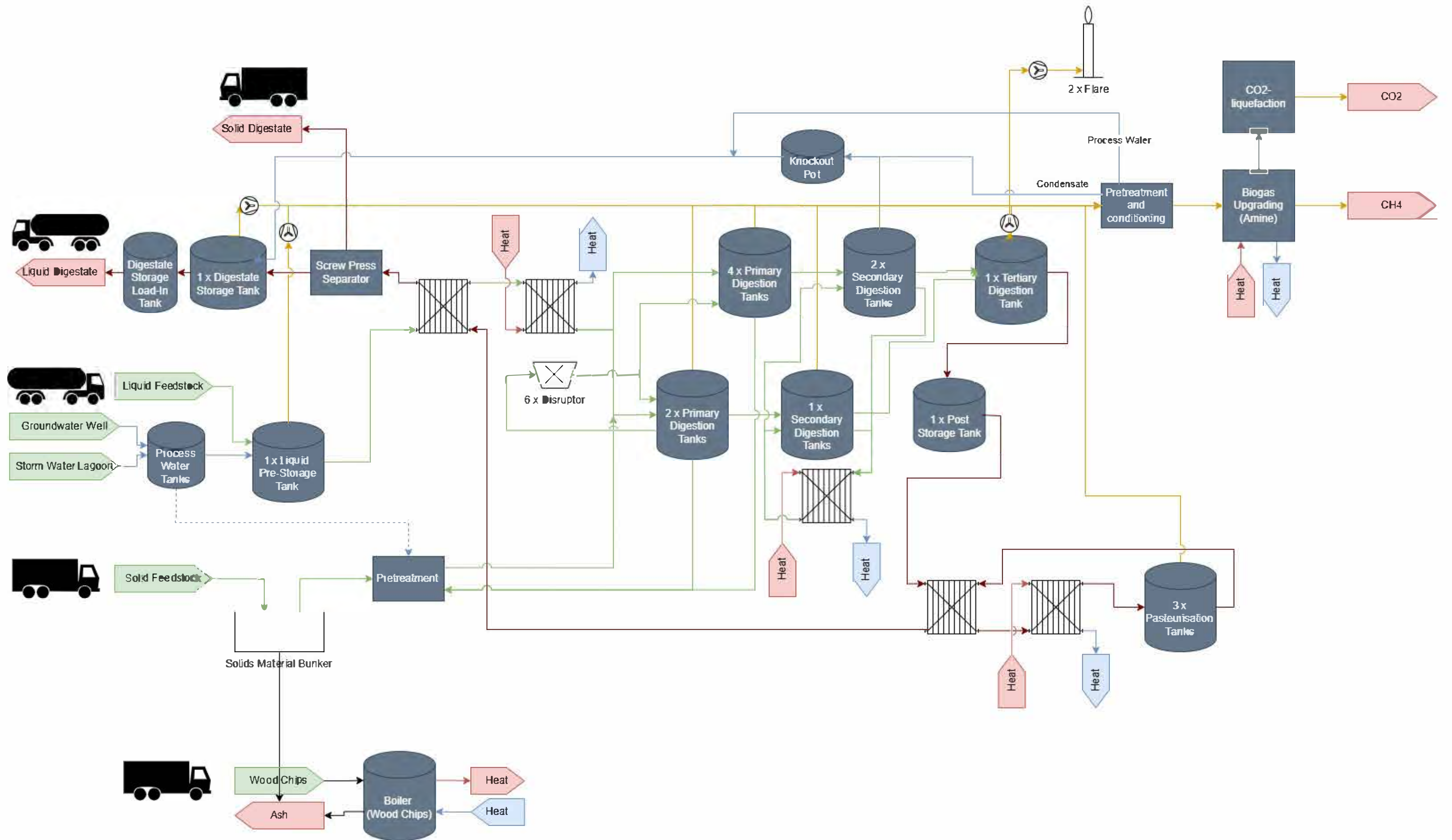


Figure 2-1: Proposed Process Flow



2.4 Hydrology, Geology and Hydrogeology

An overview of the baseline environment hydrology, geology and hydrogeology is presented in the sections 2.4.1 to 2.4.3. Further detail is contained in Chapters 12 and 13 of Volume 2 of the EIAR.

2.4.1 Hydrology

The site of the proposed development is situated within the Barrow waterbody catchment (Catchment ID - 14) as defined by the EU Water Framework Directive (2000/60/EC).

The Barrow River is classified under the WFD as a waterbody that is “At Risk” in certain sections, primarily due to pressures from agricultural runoff, urban wastewater discharge, and diffuse pollution. Nutrient enrichment (e.g., from phosphate and nitrate levels) and sedimentation are significant water quality concerns, impacting the overall ecological status of the river.

Certain parts of the Barrow catchment, particularly the lower reaches of the river, are designated as Special Areas of Conservation (SAC) due to their biodiversity value. These areas are home to a variety of aquatic species and habitats, including rare species like the otter and salmon. The river also supports a variety of plant species, fish, and birds that are sensitive to changes in water quality. The River Barrow and River Nore SAC boundary extends to the western side of the R448. The proposed development is accessed by turning east off the R448.

2.4.2 Geology

The subsoils present at the proposed development site comprise predominantly of ‘Gravels derived from Limestones’ (GLs). This sediment type is consistent across the surrounding area, extending in all directions around the proposed development site.

The proposed development site is an active quarry. It has been partially restored with soil and stone and limited volumes of sand and gravel are extracted on an annual basis. Further details are in Chapter 1 of Volume 2 of the EIAR.

2.4.3 Hydrogeology

The proposed development is located within the Barrow Groundwater Body (GWB). According to interim classification work carried out as part of the Water Framework Directive and published by the EPA, the Barrow GWB is classified as having ‘*moderate*’ status in terms of quality and quantity. The overall risk result of ‘*At Risk*’ is applied to the GWB.

The development site is situated above a section of the Barrow GWB that consists of a Locally Important Aquifer, which is moderately productive only in local zones.

2.5 Proposed Drainage Design Strategy

The site drainage strategy is designed to segregate water at the proposed development based on its origin and potential contamination risk, ensuring that all water is either recovered for reuse within the process or treated safely to remove contamination. The site manages five primary water types:

- storm water/rainwater
- wash water
- foul water
- process water



It is calculated the water consumption of the facility significantly exceeds the projected total volume of storm water and rainwater collected on-site. Therefore, there is no requirement to discharge water off-site. In the unlikely event of contamination within the storm water lagoon, the contents will be contained, removed via tanker, and transported to an authorised wastewater treatment facility.

The estimate process water usage will be 66,000 m³/year (180 m³/day) sourced from rainwater harvesting onsite (65-130 m³/day (Avg. Monthly)) and additionally the proposed onsite groundwater well (100-120 m³/day (Avg. Monthly)).

The drainage system is summarised in Figure 2-3 and is shown in Drawing No. P24188-FT-XX-XX-DR-CE-0500 to 0506 of Volume 4 of this EIAR.



Drainage Infrastructure – Engineering Overview

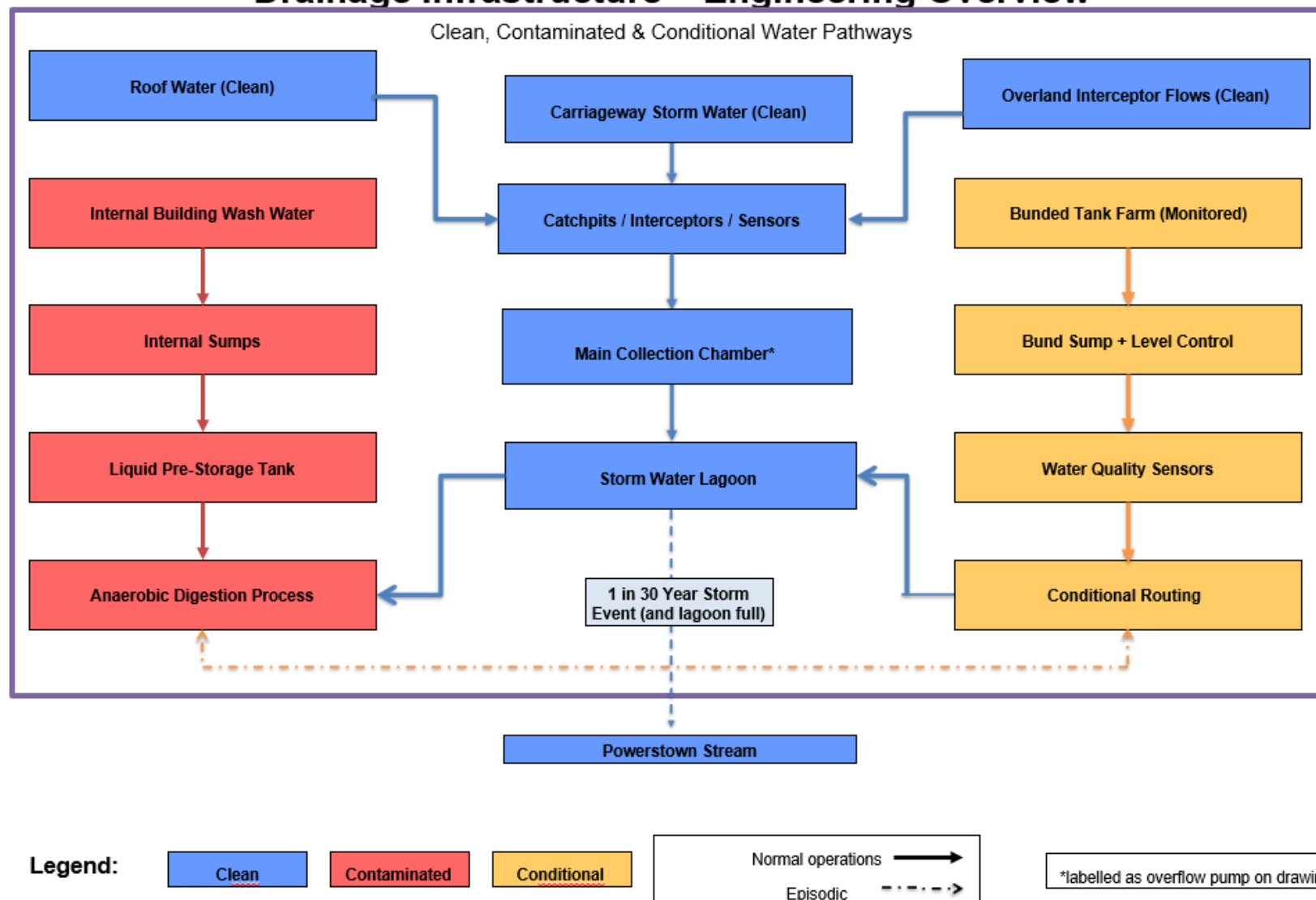


Figure 2-2: Proposed Water Management Systems



2.5.1 Water Collection Areas

Bunded Tank Farm

Rainwater accumulating within the tank farm bund drains via gravity to two dedicated storm water sumps located in the southern side of the bunded tank farm area. From here, the water is pumped directly to the storm water lagoon. The pumping of this water is controlled by autonomous level monitoring. and is strictly governed by Continuous Emission Monitoring (CEM) system to ensure quality control, preventing contaminated water being pumped to the storm water lagoon (described in Section 2.5.2.)

The stormwater will be conveyed via a dedicated pumped system into the storm water lagoon:

- The pumped system will also be fitted with water-quality sensors to continuously monitor runoff collected within bunded areas.
- Where contamination is detected, the pump will automatically prevent discharge to the stormwater lagoon, ensuring isolation of potentially contaminated water within the bund.

In the unlikely event of contamination, water will be tankered off site.

Roof Area

Rainwater from building roofs, which is deemed uncontaminated, drains via a separate rainfall collection gulley network on each building which collects to a separate drainage network under the yard area which connects to the main collection sump. This is fully separated from potentially contaminated runoff.

- Roof runoff will be conveyed through catchpits with sumps, allowing settlement of debris and fine particulates and providing access for inspection and maintenance.
- As roof water is uncontaminated, no hydrocarbon interception is required; however, the inclusion of catchpits provides additional resilience and operational control.
- Roof water will discharge to the storm water lagoon.

Yard and Circulation Areas

Storm water from the internal road network and circulation areas is collected via a gravity-fed drainage network to a Class 1 Full Retention Interceptor, which alerts of any potential hydrocarbon spills, such as oil, diesel, or petrol. It is then drained to the main collection chamber as it is deemed uncontaminated.

Once the rainwater from the roof and the storm water from the yard reaches the main collection chamber, water is pumped to the stormwater lagoon. From there it is pumped back to the process water tanks to be used as supply for the facility.

- Runoff from plant carriageways and circulation areas will be collected via gullies, eco-drains and drainage kerbs incorporating sumps, providing primary sediment control at source.
- Flows will discharge into TII-specified catchpits with a minimum sump depth of 300 mm, providing secondary sediment settlement.
- A Class 1 Full Retention petrol/oil interceptor, designed in accordance with TII specifications, will be installed to remove hydrocarbons from runoff generated in trafficked and operational areas.
- The plant drainage network will be equipped with water-quality sensors designed to continuously monitor the characteristics of water collected within the system.



- Penstocks will be installed downstream of the interceptor and upstream of the lagoon .
 - Under normal operating conditions, uncontaminated runoff will be permitted to pass through the drainage network.
 - In the event that continuous emissions monitoring (CEM) indicates the presence of contamination or a spillage, the penstocks will automatically close to prevent discharge to the lagoon.
 - Contaminated runoff will instead be automatically diverted to the dedicated spillage containment system, thereby ensuring full isolation of polluted flows from the wider drainage system.
- A dedicated spillage containment system with a minimum capacity of 50 m³ will be provided to retain large spillages. This system will be located at a lower level than the drainage network to prevent reverse flows and to facilitate safe recovery and removal of contaminated material off site to an appropriately licensed facility.

This combination of continuous monitoring, automatic isolation, and controlled diversion provides an active and fail-safe layer of protection against accidental pollution.

Interceptor Drainage Network

Overland flows from the surrounding lands and the existing quarry cut will be intercepted downslope of the operational areas via a dedicated interceptor drainage system. It will primarily comprise of vegetated swales, designed to reduce flow velocities and promote sediment settlement. Check dams will be installed at regular intervals along the swales to:

- reduce runoff velocities
- increase hydraulic residence time
- promote settlement of suspended solids
- improve water quality prior to discharge

Where space constraints prevent the use of swales, filter drains will be provided as an alternative interceptor element. Interceptor drainage flows will discharge to the lagoon.

Internal Building Drainage

Drainage from internal operational areas (the Liquids Reception Building, Solid Reception Building, and Solid Storage Building) is separated from the external storm water networks. Wash water from these buildings is collected via a dedicated internal drainage network leading to specific dedicated sumps. This water is pumped to the Liquid Pre-Storage Tank, where it is used as process water for the anaerobic digestion process and ultimately pasteurised.

Foul Water

Foul water generated from the administration building and site welfare facilities (located in the liquid reception building and the heating centre) is managed independently. It drains to sealed underground storage tanks located beneath the proposed car park, the heating centre and the solid reception building. These tanks will be monitored and periodically emptied by a licensed waste contractor via tanker for off-site treatment at a private licensed wastewater facility.



2.5.2 Water Storage Areas

Process and Firewater Storage Tanks

The process and firewater tanks, which supply the site's operations, are filled using recovered water from the storm water lagoon and the main collection sump, supplemented by the site's groundwater well. This water is pumped directly to the tank area to be used in the anaerobic digestion process.

The proposed tanks will also store water for the purposes of firefighting. See Section 3.4 & 3.5.

Storm Water Lagoon

The internal drainage network provides approximately 703m³ of storage capacity within the proposed drainage network pipes with a further 135 m³ available with manholes. Of this 50 m³ of contaminated water can be isolated in an attenuation area. As described, there is an engineered stormwater lagoon (lined and covered) on site for the management of clean storm water. In the scenario where the storm water lagoon is at capacity, the process water tanks are at capacity (excluding freeboard capacity) and there is a 1 in 30-year storm event, clean excess water will be discharged to the existing drainage system in the R448 that flows to Powerstown Stream at greenfield rates over a 24-hour period.

The storm water lagoon has a surface area of 5,300 m², the average freeboard available is 0.45m giving additional retention amount of 2,385 m³. The reliance on freeboard capacity is an **extremely conservative assumption**. In reality the stormwater lagoon is designed to retain a 1 in 30-year rainfall event. Storage capacity is therefore de facto guaranteed, i.e. the 1 in 10-year rainfall event is available to be retained with the lagoons design capacity at all times.

In the event of a fire occurring at the same time as a 1 in 30-year storm event when the lagoon and process water tanks are full, there is freeboard capacity and additional further capacity within the drainage network to retain firewater on site.

Under normal conditions, the drainage network operates as follows:

- Clean water from the plant carriageway areas, roof areas and overland flow is attenuated in the covered sealed stormwater lagoon.
- A forebay will be provided at the lagoon inlet to manage first-flush runoff and capture residual sediment.
- The lagoon will include a settling zone, sufficient storage volume, and a minimum freeboard of 300 mm.
- It is designed for the 1-in-30-year storm event plus 20 % climate change allowance.
- Due to the quarry setting, the lagoon will operate as a drainless system, with exceedance flows managed by pumping.
- Pumping of exceedance flows will be restricted to the greenfield runoff rate for the combined tributary catchments and will be controlled such that the total exceedance volume is discharged gradually over a minimum period of 24 hours (minimum retention time) recommended to the TII specifications or best practice, ensuring:
 - prevention of sudden downstream flooding;
 - replication of greenfield runoff behaviour; and
 - enhanced sedimentation and water-quality improvement prior to discharge.



- The pump station associated with the lagoon will be equipped with water-quality sensors designed to continuously monitor lagoon water prior to pumping exceedance flows.
 - Pumping of exceedance flows will only occur where monitoring confirms acceptable water quality.
 - Where monitored parameters indicate contamination or abnormal conditions, the pump system will automatically shut down preventing discharge, ensuring retention of potentially contaminated water within the lagoon for further treatment and management.

These integrated, multi-stage and actively controlled design measures provide a robust, fail-safe approach to storm water management and significantly reduce the likelihood of adverse impacts on surface water quality, hydrological regimes, and downstream receptors. The discharge of water from the lagoon will be in accordance with the conditions of the IE licence.

There is no pathway for fire water to leave the proposed development by gravity flow or over topping due to the topography of the site. See Figure



Figure 2-4: Proposed Layout with Topography



Figure 2-4: Aerial View from Southwest Storm Water Lagoon proposed at western end of proposed development



3. PROPOSED FIRE MANAGEMENT AND FIREFIGHTING STRATEGIES

The site will operate in accordance with the Fire Safety at Non-Hazardous Waste Transfer Stations (EPA, 2013). This section provides a summary of the proposed fire management and firefighting strategies, focusing on elements relevant to the Firewater Risk Assessment (FWRA).

Fire management and firefighting strategies will be developed to reduce the quantities of firewater run-off generated in the event of a fire and are considered in the preparation the FWRA. The proposed management system for a fire event at the facility comprises of the following:

- fire prevention
- fire detection
- fire response
- fire suppression and firefighting

The facility staff will be trained in fire prevention, detection, response, suppression and firefighting.

Sections 3.1 to 3.4 provide a summary of the relevant firewater risk management and firefighting strategies that will be employed at the proposed site, including prevention of fire occurrence, early detection, emergency response, and suppression strategies. These measures are designed to minimise the likelihood of fire incidents, reduce the scale of potential fires, and limit the quantity of firewater generated in the event of an incident.

3.1 Fire Prevention

A Fire Prevention Plan for the proposed development will be prepared prior to commencement of facility operations. The prevention plan will identify potential fire hazards using the following criteria

- name/description of hazard
- physical location of the hazard within the facility
- potential source(s) of ignition for the hazard
- procedures for controlling the hazard including proper handling and storage procedures of hazardous materials, procedures for controlling accumulations of flammable/combustible materials, and/or procedures for the maintenance of safeguards on heat-producing equipment
- fire equipment necessary for controlling the hazard
- team member name and/or job title responsible for controlling the hazard
- team members exposed to the hazard

3.2 Fire Detection

A fire detection and alarm system will be designed, installed and maintained to IS 3218:2024 fire Detection and Alarm Systems – System Planning, Design, Installation, Commissioning, Servicing, and Maintenance (NSAI, 2024) at the proposed development.



The works associated with the proposed development shall comply in all respects with all relevant approved codes of practice (ACOP) and guidance including, but not limited to:

- Property loss prevention data sheets (continuous digesters and related process vessels). (FM Global, 2013)
- EN 60079 - Explosive atmospheres (all parts) (European Committee For Electrotechnical Standardisation (CENELEC), 2005)
- EN 14384: Pillar fire hydrant (European Committee for Standardization (CEN), 2005)
- EN 671: Fixed firefighting systems. Hose systems (European Committee for Standardization (CEN), 2025)
- EN 15004: Fixed firefighting system. Gas extinguishing systems (European Committee for Standardization (CEN), 2026)
- EN 12845: Fixed Firefighting systems. Automatic sprinkler systems. Design, installation and maintenance (European Committee for Standardization (CEN), 2026)
- EN 15001 – Gas infrastructure, all parts (European Committee for Standardization (CEN), 2024)
- National Fire Protection Agency (NFPA)standards including but not limited to:
 - o NFPA 11: Standard for low, medium and high expansion foam (National Fire Protection Association, 2021)
 - o NFPA 12: Standard on Carbon Dioxide Extinguishing Systems (National Fire Protection Association, 2022)
 - o NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems (National Fire Protection Association), 2022)
 - o NFPA 13: Standard for the Installation of Sprinkler Systems (National Fire Protection Association, 2022)
 - o NFPA 14: Standard for the Installation of Standpipe, Private Hydrants, and Hose Systems. (National Fire Protection Association, 2019)
 - o NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection (National Fire Protection Association, 2017)
 - o NFPA 16: Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems (National Fire Protection Association, 2019)
 - o NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection (National Fire Protection Association, 2022)
 - o NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances (National Fire Protection Association, 2022)
 - o NFPA 30: Flammable and Combustible Liquids Code (National Fire Protection Association, 2021)
 - o NFPA 72: National Fire Alarm Code (National Fire Protection Association, 2022)
 - o NFPA 80A: Recommended Practice for Protection of Buildings from Exterior Fire Exposures (National Fire Protection Association, 2024)
 - o NFPA 204 Standard for Smoke and Heat Venting (if required) (National Fire Protection Association, 2018)
 - o NFPA 750 Standard on Water Mist Fire Protection Systems (National Fire Protection Association, 2023)



3.3 Fire Response

The Operator and their nominated Facility Manager shall be responsible for the identification and provision of training for all relevant employees in:

- fire control
- fire protection equipment handling
- first aid
- evacuation control

The responsibilities of which shall be detailed in the Emergency Response Procedure (ERP) (see Appendix 2.1 CEMP in Volume 3 of this EIAR) which shall be updated by the Contractor at construction stage and again by the Operator prior to commencement of facility operations. All staff shall receive the appropriate training and have frequent refresher training events.

3.4 Fire Suppression and Firefighting

A pre-incident Fire Protection and Mitigation Plan for dealing with a fire and firewater runoff shall be prepared for the facility prior to commencement of facility operations and submitted to the local fire services for their information, as required by the guidance (EPA, 2019) when the site is operational. The pre-incident Fire Protection and Mitigation Plan shall contain a detailed site layout map showing the location of material storage, firewater retention areas, the designated fire quarantine area, high risk areas, as well as the location of all fire-fighting equipment.

A risk management programme, outlining how to control any potential firewater produced from a firefighting event, shall be prepared and maintained on site, as required by the guidance (EPA, 2019) when the site is operational. The detail and contents of the risk management programme shall be in accordance with Appendix D of the EPA Guidance on Retention Requirements for Firewater Run-off (EPA, 2019).

A consultation with Carlow County Fire and Rescue Services (CCFRS) was conducted at pre-application stage to confirm the requirements for fire suppression and firefighting measures on the site.

The details of the consultation are detailed in Section 3.5.

3.5 Consultation with Carlow County Fire and Rescue Services

This section records and incorporates the requirements confirmed by CCFRS during the design consultation phase for the proposed development.

These measures shall be embedded in the site's pre-incident Fire Protection and Mitigation Plan and ERP.

Firefighting Water Demand and Sources:

- Provide a dedicated onsite firefighting water supply capable of supporting two fire units at 1,000 L/min each for two hours, 240 m³ total available volume.
- Firefighting water may be drawn from the proposed process and fire water storage water tanks and/or the stormwater lagoon, or a combination of both.



Hydrants and Distribution:

- Hydrant locations for individual buildings shall comply with Technical Guidance Document B 2024-Fire Safety-Volume 1 Buildings other than Dwelling Houses (Government of Ireland, 2024)
- Hydrants shall be served by a dedicated internal pumped rising main (≥ 150 mm diameter) providing 3-4 bar operating pressure at the hydrant.
- Hydrants shall be supplied for the proposed fire and process water storage tanks.

Pumping and Standby Power

- Proposed firewater pumps shall be backed up by means of a diesel electric generator (or similar) for use in the event of power failure.

Biomass Storage Bunker

- A water monitor or deluge system is required within the biomass storage bunker at the Heating Centre.

Incident Response and CCFRS Engagement

- CCFRS will engage with the developer during the construction/pre-operational stage, with respect to incident response planning.
- Thereafter, incident response coordination/consultation shall be updated on a periodic basis (every 3 years).
- Incident response planning will require the Operators support for onsite training exercises.

A record of the meetings with CCFRS are in Appendix 2 and 3 of this report.



4. MATERIALS ASSESSMENT

An assessment of the materials to be stored and handled at the proposed facility is required to establish the potential fire load and identify substances that could contribute to firewater generation or pose environmental hazards in the event of a fire. The types and quantities of materials handled on site directly influence the firewater retention requirements and inform the scenarios to be modelled in the FWRA.

This section identifies the expected materials at the proposed development. It identifies storage arrangements and indicative quantities of feedstocks, process intermediates, fuels and utilities, as well as the associated fire and environmental hazard characteristics. This information was used to assess the proposed development against the firewater retention qualifying criteria (described in Section 5.2 of this report), to undertake the FWRA (described in Section 5.3), and to determine the firewater retention capacities required at the site (described in Section 6.)

4.1 Types and Quantities of Materials

The proposed development is designed to manage the feedstock materials SFYM and LFYM on a near continual basis.

The equipment shall adhere to industry-standard specifications for continuous operation, ensuring the required availability rate.

The maximum quantities of each type of combustible materials (waste, agricultural residues and biomass), which can become entrained in and add to firewater in a fire event, which will be present at the proposed development is shown in Table 4-1.

Table 4-1: Types and Quantities of Materials Present On-site

Material	Description	Indicative Maximum On-Site (for FWRA)	Combustibility
Liquid Feedstock & Digestate	Cattle, pig and poultry slurries Liquid Digestate i.e. entire contents of tank farm area tanks	134,000 m ³	Non-Combustible
Solid Feedstock	FYM, high-grade FYM (straw-based), poultry manure, horse manure and cattle manure.	≈ 2,880 t	Limited Combustion Potential
Liquid CO ₂	CO ₂ production 4.6 t/h; ≥4 days storage	≈ 440 t liquid CO ₂	Non-Combustible
Biogas	Upgrading input up to 5,500 Nm ³ /h; ≥2 h viable storage	≈ 11,000 Nm ³ biogas equivalent	Combustible
Wood chips	Annual throughput ≈13,000 t/yr; ≥5 days storage Enclosed bunker with automatic dosing.	≈ 180 t (5 day average)	Combustible
Solid Digestate (fibre)	Indoor storage; odour-controlled 620 m ³ (≥4 days production)	620	Limited Combustion Potential
Diesel (standby generator)	Critical Infrastructure	5,000 Litres	Combustible



4.2 Hazards Associated with Materials

Hazard Statements (H-Statements) describe the nature of the hazard associated with a substance or mixture and are defined in the Classification, Labelling and Packaging 'CLP' Regulation (EC) No. 1272/2008 and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). H-Statements are summarised into groups related to their physical, health, and environmental hazards.

To assess the proposed development against the first firewater retention qualifying criteria (described in Section 5.1 of this report), proposed materials with environmental H-Statements must be identified and quantified. Furthermore, to undertake the FWRA (described in Section 5.3 of this report), materials with physical H-Statements (i.e. flammable) must be identified and quantified.

The agricultural feedstocks are not classed as having either an environmental H statement or a physical H statement. Some of the agricultural materials are potentially combustible (e.g. high-grade farmyard manure).

A detailed overview of all H-List materials on site is detailed in Section 5.2.1.



5. FIREWATER RISK ASSESSMENT

The proposed development is first assessed against the firewater retention qualifying criteria, to determine if the proposed development is obligated to provide firewater retention. If the criteria are met, provision of firewater retention at the site is automatically required.

However, if the site is below these criteria, firewater retention is not automatically required² and the FWRA is undertaken to determine the site-specific requirements.

The following steps in the FWRA are addressed in this section:

- site zoning
- firewater retention qualifying criteria
- firewater risk assessment analysis

5.1 Site Zoning

Facilities can be separated into different assessment zones based on a minimum of two-hour fire walls between buildings, compartmentalising within buildings, or a minimum of 15 m separation distance between zones.

For this FWRA, the site has been divided into the following assessment zones:

Zone	Zone Name	Zoning Justification
1	Administration Building	15m separation to all other buildings.
2	Solid Reception Building	Solids reception building is separated from the Solids digestate building by a two-hour fire rated dividing wall. The storage of feedstock materials in the solids reception building is limited to the centrally located solids storage bunker. The bunker provides significant fire compartmentalisation (i.e. 4m deep bunker with concrete reinforced retaining walls). The solids bunker is located approx. 19.5m from the solids digestate storage building. The risk of fire spread is therefore considered extremely low to negligible based on the significant compartmentalisation provided within the bunker, the internal distance from the bunker to neighbouring building and the limited combustion potential of the SFYM stored i.e. high moisture content (30-50%).

² As states the proposed development is classified as a lower tier COMAH sites. As guidance, (EPA, 2019) "Such facilities generally require firewater retention, due to the large quantities of dangerous substances present on site." For completeness an assessment against the qualifying criteria and subsequent FWRA has been completed.



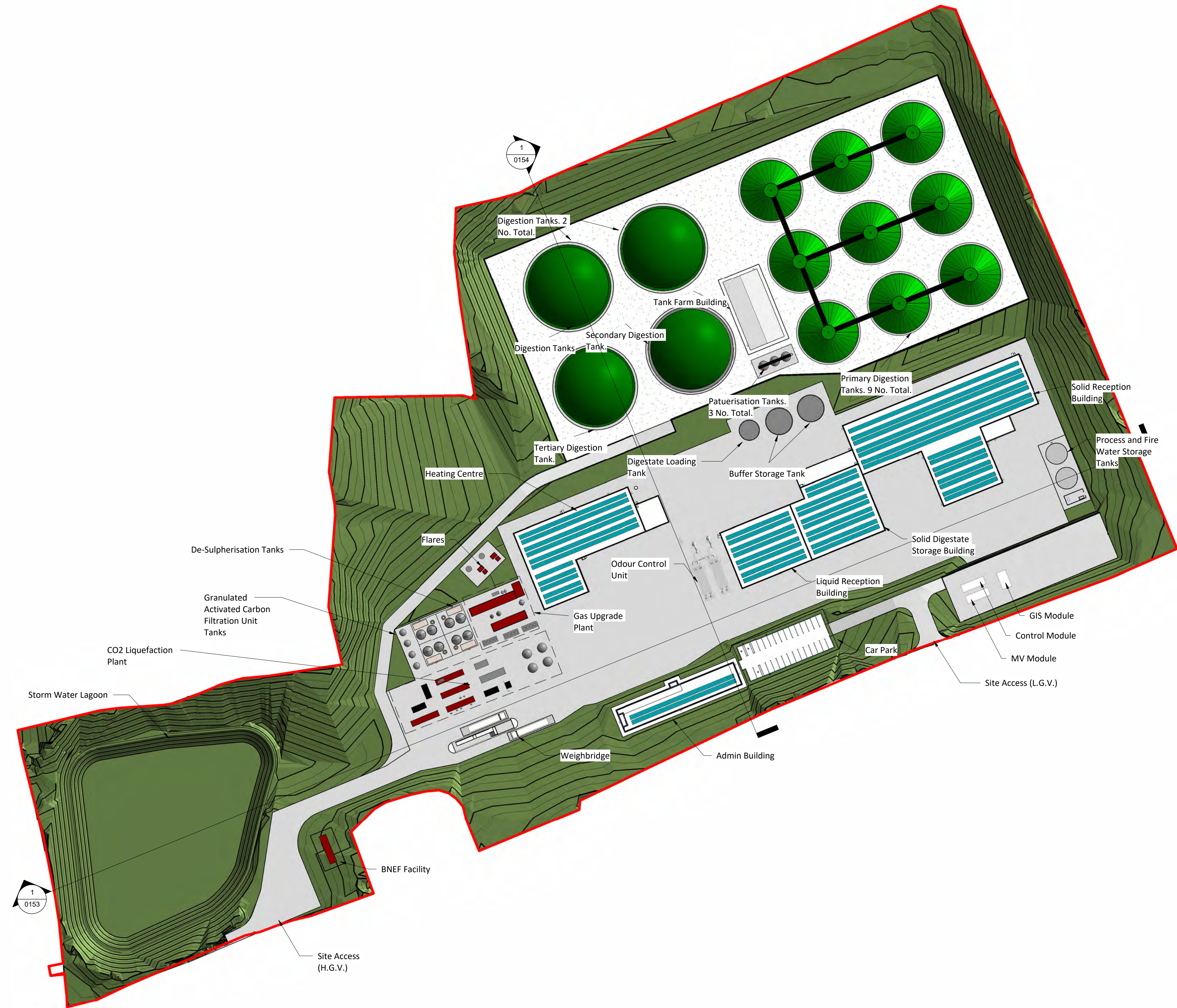
Zone	Zone Name	Zoning Justification
3	Solid Digestate Building and Liquid Reception Building	The solids digestate storage building is separated from the solids reception building by a two-hour fire rated dividing wall. The storage of materials within the solids digestate storage building is contained by a 5m reinforced concrete retaining wall. This structure provides a fire break wall. The solids digestate storage building is located 19.5m from materials stored in the solids reception buildings solids bunker (See Zone 2 Justification). The risk of fire spread is considered extremely low to negligible based on the significant compartmentalisation provided, the internal distance between the stored materials and the limited combustion potential of the solid digestate stored i.e. high moisture content.
4	Tank Farm	A minimum of 10m separation is provided to all zones.
5	Heating Centre	The storage of materials within the Heating Centre is limited to the biomass storage bunker. The bunker provides significant fire separation i.e. reinforced concrete retaining wall to the entire storage perimeter, significantly reducing the risk of fire spread. An automated fire detection system and water deluge canon will be located within the biomass storage bunker area, further reducing the risk of fire spread. The Heating Centre is separated from the gas upgrade area by a two-hour fire rated building fabric
6	Emergency Flare Compound	Minimum 10m Separation form all other zones. There are no flammable or combustible materials present in the Emergency flare compound. The risk of fire spreading is considered low to negligible.
7	Gas Upgrade Area	The gas upgrade area is separated from the Heating Centre by a two-hour fire rated building fabric. See Heating Centre zoning justification for further information.

The location of each building is shown in the proposed site layout in Figure 5-1.



Legend

— Planning Boundary



PROPOSED SITE LAYOUT PLAN
Scale 1 : 1000

Rev.	Description	App By	Date

PROJECT	POWERSTOWN BIOENERGY	CLIENT					
SHEET	PROPOSED SITE LAYOUT PLAN	Date	08/06/25	Project Number	P24188	Scale (at A1)	
						As indicated	
		Drawn by	NW	Drawing Number			Rev
		Checked by	Checker	P24188-FT-XX-XX-DR-CE-0110			



5.2 Firewater Retention Qualifying Criteria

The qualifying criteria, which if met, obliges all sites licensed by the EPA to provide firewater retention. If the site or site zones are below the criteria, then a FWRA must be undertaken to determine if firewater retention is required.

The two qualifying criteria are:

- environmentally hazardous substance storage threshold
- environmental receptor criteria

These are described in the following sections.

5.2.1 Environmentally Hazardous Substance Storage Threshold

Only substances with 'environmental' H-Statements, as defined in the Classification, Labelling and Packaging 'CLP' Regulation (EC) No. 1272/2008, are considered for this criterion. The substances with environmental H-Statements are in the range H400 – H499.

Agricultural residues to be processed on-site are not assigned an 'environmental' H statement.

Biomass (woodchips) used in the Heating Centre and stored in the biomass bunker in the Heating Centre are not assigned an 'environmental' H statement.

An inventory of process consumables to be stored at the proposed development and associated H-List assignments are detailed in Table 5-1 along with the storage threshold.



Table 5-1: H-List Inventory: Process Consumables

Name	Volume (Litres)	Location	Zone	H – List	Above Threshold ³
Diesel Fuel	5000		3	H411: Toxic to aquatic life with long lasting effects.	No
Polyamine	200 ⁴	Heating Centre	5	H290 May be corrosive to metals H302 Harmful if Swallowed H304 May be fatal if swallowed and enters airways H312 Harmful in contact with skin H314 Causes severe skin burns and eye damage H315 Causes Skin Irritation H318 Causes serious eye damage H319 Causes serious eye irritation H332 Harmful if inhaled H335 May cause respiratory irritation H372 May cause damage to organs through prolonged or repeated exposure H400 Very toxic to aquatic life H410 Very toxic to aquatic life with long lasting effects H412 Harmful to aquatic life with long lasting effects	No
Anti Foam (Rapeseed oil)	100	Gas Upgrade Area	7	None listed on datasheet	No relevant codes (H400, H401, H402, H410, H411, H412, H413)
NPK Liquid Fertiliser	3000	Gas Upgrade Area	7	H272 May intensify fire; oxidizer H302 Harmful if swallowed H319 Causes serious eye irritation WGK 1, Slightly hazardous to water	
Glycol Cooling Liquid	2500	Gas Upgrade Area	7	H302: Warning Harmful if swallowed H373: May cause damage to organs (kidney) through prolonged or repeated exposure (if swallowed) WKG 1, slightly hazardous to water	

³ Thresholds as defined in Table 2.1 of guidance (EPA, 2019)

⁴ Polyamine - H400, H410 listed, Threshold Value 1 tonne, therefore not above threshold.



Name	Volume (Litres)	Location	Zone	H – List	Above Threshold ³
Sulphuric Acid 96%	5	Liquid Reception Building - Laboratory	3	H290: May be corrosive to metals H314: Causes severe skin burns and eye damage H318: Causes serious eye damage	
Inhibited Sulphuric Acid	2000	Liquid Reception Building	3	H290: May be corrosive to metals H314: Causes severe skin burns and eye damage H318: Causes serious eye damage	
Sodium Hydroxide	1000	Liquid Reception Building	3	H290 Danger May be corrosive to metals H314 Causes severe skin burns H318 Serious eye damage/Eye irritation	
Inhibited Hydrochloric Acid	2000	Liquid Reception Building	3	H290 May be corrosive to metals H302 Harmful if swallowed H314: Causes severe skin burns and eye damage H332 Harmful if inhaled H335 May cause respiratory irritation	
Hydrocarbon/CO2 cooling agent	3000	CO2 liquefaction unit and heating area	7	No H codes listed	
Amine Liquid	12,000	Gas upgrade area, inside container	7	H319 Causes serious eye irritation	
Hydraulic Oil	500	Workshop (Solid Reception Building)	2	No H statements listed	
Adblue	1,000	Workshop (Solid Reception Building)	2	No H statements listed	
Hydrogen Peroxide (30% in water)	113,800	Odour Control Unit	3	H302: Warning Harmful if swallowed H332 Harmful if inhaled H332 Harmful if inhaled	



Name	Mass (kg.)	Location	Zone	H – List	
Salt Tablets	100	Gas Upgrade Area	7	WGK 1, Slightly hazardous to water	No relevant codes (H400, H401, H402, H410, H411, H412, H413)
Sorbead - Drying Agent	2000	Gas Upgrade Area	7	99% Silicon dioxide No H-statement or WGK listed	
Ferric Powder	2000	Liquid Reception Building	3	H228: Flammable solid H251: Self-heating; may catch fire.	
Activated Carbon	23,000	Workshop (Solid Reception Building)	2	No H statements listed	
SulpaRed	1.5	Workshop (Solid Reception Building)	2	No H statements listed	



MSDS sheets for each of the above substances are in Appendix 3 of this report.

5.2.2 Environmental Receptor Criteria

The environmental receptor criteria consider proposed developments whose activities involve potentially polluting substances and have a direct storm water discharge from source to receptor. “Developments whose activities involve potentially polluting substances and have a direct storm water discharge to any of the following receiving waters will require firewater retention.

- municipal drinking water intake points
- designated bathing waters
- freshwater pearl mussel rivers
- designated shellfish waters
- water bodies characterised as High Status under the Water Framework Directive
- Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Natural Heritage Areas (NHA)”

The relevant information from the EPA Geoportal website (<http://gis.epa.ie>), the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I. No. 296 of 2009) and the European Communities (Quality of Shellfish Waters) Regulations S.I. No. 268/2006, S.I. No. 55/2009 and S.I. No. 464/2009 was reviewed, and the following was determined:

Table 5-2: Environmental Receptor Criteria

Receptor	Comment
Municipal drinking water intake points	No direct discharge
Designated bathing waters	None in vicinity
Freshwater pearl mussel rivers	No direct discharge
Designated shellfish waters	None in vicinity
Water bodies characterised as High Status under the Water Framework Directive	No direct discharge
Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Natural Heritage	No direct discharge

The proposed site is below the threshold for the environmental receptor criteria as shown in Table 5-2.

There is **no** direct surface water discharge from the proposed facility to surface water or any of the environmental receptors in Table 5-2 in the event of a fire. Section 2.5 describes the storm water management system for the proposed development.

As the proposed development is below both the environmental hazardous substance storage threshold as per Table 2.1 of guidance (EPA, 2019). The site when assessed against the environmental receptor criteria also does not automatically require firewater retention due to there being no direct surface water discharge from the site.



A FWRA must therefore be undertaken to determine if there is a requirement for firewater retention and if so, the retention capacity required.

5.3 Firewater Risk Assessment Analysis

In the previous section it was determined that the site was below the qualifying criteria and does not automatically require firewater retention. A FWRA must be undertaken for the site to determine if there is a requirement for firewater retention, and if so the appropriate type and capacity of retention required.

The FWRA evaluates the requirement for retention of each zone against the following criteria:

- significance of a fire event
- environmental hazard potential
- firewater run-off risk

The EPA Microsoft Excel based FWRA Tool, was populated with the relevant information to provide a rating for the significance of a fire event, the environmental hazard potential and the firewater risk run-off.

The required inputs to the FWRA tool are as follows:

- Significance of Fire Event (S)
 - o Quantities and types of flammable and combustible materials?
 - o Is fire detection in place?
 - o Are sprinklers in place?
- Environmental Hazard Potential (H)
 - o Quantities and Types of 'Hazardous to the Aquatic Environment' Materials (H400, H401, H402, H410, H411, H412, H413)?

The output of the significance of a fire event, shown in Table 5-3, along with the output of the hazard potential, shown in Table 5-4, determines the overall firewater run-off risk, shown in Table 5-5.

If the overall firewater run-off risk is R0 – No Risk, then no dedicated firewater retention is required. If the overall risk is R1 – Risk of Environmental Contamination, then firewater run-off must be retained within the operational site. In the case of R1, the FWRA tool can be used to calculate retention volume required using the appropriate calculation method (detailed in Section 6).

Table 5-3: Evaluation of Significance of a Fire Event

Significance (S)	Description
S1	Low Significance
S2	Medium Significance
S3	High Significance



Table 5-4: Evaluation of Hazard Potential

Hazard Potential (H)	Description
H0	No Hazard Potential
H1	Hazard Potential

Table 5-5: Evaluation of Firewater Run-Off Risk

Significance	Hazard Potential	
	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

5.3.1 Overall Firewater Run-Off Risk

The FWRA Tool was populated for each zone to determine the requirement for firewater retention and to calculate the retention volume required where applicable.

Zone 1, 6 and 7 were assigned an overall firewater run-off risk of R0 – No Risk. As a non-significant amount of combustible, flammable or environmentally hazardous materials will be stored in these zones. These Zones were classed as having a ‘Low Significance’ and ‘No Hazard Potential.’

Zone 2, 3, 4 and 5 were assigned an overall firewater run-off risk of R1 – Risk of Environmental Contamination. Firewater retention must be provided for these zones.

The overall firewater run-off risk for each zone identified using the FWRA tool for each zone is summarised in Table 5.4.

The firewater retention capacities required for Zones 2, 3, 4 and 5 are calculated in Section 6. See Appendix 5 for relevant supporting calculation worksheets.



Table 5-6: Overall Firewater Run-off Risk for Each Zone

Zone	Zone Name	Significance of Fire Event	Hazard Potential	Overall Firewater Run-Off Risk	Firewater Retention Required
1	Administration Building	S1	H0	R0	No
2	Solid Reception Building	S3	H0	R1	Yes
3	Solid Digestate Building and Liquid Reception Building	S3	H0	R1	Yes
4	Tank Farm	S3	H0	R1	Yes
5	Heating Centre	S3	H0	R1	Yes
6	Emergency Flare Compound	S1	H0	R0	No
7	Gas Upgrade Area	S1	H0	R0	No



6. RETENTION CAPACITY CALCULATIONS

This section details the calculation methodologies and the application of these to calculate the firewater retention capacity required in:

- Zone 2: Solid and Liquid Reception Building & Solids Storage Building.
- Zone 3: Liquid Reception Building & Solids Storage Building.
- Zone 4: Tank Farm
- Zone 5: Heating Centre

6.1 Retention Capacity Calculation Methodology

Three methods to calculate the firewater run off retention requirements are:

- Method 1: Warehouse Retention Calculation
- Method 2: Bunded Tank Farm / Process Plant Retention Calculation
- Method 3: General Retention Calculation

The most appropriate calculation method is selected based on the site or zone characteristics and the availability of accurate data. Each of the methods are summarised below.

6.1.1 Method 1: Warehouse Retention Calculation

This method is appropriate for warehouse storage and is based on the Swiss Federation Firewater Retention Practical Guide (REF) and considers the size of the warehouse (m²), the storage density, and the fire protection measures in place. This method is only likely to be suitable to warehouses built to high specifications and is not suitable for waste sites (EPA, 2019).

6.1.2 Method 2: Bunded Tank Farm / Process Plant Retention Calculation

This method is appropriate for tank farms and is based on inventory, fire protection measures, estimated extinguishing time, and local containment. It requires significant information on the design of the Bunded Tank Farm or process plant fire protection measures.

The firewater retention capacity using Method 2 calculated as follow:

$$V_R = V_T + W_E + W_F + R_W - E$$



Where:

- V_R = Firewater Retention Required
- V_T = Volume of Process / Product Contribution (e.g. Largest Tank only)
- W_E = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)
- W_F = Cooling Water for Adjacent Tanks
- R_w = Rainwater Contribution
- E = Retention Volume Directly Available (i.e. capacity at area on fire only).

This method is only suitable for Zone 4 in this instance as it is the only Zone that contains a tank farm.

6.1.3 Method 3: General Retention Calculation

This method is based on the worst-case firewater volumes that could be generated. It is used if Methods 1 or 2 are deemed to be inappropriate, or the required information or expertise is not available.

This method was the appropriate method to use in this instance and has been used in the retention requirement calculations for Zone 2, 3 and 5 detailed in Section 6.

The firewater retention capacity using method 3 is calculated as follows:

$$V_R = V_P + W_E + R_w - E$$

Where:

- V_R = Firewater Retention Required
- V_P = Full volume of Product Loss
- W_E = Extinguishing Medium (Water & Foam)
- R_w = Rainwater Contribution
- E = Retention Volume Directly Available (i.e. capacity at area on fire only).

6.2 Retention Capacity Calculations

Zone 2, 3, 4 and 5 were considered for the firewater retention requirement calculations.

The General Retention Method 3 was used to determine firewater retention requirements for Zone 2, Zone 3 and Zone 5. Method 2 was used to determine the firewater retention requirements for Zone 4.

The following assumptions were made in the firewater retention capacity calculations:

- A 1:10 year (24hr) rainfall event value of **56.4mm** as provided by Met Eireann in Appendix 1.
- The total firefighting water volume has been confirmed by CCFRS as 240 m³ (2 No. fire units at 1,000 L/min for 2 hours), see Section 3.4.1 for details of the consultation with CCFRS.
- Firefighting water will be sourced from the proposed process and fire water tanks and distributed via an internal fire water rising main.



The FWRA calculation sheets are in Appendix 5.

6.2.1 Zone 2: Solid Reception Building

The solids reception building is for the reception of SFYM. It is located at the eastern end of the site.

Assumptions

- Quantities of materials are as per Section 4.1.
- The shared drainage catchment area is assumed to comprise the full yard area of approximately 33,000 m² including building footprints.

Calculations:

Table 6-1: Zone 2 Calculation

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)	n/a	Carlow County Council Senior Assistant Fire Officer agreement, refer to Section 3.5 and Appendix 2 for full memorandum
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours	n/a	
1.3	Max Fire Water volume from hydrants during Fire Event m ³	n/a	
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)	n/a	
1.5	Total Fire Water/Foam Stored on Site (m ³)	240	
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document (EPA, 2019) for further information	0*	See note below table Solid materials - Agricultural Residues is completely contained within a large precast concrete bunker.
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33,000	Common Drainage Area - Yard Hardstanding and Building Footprints
1.8	1 in 10 year 24 hour rainfall event for local area (m)	0.0564	Met Eireann Data
1.9	Rain Water (m ³)	1,861	Based on Total Yard Area and Met Eireann Data
	Fire Water Retention Required (m ³)	2,101	



*The volume 2,842 m³ of the SFYM i.e. product located in Zone 2 is stored in its entirety within an underground reinforced concrete bunker with the following characteristics:

- Depth: 4.0 m
- Surface area: 706 m²
- containment volume: 2,824 m³

This bunker effectively functions as a discrete bunded structure. In accordance with Section 5.4 of the EPA Guidance on Retention of Firewater Runoff (EPA, 2019), bunded areas may be credited towards firewater retention where the contents of the bund are directly involved in the fire event and where it is reasonably foreseeable that firewater will be generated and captured within the bund during a fire.

Additionally, the SFYM material in Zone 2 is characterised by:

- Very high moisture content - 30-50%
- Non-flammable and not subject to self-heating
- Has the capacity to become fully saturated within the during a fire event without displacement or product loss

In the extremely unlikely event of the SFYM igniting the entirety of the bunker could be filled with water until the material is entirely saturated with no loss of material or fire water.

6.2.2 Zone 3: Solid Digestate Building and Liquid Reception Building

The solid digestate building is for the separation of digestate into solid and liquid digestate following the pasteurisation process. Post separation all solid digestate will be stored within the solid digestate building before transfer offsite.

Liquid feedstock will be delivered to the proposed development in sealed tankers to the liquid reception building. These buildings are located adjacent to each other in the centre of yard area at the eastern end of the site.

Assumptions

- Total digestate generation is 46,405 tonnes per annum, in accordance with Section 4.4.18 Digestate Management of Chapter 3 (Description of Development).
- The facility is assumed to operate 365 days per year, resulting in an average daily digestate production of approximately 127.1 tonnes.
- Solid digestate storage capacity is based on 5 days of storage, equating to approximately 636 tonnes.
- Liquid digestate is not stored within this building and is transferred directly to the Bunded Tank Farm for storage.
- The shared drainage catchment area is assumed to comprise the full yard area of approximately 33,000 m² including building footprints.



Calculations

Table 6-2: Zone 3 Calculation

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)	n/a	Carlow County Council Senior Assistant Fire Officer agreement, refer to Section 6.1.1 and Appendix 2 for full memorandum
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours	n/a	
1.3	Max Fire Water volume from hydrants during Fire Event m ³	n/a	
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)	n/a	
1.5	Total Fire Water/Foam Stored on Site (m ³)	240	
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document (ref) for further information	0*	See note below table
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33,000	Common Drainage Area - Yard Hardstanding and Building Footprints
1.8	1 in 10 year 24hour rainfall event for local area (m)	0.0564	Met Eireann Data
1.9	Rain Water (m ³)	1861	Based on Total Yard Area and Met Eireann Data
	Fire Water Retention Required (m ³)	2101	

*The volume 636 m³ of the product located in Zone 3 is stored within a reinforced concrete storage area. The building is constructed such that:

- The entire structure is set 0.2 m below the surrounding yard level, enabling containment.
- The digestate storage area is enclosed by reinforced concrete walls:
 - 5 m high on three sides, 1 m high on the final side
 - 620 m² in surface area

This configuration forms an effective bunded containment area. In accordance with Section 5.4 of the EPA Guidance on Retention of Firewater Runoff (EPA, 2019), this bunded area of 620 m³ in volume may be used as firewater retention where the contents of the bund are directly involved in the fire event and where firewater generation and capture within the bund is reasonably foreseeable.

The stored solid digestate material in Zone 3 is characterised by:

- Very high moisture content of ca. 70-75%
- non-flammable and not subject to self-heating
- has the capacity to become fully saturated during a fire event without displacement

Given the configuration of the solid digestate building and the nature of the solid digestate it is assumed that the entirety of the solid digestate product shall be accommodated within the building itself in the event of a fire.



6.2.3 Zone 4: Bunded Tank Farm

The tank farm will comprise 16 no. tanks required for the anaerobic digestion process, these include 6 no. Primary digester tanks, 3 no. Secondary digester tanks and 1 no. Tertiary digester tanks. Additionally, there will be 1 no. Post Digestion Liquid Digestate Storage Tank, 1 no. Liquid Pre-Storage Tank, 1 no. Digestate Storage Tank and 3 no. Pasteurisation tanks located in the tank farm. These tanks are all contained in a concrete bund.

Assumptions

- In accordance with Section 4.3.1 of the EPA Guidance on Retention of Firewater Runoff (EPA, 2019), and due to the presence of an automatic fire protection system, only the volume of the largest vessel has been included in the calculation of product contribution. Accordingly, the contents of one 12,026 m³ reactor have been assumed.
- Although tank farms and process plants typically store flammable materials, the tanks within this facility store non-flammable agricultural slurry. Any gases generated are appropriately captured, transferred, and treated elsewhere on site before export off site.
- Given the nature of the material stored, only minimal automatic fire-fighting systems are required.
- Rainfall contribution has been calculated based on the bunded surface area of approximately 18,900 m².
- The retention volume directly available within the bunded area is 40,987 m³.

Calculations as per Section 6.1.2

Table 6-3: Zone 4 Calculation

	m ³
Volume of Process / Product Contribution (VT)	12,026.00
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	-
Cooling Water for Adjacent Tanks (WF)	240.00
Rainwater Contribution (Rw) - see Section 4.6.2 of guidance (EPA, 2019)	1,065.96
Retention Volume Directly Available (i.e. capacity at area on fire only)	40,987.00
Fire Water Retention Required (VR)	-27655 m³

As the retention volume within the tank farm bund directly available exceeds the retention volume required, 0 m³ of additional firewater storage is required.

6.2.4 Zone 5: Heating Centre

The heating centre includes a biomass storage area, 2 no. biomass boilers and an ash storage area.

Assumptions:

- A biomass fuel storage quantity of 180 tonnes of wood chips has been assumed, in accordance with Table 4-1.
- The shared drainage catchment area is assumed to comprise the full yard area of approximately 33,000 m².



Calculations:

Table 6-4: Zone 5 Calculations

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)	n/a	Carlow County Councils Senior Assistant Fire Officer agreement, refer to Section 6.1.1 and Appendix 2 for full memorandum
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours	n/a	
1.3	Max Fire Water volume from hydrants during Fire Event m ³	n/a	
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)	n/a	
1.5	Total Fire Water/Foam Stored on Site (m ³)	240	
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information	0*	See note below table
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33,000	Common Drainage Area - Yard Hardstanding and Building Footprints
1.8	1 in 10 year 24hour rainfall event for local area (m)	0.0564	Met Eireann Data
1.9	Rain Water (m ³)	1,861	Based on Total Yard Area and Met Eireann Data
	Fire Water Retention Required (m³)	2,281	

* The volume of the product (biomass) located in Zone 5 is stored within a reinforced concrete bunkered area. The building is constructed such that:

- The biomass storage area is enclosed by reinforced concrete walls:
 - 5.5 m high on each side
 - 515 m² in surface area
 - 2832 m³ of effective bunded area

This configuration forms an effective bunded containment area. In accordance with Section 5.4 of the EPA Guidance on Retention of Firewater Runoff (EPA, 2019), this bunded area may be used as firewater retention where the contents of the bund are directly involved in the fire event and where firewater generation and capture within the bund is reasonably foreseeable.

Given the configuration of the bunker, it is assumed that the product volume of 180 m³ can be accommodated within the bunker itself and will not contribute to the fire water retention requirement.

On this basis, the residual firewater volume of 2,101 m³, is required to be retained on site for Zone 5.



6.2.5 Summary

The firewater retention capacities calculated for each zone are outline in Table 6-5. The refined firewater retention volumes for Zones 2, 3 and 5 are identical. This outcome is expected, as the controlling contribution arises from firewater and rainfall falling on the shared drainage catchment area, which is common to all three zones.

Table 6-5: Zone Summary: Firewater Retention Capacity

Zone	Zone Name	Calculation Method	Retention Capacity Required (m ³)
2	Solids Reception Building	3	2,101
3	Solids Digestate Building & Liquid Reception Building	3	2,101
4	Tank Farm	2	0
5	Heating Centre	3	2,101

The largest retention capacity required is 2,101 m³ for Zone 2, 3 and 5.



7. DESIGN OF FIREWATER RETENTION SYSTEMS

In this section, the available firewater retention capacity for the facility is calculated based on the design of the proposed development. The available capacity is then compared with the required capacity (as established in Section 5.), and any additional design measures needed to meet firewater retention requirements are identified.

7.1 Firewater Retention Systems

The firewater retention system has been designed in accordance with the EPA Guidance on Retention of Firewater Runoff (EPA, 2019), adopting a conservative, worst-case approach initially, followed by refinement based on site-specific containment features and material properties.

The worst-case volume is 2,101 m³, as shown in Table 6-5.

In the event of a fire (in all areas excluding Zone 4 refer to Section 7.1.1), firewater not captured within the footprint of each building will flow via the site drainage system to the “main drainage sump” (refer to Section 2.5 for drainage details). Fire water will be pumped from the sump for storage in the stormwater lagoon. The main drainage sump pumps will be connected to the sites critical power supply system i.e. emergency diesel generator. Duty and Standby pumping capacity shall also be available. The stormwater lagoon is designed with a freeboard to provide firewater retention in case of fire.

In the 1 in 10 storm event occurring, it is assumed that the proposed stormwater lagoon has a firewater retention capacity of 2,385 m³. This provides storage for the full amount of firewater retention needed in the worst-case scenario.

Pumping from the storm water lagoon via the Emergency discharge line is not anticipated under normal working scenarios due to the significant need for water usage within the proposed process. Pumping via the emergency discharge shall be manually controlled and subject to testing. Additionally control systems shall ensure emergency discharge pumps cannot operate in the event of a fire alarm being triggered across any area of the site.

The proposed development lies at a lower elevation than the surrounding lands, forming a naturally enclosed basin, surface water cannot discharge from site to local surface watercourses without being pumped out. There is a drainage system within the paved areas, unpaved areas, building roof areas and, bunded areas all draining to the stormwater lagoon.

There is no opportunity for the direct discharge of surface waters from the site in the event of a fire. All fire water shall be pumped to the surface water lagoon for storage and will be tankered off site to a private wastewater treatment facility if contamination is detected

The entire yard area is covered with impermeable concrete hardstanding. The site will be bounded by a continuous raised perimeter made up of raised kerbs and a ramp access which will serve to prevent the egress of firewater off-site in the event of a fire or environmental incident.

7.1.1 Fire Water Retention System: Tank Farm

In the event of a fire with Zone 4: Tank Farm, all firewater shall be retained within the bund area itself. The proposed bund area is designed with 2 no. storm water sump locations.



Under normal operating circumstances, the continuous emissions monitoring (CEM) control system shall work as follows. The bund sump pumping control default position shall be OFF. Only in the event that all CEM probes are detecting within the preset range for clean storm water will the pumps switch to ON. In the unlikely event of firewater being present in the surface water (in the absence of a fire alarm activation) the installed CEM will detect the presence of contamination switching the pumping system to OFF.

The proposed Bunded Tank Farm pump control system shall in the event of a fire detection or alarm in any location across the facility shall be designed to switch OFF. No pumping from the bund area will be possible during a fire alarm activation.

The CEM system and additional discrete sampling will determine water quality to inform whether retained fire fighting water can be discharged to the storm water lagoon, or if it is suitable for use as process water, or if it has to be tankered off site for treatment at a private wastewater treatment facility.

7.1.2 Construction Quality Assurance

All bunded containment systems on site will be designed, constructed, and maintained in accordance with the:

- IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities (EPA, 2013)
- Guidance on Retention Requirements for Firewater Run-Off (EPA, 2019)
- CIRIA C736 Containment systems for the prevention of pollution, secondary, tertiary and other measures for industrial and commercial premises (CIRIA, 2014)

and the structural and impermeability requirements of

- BS 8007 Code of practice for design of concrete structures for retaining aqueous liquids (BSI, 1987)
- Eurocode 2: Design of concrete structures (European Commission, 2006)

All bunded areas shall be subject to appropriate independent construction quality assurance, integrity testing and periodic inspection in accordance with EPA guidance, "Note on Storage and Transfer of Materials for Scheduled Activities, (EPA, 2013)).

Proposed integrity testing shall be completed by a suitably qualified engineer and be in line with Agency's guidance on bund testing as required under the guidance (EPA, 2013). Integrity testing will be condition of the IE licence required to operate the proposed development.

The details of the bunded area are as detailed in the following sections.

7.1.2.1 *Zone 2 Solid Reception Building*

The bund in the Solid Reception Building (Zone 2) is in the solids bunker; it will function as containment for solid feedstock and firewater only. Bunds will be designed, constructed, and maintained in accordance with the guidance (EPA, 2013) (EPA, 2019), including requirements for watertightness, structural integrity, and retention capacity. The bund will be designed to provide a minimum retention capacity equivalent to the calculated product lost volume for the zone.



7.1.2.2 Zone 3 Solid Digestate Building and Liquid Reception Building

The bund serving Zone 3 is in the Solid Digestate Building. It will be provided for containment of potentially contaminated runoff and firewater only, with no routine storage of process liquids. The bunded area will be designed in accordance with the guidance (EPA, 2013) (EPA, 2019) and (CIRIA, 2014), ensuring structural stability, and watertightness under emergency flow conditions. Construction materials, joint details, and any containment systems will be selected to achieve long-term impermeability and durability.

7.1.2.3 Zone 4: Bunded Tank Farm

The Bunded Tank Farm (Zone 4) will provide secondary containment for the anaerobic digestion tanks. The bund will be designed, constructed, and maintained in accordance with guidance and standards (EPA, 2013) (EPA, 2019) and (CIRIA, 2014), (BSI, 1987) and (European Commission, 2006).. The bund will provide a minimum capacity of 110% of the largest tank (or 25% of the total tank volume, whichever is greater), will be constructed from chemically resistant concrete.

Hydrostatic integrity testing will be carried out at commissioning and at defined intervals thereafter, in line with EPA guidance and IE licence conditions.

7.1.2.4 Zone 5 Heating Centre

The bund associated with the Heating Centre (Zone 5) will be designed for the containment of firewater. The bund will be designed and maintained in accordance with the guidance and standards (EPA, 2013) (EPA, 2019) including provision of sufficient retention capacity, impermeability, and controlled drainage. Construction will follow the containment performance criteria applied to other firewater-only bunds on site.

7.1.2.5 Storm Water Lagoon

The Surface Water Lagoon is designed as a dedicated retention and attenuation facility for storm water and, for firewater retention in accordance with the guidance (EPA, 2019). The lagoon is designed to provide the required storage volume derived from this site-specific firewater risk assessment and stormwater design criteria and will be constructed using impermeable engineered materials (i.e. a synthetic HDPE liner) with inlet/outlet control structures, and isolation capability.

Integrity testing shall be carried out on the storm lagoon in accordance with the maintenance schedule, and in accordance with the IE licence conditions.

The storm water lagoon is covered.

7.2 Fire Water Retention System: Testing and Periodic Inspection

All proposed infrastructure associated with the retention of firewater shall be subject to periodic inspection and testing. Periodic inspection and testing of all infrastructure shall be undertaken at a minimum every 3 years or as may be required by the IE licence.



7.3 Post Fire Event Treatment and Disposal Options

All contaminated firewater collected on site will be subject to characterisation testing before being collected and brought to an appropriately designed authorised private wastewater treatment plant / or waste treatment facility for treatment.

The removal of firewater from the site shall be subject to the agreement of the EPA.

A list of all appropriate potential treatment outlets shall be maintained as part of the Emergency Management Planning for the proposed development.

7.4 Periodic Review: Fire Water Risk assessment

In accordance with Section 9 of the guidance (EPA, 2019) this FWRA shall be updated and submitted for EPA approval in the event of significant site changes e.g.

- changes in inventory which alters the storage thresholds of substances or the hazardous potential
- changes in applicable separation distances or fire compartments
- changes to site risk area/assessment areas
- changes to site drainage or containment systems



8. POST FIRE – OPERATIONAL CONTINUITY PLAN

The guidance (EPA, 2019) states:

“Where a firewater retention facility solution, outside of a dedicated firewater tank or pond is proposed (e.g. WWTP tanks or storm water attenuation facilities), an explanation is required of how this would affect the continued operation of the site during and after the fire event.”

An Operational Continuity Plan will be prepared as part of the sites proposed Emergency Management Plan (EMP) to the satisfaction of the EPA prior to the commencement of site operations. The continuity plan will describe how plant operations will cease and return to normal in the event of a fire.

In accordance with Guidance to Licensees on the Preparation of Accident Prevention Procedures and Emergency Response Procedures (EPA, 2016) the EMP shall:

- “be appropriate to the risk posed by the facility
- be clearly documented with revision numbers
- include clearly assigned responsibilities to specific roles
- be signed by the senior site manager or director
- be readily available and explained to all staff
- include current internal and external contacts including emergency contact numbers”

The outline contents of this plan are described in the following sections and are provided as a general guide, subject to change, dependant of the nature and extent of the fire and associated damage.

An operational continuity plan will be developed for the site with reference to the following headings (at a minimum). The operational continuity plan will list fire emergency scenarios and actions to be taken appropriate to each scenario.

8.1 Facility Operations

In the event of a fire, the operational continuity plan will determine operations on site. It is likely that the time to return to normal operations could vary from hours (e.g. localised fire easily controlled by trained site staff with limited if any damage) or weeks (extensive fire, requiring significant intervention and extensive damage to plant and buildings).

8.2 Response Team

In the event of a fire the emergency response will be led by the

- Facility Manager

This facility manager shall ensure that the fire response is appropriate resourced and organised and implemented in accordance with the requirements of the facilities permit or licence.



They will be responsible for the following:

- ensure emergency services are contacted
- lead the operational response, implement the EMP.
- contact Gas Networks Ireland
- organise the wider company response i.e. feedstock and digestate logistics, transfer of additional company resources, appointment of specialist subcontractors etc.
- utilise the resources of the company's environmental compliance team and maintain communications and coordination with the local authority and the EPA

8.3 Feedstock Transfer Operations

In the event of a complete or partial shutdown feedstock import shall reduce or cease as per the scenarios listed in the operational continuity plan.

8.4 Firewater Removal and Disposal

All contaminated firewater collected on site will be subject to characterisation testing before being collected and brought to an appropriately authorised wastewater treatment plant / waste treatment facility for treatment.

Transfer of firewater will be undertaken by vacuum tankers. It is estimated that in a worst-case firewater scenario i.e. circa 2,101 m³ of firewater to be disposed that removal operation could reasonably be completed in 2 - 3 days.

The EMP shall include details of multiple tanker operators and disposal locations to allow for rapid mobilisation of suitable resources.

8.5 Material Removal and Segregation

Burnt and unburnt materials from affected areas will be isolated in the designated onsite quarantine area.

All materials will be classified based on contamination levels and sent for recovery or disposal to an appropriately authorised waste facility. All waste transfer documentation will be retained.

Waste may if required be temporarily transferred to skips or other sealed containers to avoid/contain leachates being generated and allow cleanup operations to commence.

8.6 Infrastructure cleaning and inspection

Drainage pipes, channels, sumps settling tanks, the oil interceptor, tank farm bund and stormwater lagoon will be inspected for fire damage or contamination buildup and cleaned as required.

The integrity of yard hardstanding raised kerbing, bunded areas and the site entrance ramp will be inspected to confirm no compromise to firewater containment capacity. Integrity surveying shall be undertaken by an appropriately qualified engineer as defined by guidance (EPA, 2013).

Mechanical and Electrical plant will be subject to appropriate mechanical and electrical inspection and testing prior to resumption of processing operations.



Plant equipment if damaged will be removed from site and replaced with hired equipment or similar plant if possible.

8.7 Environmental Monitoring

Environmental monitoring of the fire water will be undertaken as soon as possible in the event of a fire to determine presence of contaminants.

8.8 Phased Operational Return

Subject to the completion of the works described previously and subject to the approval of Carlow County Council and the Environmental Protection Agency operations will return to normal conditions.

8.9 Response and Investigative Reporting

A Fire Incident Summary Report will be prepared within 4 weeks of any incident. This will likely include photographic records, laboratory analysis results, a description of remedial measures undertaken and all waste or wastewater transfer documentation.

An investigative report shall also be prepared post any incident at the site this report shall in accordance with guidance (EPA, 2019) to include at a minimum:

- a descriptive of events occurring
- a root cause analysis
- a summary of the response taken
- a summary of the impact on the environment.
- identification of lessons regarding prevention of reoccurrence and in terms of response to future events.

The report will also document how (if appropriate) the EMP has been reviewed after any accident/incident to ensure it is still fit for purpose.

8.10 Notification, Management and Communication

The continuity plan and EMP will include or link to an incident notification, management and communication procedure. This procedure shall describe how in the event of fire (or other notifiable incidents) relevant parties shall be notified and communicated with. The procedure will include all relevant contact details.

8.11 Revision and Document Control

In accordance with best practice (ref) and agency guidance (ref) the EMP and continuity plan described shall be reviewed and revised with a document control system.



8.12 Training and Education

All staff will be appropriately trained in fire emergency response subject to their individual roles and responsibilities. Training shall include but not be limited to the following:

- Emergency Response Training
- Fire Extinguisher Use Training
- Fire Warden Training
- Internal Training: Emergency Management Plan
- Mock Emergency Response Drills

All training and education needs shall be captured in a suitable training matrix continually maintained and updated for all site staff members.



9. SUMMARY AND CONCLUSION

The proposed development has been designed to avoid impacts, and specific to this topic to manage stormwater and firewater. This report is an appendix to Chapter 3 of the EIAR. The EIAR demonstrates no significant effects on the environment. There is an engineered drainage system directing storm water generated at the proposed development to a lined and covered storm water lagoon designed for a 1 in 30 year storm. There are multiple points along the drainage system checking the water quality and providing isolation as required. The proposed development requires an IE licence to operate. The IE licence will condition potential emissions to the environment including the proposed discharge of excess clean stormwater. Under normal condition the proposed development requires all the rain water captured for the anaerobic process and tops up with groundwater if insufficient rain water. This water is pumped to the fire and process water tanks. The proposed development is in an enclosed basin, it is a drainless site meaning storm water has to be pumped out of the site to discharge to the local watercourse. The stormwater lagoon will always have 300 mm of freeboard as a condition of the IE licence. The process tanks are located in a large impermeable bund.

A FWRA was undertaken for the proposed development. The FWRA was undertaken in accordance with the Guidance on Retention Requirements for Fire Water Runoff (EPA, 2019).

The proposed development was assessed against the two qualifying criteria,

- environmentally hazardous substance storage threshold (Section 5.2.1)
- environmental receptor criteria for sites whose activities involve potentially polluting substance (Section 5.2.2)

It was determined that the proposed development did not meet these criteria and did not automatically require firewater retention. Following on from this the site was divided into three distinct zones, as appropriate, to undertake the FWRA to determine if firewater retention was required.

The site was divided into the following zones:

- Zone 1: Administration and Carpark Area
- Zone 2: Solids Reception Building
- Zone 3: Solid Digestate Building and Liquid Reception Building
- Zone 4: Tank Farm
- Zone 5: Heating Centre
- Zone 6: Emergency Flare Compound
- Zone 7: Gas Upgrade Area

It was determined that **firewater retention was not required for Zone 1, 6 and 7** as they were assigned an overall firewater runoff risk rating of 'R0' in the FWRA.

The risk rating 'R1' was assigned to **Zones 2, 3, 4 and 5** hence **these zones require firewater retention capacity to be provided**.

Calculation Method 3 was used to calculate the firewater retention capacity required for Zones 2, 3 and 5.

Calculation Method 2 was used to calculate the firewater retention capacity required for Zone 4.

The firewater retention calculation determined that in the worst-case scenario the overall amount of firewater retention capacity at the proposed facility be 2,101 m³.



Fire water retention shall be provided within the storm water lagoon. The storm water lagoon provides a minimum volume of 2,385 m³ of fire water storage. The proposed Tank Farm bund includes freeboard capacity for firewater storage (total capacity of 40,987m³). This minimum capacity is representative of conditions where the storm water lagoon is full, the fire and process water tanks are full and there is a 1 in 30 year storm event. Under normal conditions, clean water is pumped to the Powerstown Stream. In a fire fighting event, water will not be pumped and this minimum capacity is always retained in the storm water lagoon for fire water.

All bunded areas and the storm water lagoon shall be designed, specified, appropriately lined, subject to appropriate independent construction quality assurance, and integrity testing at facility construction stage. All proposed infrastructure associated with the retention of firewater shall be subject to periodic inspection and testing. Periodic inspection and testing of all infrastructure shall be undertaken at a minimum every 3 years or as may be required by the IE licence.



10. BIBLIOGRAPHY

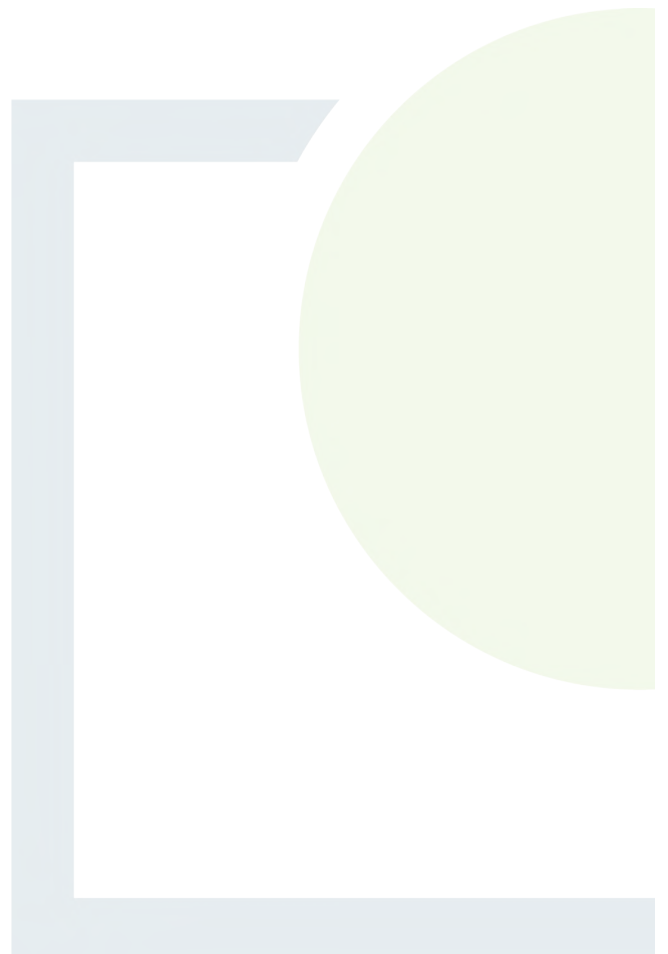
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DESIGNING AND DELIVERING
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APPENDIX 1

Met Eireann Rainfall Data



Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 271089, Northing: 168668,

DURATION	Interval		Years													
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.8,	3.8,	4.4,	5.1,	5.6,	6.0,	7.3,	8.7,	9.7,	10.9,	12.1,	12.9,	14.2,	15.3,	16.1,	N/A ,
10 mins	3.9,	5.3,	6.1,	7.1,	7.9,	8.4,	10.2,	12.2,	13.5,	15.3,	16.8,	18.0,	19.8,	21.3,	22.4,	N/A ,
15 mins	4.6,	6.3,	7.1,	8.4,	9.3,	9.9,	12.0,	14.3,	15.8,	17.9,	19.8,	21.2,	23.4,	25.0,	26.4,	N/A ,
30 mins	6.1,	8.2,	9.3,	10.8,	11.9,	12.6,	15.2,	18.0,	19.8,	22.3,	24.4,	26.1,	28.6,	30.5,	32.1,	N/A ,
1 hours	8.1,	10.7,	12.0,	13.9,	15.2,	16.1,	19.2,	22.5,	24.7,	27.6,	30.2,	32.1,	35.0,	37.3,	39.1,	N/A ,
2 hours	10.7,	13.9,	15.6,	17.9,	19.4,	20.6,	24.3,	28.3,	30.8,	34.3,	37.2,	39.5,	42.9,	45.5,	47.6,	N/A ,
3 hours	12.6,	16.3,	18.1,	20.8,	22.5,	23.8,	27.9,	32.3,	35.1,	38.9,	42.1,	44.6,	48.3,	51.1,	53.4,	N/A ,
4 hours	14.2,	18.2,	20.2,	23.0,	24.9,	26.3,	30.7,	35.4,	38.4,	42.5,	46.0,	48.6,	52.6,	55.6,	58.0,	N/A ,
6 hours	16.7,	21.2,	23.5,	26.7,	28.8,	30.3,	35.2,	40.5,	43.8,	48.2,	52.0,	54.9,	59.2,	62.4,	65.1,	N/A ,
9 hours	19.7,	24.8,	27.3,	30.9,	33.3,	35.0,	40.4,	46.2,	49.8,	54.7,	58.8,	62.0,	66.7,	70.2,	73.0,	N/A ,
12 hours	22.2,	27.7,	30.5,	34.4,	36.9,	38.7,	44.6,	50.7,	54.6,	59.8,	64.2,	67.5,	72.5,	76.2,	79.3,	N/A ,
18 hours	26.1,	32.4,	35.5,	39.8,	42.6,	44.7,	51.1,	57.9,	62.2,	67.8,	72.7,	76.3,	81.6,	85.7,	88.9,	N/A ,
24 hours	29.4,	36.2,	39.5,	44.2,	47.2,	49.4,	56.4,	63.6,	68.1,	74.2,	79.3,	83.1,	88.8,	93.1,	96.5,	108.0,
2 days	36.5,	44.4,	48.2,	53.6,	57.0,	59.6,	67.5,	75.6,	80.7,	87.4,	93.1,	97.3,	103.6,	108.3,	112.0,	124.6,
3 days	42.4,	51.3,	55.5,	61.5,	65.3,	68.1,	76.8,	85.7,	91.2,	98.5,	104.7,	109.3,	116.1,	121.1,	125.2,	138.7,
4 days	47.7,	57.4,	62.0,	68.5,	72.6,	75.7,	85.0,	94.7,	100.6,	108.5,	115.1,	120.0,	127.2,	132.6,	137.0,	151.3,
6 days	57.2,	68.3,	73.6,	81.0,	85.7,	89.2,	99.7,	110.6,	117.2,	126.1,	133.4,	138.9,	147.0,	153.0,	157.8,	173.7,
8 days	65.7,	78.1,	84.0,	92.2,	97.4,	101.2,	112.9,	124.8,	132.1,	141.8,	149.8,	155.8,	164.6,	171.1,	176.4,	193.6,
10 days	73.6,	87.2,	93.7,	102.6,	108.2,	112.4,	125.1,	138.0,	145.8,	156.3,	164.9,	171.4,	180.8,	187.8,	193.5,	212.0,
12 days	81.2,	95.8,	102.8,	112.4,	118.5,	122.9,	136.5,	150.3,	158.7,	169.9,	179.1,	186.0,	196.1,	203.5,	209.5,	229.1,
16 days	95.3,	112.0,	119.9,	130.8,	137.6,	142.6,	157.9,	173.4,	182.8,	195.2,	205.5,	213.2,	224.3,	232.6,	239.2,	261.0,
20 days	108.7,	127.2,	136.0,	148.0,	155.5,	161.1,	177.8,	194.8,	205.2,	218.8,	230.1,	238.4,	250.6,	259.6,	266.8,	290.5,
25 days	124.5,	145.2,	155.0,	168.3,	176.7,	182.8,	201.4,	220.2,	231.6,	246.5,	258.9,	268.1,	281.5,	291.4,	299.3,	325.1,

NOTES:

N/A Data not available

These values are derived from a Depth Duration Frequency (DDF) Model

For details refer to:

'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',

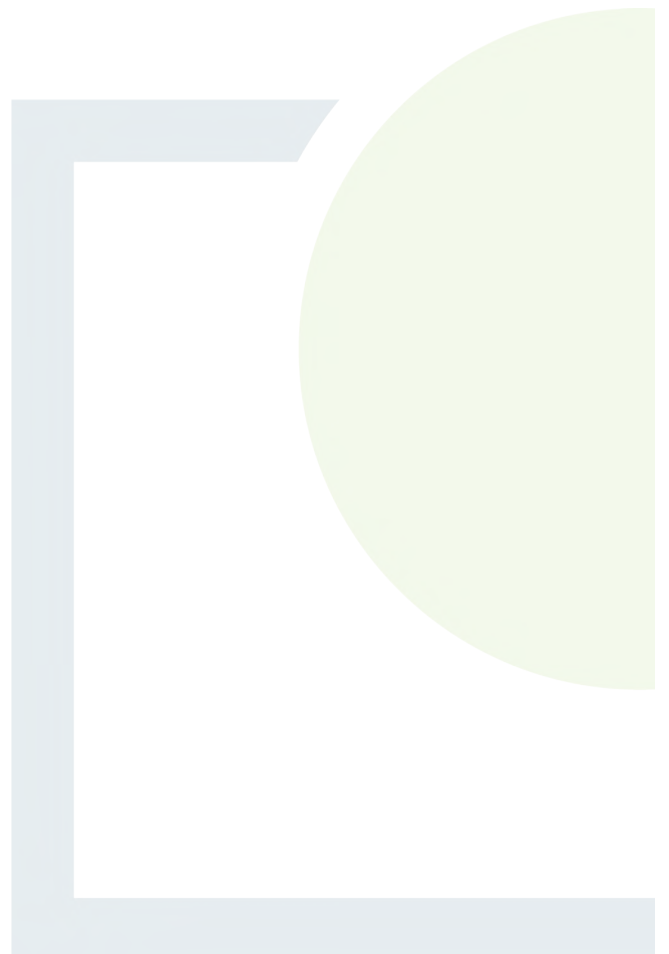
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf



DESIGNING AND DELIVERING
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APPENDIX 2

Memorandum Record of
Meeting: Carlow Senior
Assistant Fire Officer



MEMORANDUM

To:	Ray Regan Ryan Lally	From:	Fehily Timoney and Company
Client:	Greengate Biogas	Date:	13-08-25

Subject: Record of Meeting: Carlow Senior Assistant Fire Officer: Powerstown Bioenergy

The following memo has been prepared by Mr. James O'Neill of Fehily Timoney and Company as a contemporary record for agreement of the meeting held at the office of Carlow County Councils Senior Assistant Fire Officer on the 19th June 2025. The purpose of the meeting was to confirm the firefighting water supply requirements for the proposed Powerstown BioEnergy facility at Powerstown, County Carlow.

The meeting was attended by the following persons

- Mr Ray Regan, Senior Assistant Fire Officer, Carlow County Fire and Rescue Service
- Mr Ryan Lally, Assistant Chief Fire Officer, Carlow County Fire and Rescue Service
- Mr James O'Neill Principal Engineer Fehily Timoney and Company

The following information was supplied in advance of the meeting to Carlow County Council.

- Letter Ref: P24188-FT-EN-ZZ-LT-EN-0001, By Email 5th May 2025

Mr. O'Neill presented an overview of all materials presented, explaining the nature and scale of the proposed development.

The following was confirmed by Carlow County Fire and Rescue Service (CCFRS)

- A supply of firefighting water capable of supplying 2 No. Fire Units consuming 1,000 litres per minute for a period of 2 hours should be provided onsite i.e. Total - 240 m³
- Firefighting water can be made available from the proposed process water tanks and/or the surface water storage lagoon or a combination of both.
- Hydrant location(s) for individual building should be located in accordance with the guidance of Building Regulations Technical Guidance Document B, 2024.
- Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure.
- Proposed firewater pumps shall be backed up by means of a diesel electric generator (or similar) for use in the event of power failure.
- A water monitor or deluge system is recommended within the heating centres biomass storage bunker.

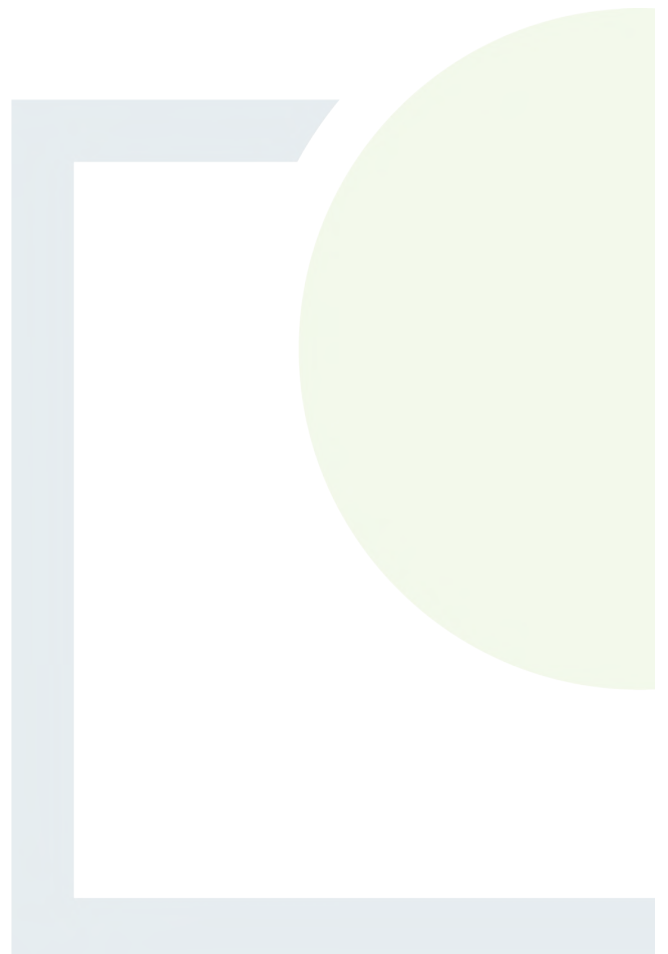
- CCFRS will engage with the developer during the construction/preoperational stage, with respect to incident response planning. Thereafter incident response co-ordination/consultation would be updated on a periodic basis (3 years). Incident response planning may require the developers support for onsite training exercises.
- CCFRS will submit a formal response at the planning submission stage only, CCFRS do not intend to respond to the statutory consultation previously issued.



DESIGNING AND DELIVERING
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APPENDIX 3

Email Memorandum for
Agreement Firefighting Water
Requirements





Outlook

FW: Powerstown BioEnergy Carlow - Memorandum for Agreement - Firefighting Water Requirements

From James O'Neill [REDACTED]

Date Mon 9/8/2025 9:22 AM

To Janyne Silva de Abreu [REDACTED]

14 attachments (917 KB)

P24188-FT-XX-XX-MO-CE-0005-1.1-Memo - Firefighting Water Supply Requirements.pdf; image001.png; image002.jpg; image003.jpg; image004.gif; image005.png; image006.png; image007.png; image008.png; image009.png; image010.png; image011.png; image012.png; image013.jpg;

J,

Create an appendix from the email chain below and attached memo.

James O'Neill
Principal Engineer
m: +353 87 742 9704

From: Ray Regan [REDACTED]
Sent: Wednesday 13 August 2025 10:22
To: J [REDACTED]
Cc: R [REDACTED]
Subject: RE: Powerstown BioEnergy Carlow - Memorandum for Agreement - Firefighting Water Requirements

Thanks James,

I can confirm that the contents accurately reflect Carlow Fire and Rescues requirements for the Powerstown BioEnergy project.

Kind regards,
Ray Regan

Príomhoifigeach Cúnta Sinsearach Dóiteáin, Seirbhísí Dóiteáin
Senior Assistant Chief Fire Officer, Fire Services

T: +353 59 9172427

E: [REDACTED]

W: carlow.ie

Follow us on Facebook: <https://www.facebook.com/CarlowFRS/>

<https://www.facebook.com/CarlowCountyCouncil>

A working smoke alarm could save a life Visit <https://www.fireireland.ie/>



COMHAIRLE CONTAE
CHEATHARLACH
CARLOW COUNTY COUNCIL

Stáisiún Dóiteáin Lárnach, Lána Glas, Ceatharlach, R93XE72
Central Fire Station, Green Lane, Carlow, R93XE72



From: [REDACTED]
Sent: Wednesday 13 August 2025 10:17
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: Powerstown BioEnergy Carlow - Memorandum for Agreement - Firefighting Water Requirements

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Ray,

Updated memo for final agreement.

Le Meas

James O'Neill
Principal Engineer
m: +353 87 742 9704

From: [REDACTED]
Sent: Tuesday 12 August 2025 10:13
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: Powerstown BioEnergy Carlow - Memorandum for Agreement - Firefighting Water Requirements

Hi James,

Can you amend the record of our discussion to mention that we spoke about the provision for a water monitor or deluge system in the wood pellet storage room. Also, can you change my title to Senior Assistant Chief Fire Officer. I can confirm that the contents accurately reflect Carlow Fire and Rescues requirements specifically with respect to the fire water supply required for the site and stored volume of same.

Thanks for meeting with us and if we can be of any further assistance, please do not hesitate to contact us.

Kind regards,
Ray Regan

Príomhoifigeach Cúnta Sinsearach Dóiteáin, Seirbhísí Dóiteáin
Senior Assistant Chief Fire Officer, Fire Services

T: +353 59 9172427
E: [REDACTED]
W: [carlow.ie](https://www.carlow.ie)

Follow us on Facebook: <https://www.facebook.com/CarlowFRS/>
<https://www.facebook.com/CarlowCountyCouncil>
A working smoke alarm could save a life Visit <https://www.fireireland.ie/>



Stáisiún Dóiteáin Lárnach, Lána Glas, Ceatharlach, R93XE72
Central Fire Station, Green Lane, Carlow, R93XE72



From: James O'Neill [REDACTED]
Sent: Wednesday 30 July 2025 18:08
To: Ray Regan [REDACTED]; Ryan Lally [REDACTED]
Cc: Tanya Ruddy [REDACTED]; Edward Lilleystone [REDACTED]
Subject: Powerstown BioEnergy Carlow - Memorandum for Agreement - Firefighting Water Requirements

****Warning From Carlow County Council IT Department****

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Dear Ray and Ryan,

Many thanks for meeting with me in your offices on the 19th June and my apologies for the delay in getting this to you.

I'm attaching for agreement a memorandum as a record of our discussion. The memo sets out my notes from the meeting.

I'd be obliged if you could confirm by return that the contents accurately reflect Carlow Fire and Rescues requirements specifically with respect to the fire water supply required for the site and stored volume of same.

I'm also attaching for ease of reference the Letter referred to in the memo.

If you have any questions or comments relating to the attached, please do not hesitate to contact me directly.

Le Meas



James O'Neill

Principal Engineer

Unit 3/4, Northwood House, Northwood Crescent, Northwood, Dublin, D09 X899

T: +353 (0)1 658 3500

M: +353 (0)74 7429704



fehilytimoney.ie



'GLASSDOOR'



**Project of the Year
2025**



**Awards Finalist
2025**



**Data Management
Shortlisted
2025**



**Planning Working
Group
2024**



**Fleming Award
2024**

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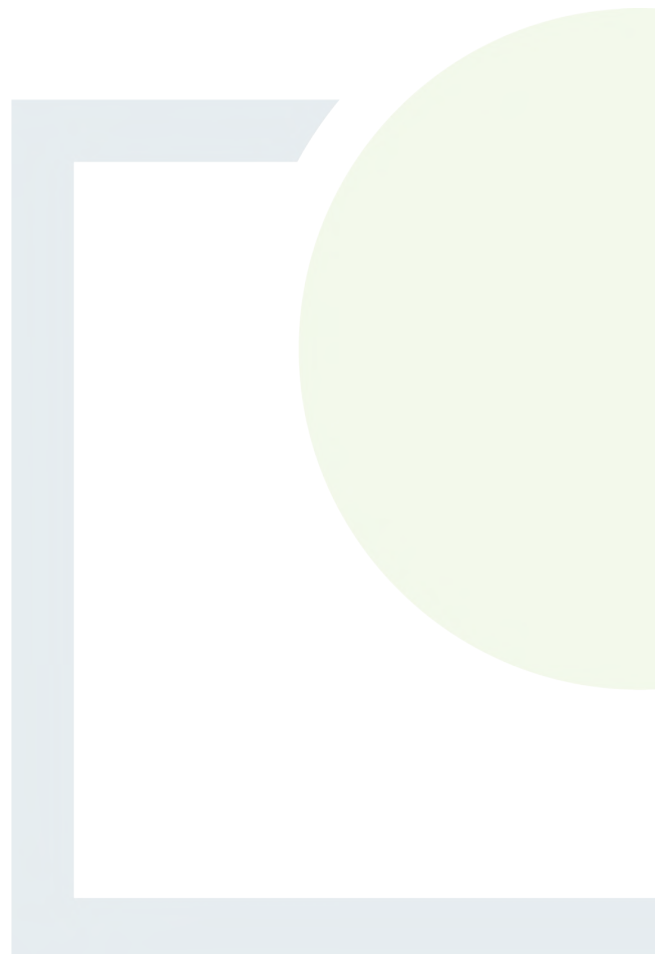
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APPENDIX 4

Material Safety Data Sheets





We create chemistry

Safety Data Sheet

BASF 13X MOLECULAR SIEVE 2.5-5.0mm

Revision date : 2025/08/19

Version: 4.0

Page: 1/11

(30520268/SDS_GEN_CA/EN)

1. Identification

Product identifier used on the label

BASF 13X MOLECULAR SIEVE 2.5-5.0mm

Recommended use of the chemical and restriction on use

Recommended use*: Adsorbent for the chemical industry

Recommended use*: adsorbent

Unsuitable for use: Not intended for sale to or use by the general public.

* The "Recommended use" identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:

BASF Canada Inc.

5025 Creekbank Road

Building A, Floor 2

Mississauga, ON, L4W 0B6, CANADA

Chemical Catalysts

E-mail address: RegXcellenceCatalysts@basf.com

Emergency telephone number

24 Hour Emergency Response Information

CHEMTREC: 1-800-424-9300

BASF HOTLINE: (800) 454-COPE (2673)

Other means of identification

Chemical family: adsorbent

2. Hazards Identification

According to Hazardous Products Regulations (HPR) (SOR/2022-272)

Classification of the product

Carc.
STOT RE

1A (by inhalation)
2 (by inhalation)

Carcinogenicity
Specific target organ toxicity — repeated exposure

Safety Data Sheet

BASF 13X MOLECULAR SIEVE 2.5-5.0mm

Revision date: 2025/08/19
Version: 4.0

Page: 2/11
(30520268/SDS_GEN_CA/EN)

STOT RE 1 (by inhalation) Specific target organ toxicity — repeated exposure

Label elements

Pictogram:



Signal Word:
Danger

Hazard Statement:

H350 May cause cancer by inhalation.
H372 Causes damage to organs (lung) through prolonged or repeated exposure (inhalation).
H373 May cause damage to organs (Kidney, Immune system) through prolonged or repeated exposure (inhalation).

Precautionary Statements (Prevention):

P280 Wear protective gloves, protective clothing and eye protection or face protection.
P201 Obtain special instructions before use.
P260 Do not breathe dust.
P202 Do not handle until all safety precautions have been read and understood.
P270 Do not eat, drink or smoke when using this product.
P264 Wash contaminated body parts thoroughly after handling.

Precautionary Statements (Response):

P308 + P313 IF exposed or concerned: Get medical attention.

Precautionary Statements (Storage):

P405 Store locked up.

Precautionary Statements (Disposal):

P501 Dispose of contents/container in accordance with local regulations.

3. Composition / Information on Ingredients

According to Hazardous Products Regulations (HPR) (SOR/2022-272)

Aluminum oxide

CAS Number: 1344-28-1
Content (W/W): ≥ 30.0 - $\leq 60.0\%$
Synonym: Aluminium oxide; Alumina

Silicon dioxide

CAS Number: 7631-86-9
Content (W/W): ≥ 30.0 - $\leq 60.0\%$
Synonym: Siliciumdioxid

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crystalline silica
CAS Number: 14808-60-7
Content (W/W): $\geq 1.0 - \leq 7.0\%$
Synonym: No data available.

The actual concentration is withheld as a trade secret.

4. First-Aid Measures

Description of first aid measures

General advice:

Remove contaminated clothing.

If inhaled:

Keep patient calm, remove to fresh air.

If on skin:

Wash thoroughly with soap and water

If in eyes:

Wash affected eyes for at least 15 minutes under running water with eyelids held open.

If swallowed:

Rinse mouth and then drink 200-300 ml of water.

Most important symptoms and effects, both acute and delayed

Symptoms: coughing, respiratory disorders

Information on: zeolites

Symptoms: Overexposure may cause: , nausea, headache, vomiting, dizziness, diarrhea, abdominal cramps

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment: Symptomatic treatment (decontamination, vital functions).

5. Fire-Fighting Measures

Suitable extinguishing media:
water spray, foam, dry powder

Additional information:

Use extinguishing measures to suit surroundings.

Special hazards arising from the substance or mixture

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Hazards during fire-fighting:
Reacts with water to generate heat.

Advice for fire-fighters

Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:

Product itself is non-combustible; fire extinguishing method of surrounding areas must be considered. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Do not breathe dust. Avoid contact with the skin, eyes and clothing. Use personal protective clothing. Information regarding personal protective measures, see section 8.

Environmental precautions

Discharge into the environment must be avoided.

Methods and material for containment and cleaning up

Avoid raising dust. Dampen, pick up mechanically and dispose of. Dispose of absorbed material in accordance with regulations. Reclaim for processing if possible.

7. Handling and Storage

Precautions for safe handling

Avoid dust formation. Avoid inhalation of dusts. Avoid contact with the skin, eyes and clothing. Wear suitable protective clothing and gloves. Provide suitable exhaust ventilation at the processing machines. Ensure adequate ventilation. Keep container tightly closed.

Protection against fire and explosion:

The product is not an oxidizer, not self-combustible and not explosive. The substance/product is non-combustible.

Conditions for safe storage, including any incompatibilities

Segregate from incompatible substances.

Suitable materials for containers: Aluminium, glass, HDPE fluorinated, Paper/Fibreboard, Polypropylene (PP), Carbon steel (Iron), High density polyethylene (HDPE), Low density polyethylene (LDPE)

Further information on storage conditions: Containers should be stored tightly sealed in a dry place.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

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zeolites	TWA value	1.25 mg/m ³ Respirable fraction ;
crystalline silica	OSHA, US:	TWA value 0.05 mg/m ³ (Respirable dust);
	OSHA, US:	OSHA Action level 0.025 mg/m ³ (Respirable dust);
	ACGIH, US:	TWA value 0.025 mg/m ³ Respirable fraction ;
crystalline silica	OSHA Z1:	PEL 0.05 mg/m ³ Respirable dust ;
	OSHA Z3:	TWA value 2.4 millions of particles per cubic foot of air Respirable ; The exposure limit is calculated from the equation, $250/(\%SiO_2+5)$, using a value of 100% SiO ₂ . Lower percentages of SiO ₂ will yield higher exposure limits.
	OSHA Z3:	TWA value 0.1 mg/m ³ Respirable ; The exposure limit is calculated from the equation, $10mg/m^3/(\%SiO_2+2)$, using a value of 100% SiO ₂ . Lower percentages of SiO ₂ will yield higher exposure limits.
	OSHA, US:	TWA value 0.05 mg/m ³ (Respirable dust);
	OSHA, US:	OSHA Action level 0.025 mg/m ³ (Respirable dust);

Advice on system design:

Provide local exhaust ventilation to maintain recommended P.E.L. Ensure adequate ventilation.

Personal protective equipment

Respiratory protection:

Breathing protection if dusts are formed. Wear appropriate certified respirator when exposure limits may be exceeded. Wear a NIOSH-certified (or equivalent) particulate respirator.

Hand protection:

Wear chemical resistant protective gloves.

Eye protection:

Safety glasses with side-shields.

Body protection:

No body protection required if used for intended purpose and satisfying generally accepted industrial hygiene rules.

General safety and hygiene measures:

Avoid contact with the skin, eyes and clothing. Avoid inhalation of dust. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Physical state:	solid
Form:	solid in various forms
Odour:	odourless
Odour threshold:	not applicable, odour not perceivable
Colour:	white to red-brown

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pH value:	9 - 11 (50 g/kg)
Melting point:	> 1,000 °C not determined
Freezing point:	No data available.
Boiling point:	not determined
Boiling range:	No data available.
Flash point:	not applicable, the product is a solid
Flammability:	Not a flammable solid according to UN transport regulations division 4.1 and GHS chapter 2.7. The product is not combustible.
Lower explosion limit:	For solids not relevant for classification and labelling.
Upper explosion limit:	For solids not relevant for classification and labelling.
SADT:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1.
Vapour pressure:	(20 °C) negligible
Bulk density:	650 - 795 g/l
Relative vapour density:	The product is a non-volatile solid.
Partitioning coefficient n- octanol/water (log Pow):	not applicable for mixtures
Self-ignition temperature:	not self-igniting
Thermal decomposition:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1. No decomposition if correctly stored and handled.
Viscosity, dynamic:	not applicable, the product is a solid
Viscosity, kinematic:	not applicable, the product is a solid
Solubility in water:	insoluble
Miscibility with water:	not soluble
Evaporation rate:	The product is a non-volatile solid.

Particle characteristics

Particle size distribution: not applicable

10. Stability and Reactivity

Reactivity

No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:

No corrosive effect on metal.

Oxidizing properties:

Not an oxidizer.

Chemical stability

The product is chemically stable.

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Peroxides: The product does not contain peroxides. The product/the substance has not a tendency towards the formation of peroxide.

Possibility of hazardous reactions

The product is stable if stored and handled as prescribed/indicated.

The material is a desiccant and generates heat when it adsorbs water. Strong bases are formed on the addition of water.

Conditions to avoid

Avoid dust formation. Avoid moisture.

Incompatible materials

mineral acids, organic acids, strong oxidizing agents

Hazardous decomposition products

Decomposition products:

Hazardous decomposition products: No hazardous decomposition products known.

Thermal decomposition:

Not a substance liable to self-decomposition according to UN transport regulations, class 4.1. No decomposition if correctly stored and handled.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity

Assessment of acute toxicity: Not expected to be acutely toxic. The product has not been tested. The statement has been derived from the properties of the individual components.

Oral

Type of value: ATE

Value: > 5,000 mg/kg

Inhalation

Type of value: ATE

Value: > 5 mg/l

Exposure time: 4 h

Determined for dust

Dermal

Type of value: ATE

Value: > 5,000 mg/kg

Assessment other acute effects

Assessment of STOT single:

Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

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Irritation / corrosion

Assessment of irritating effects: Based on available data, the classification criteria are not met.

Contact with the eyes or skin may cause mechanical irritation. The product has not been tested. The statement has been derived from the properties of the individual components.

Sensitization

Assessment of sensitization: Based on available data, the classification criteria are not met.

Aspiration Hazard

No aspiration hazard expected.

Chronic Toxicity/Effects

Repeated dose toxicity

Assessment of repeated dose toxicity: Prolonged and repeated exposure causes lung damage. The substance may cause damage to the kidney after repeated inhalation. May cause immune system effects.

Information on: crystalline silica

Assessment of repeated dose toxicity: Prolonged or repeated inhalation of respirable crystalline silica may result in silicosis. Repeated inhalation exposure may cause inflammatory effects in the lung.

The substance may cause increase in lung mass and lung tissue changes after repeated inhalation.

The effects observed are due to inhalation of the product; since the product does not contain respirable material, these effects are not expected to occur.

This product may contain greater than 0.1% crystalline silica. Repeated exposure to high concentrations results in silicosis, a lung disease characterized by coughing, difficult breathing, wheezing, scarring of the lungs, and repeated, non-specific chest illnesses.

Genetic toxicity

Assessment of mutagenicity: Based on available data, the classification criteria are not met.

Carcinogenicity

Assessment of carcinogenicity: This product contains crystalline silica (quartz). The International Agency for Research on Cancer (IARC) has classified this substance as a Group 1 (known) human carcinogen. NTP listed carcinogen The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this substance as Group A2 - Suspected Human Carcinogen.

This product contains crystalline silica (quartz). The International Agency for Research on Cancer (IARC) has classified this substance as a Group 1 (known) human carcinogen.

Information on: crystalline silica

Assessment of carcinogenicity: The substance and its compounds in the form of respirable dusts/aerosols classified by the German MAK commission as a category 1 carcinogen (substances that cause cancer to humans). The International Agency for Research on Cancer (IARC) has classified this substance as a Group 1 (known) human carcinogen. The effects observed are due to inhalation of the product; since the product does not contain respirable material, these effects are not expected to occur.

NTP listed carcinogen

Reproductive toxicity

Assessment of reproduction toxicity: Based on available data, the classification criteria are not met.

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Teratogenicity

Assessment of teratogenicity: Based on available data, the classification criteria are not met.

Experiences in humans

Information on: crystalline silica
May cause silicosis.

Other Information

The product has not been tested. The statement has been derived from the properties of the individual components. The product has been assessed on the basis of the components' available data. To some extent data gaps exist for individual components. According to our present knowledge and experience dangers which are not covered by the current labeling are not to be expected.

Medical conditions aggravated by overexposure

Individuals with pre-existing respiratory disorders may have increased susceptibility to excessive exposures.

12. Ecological Information

Toxicity

Aquatic toxicity

Assessment of aquatic toxicity:

There is a high probability that the product is not acutely harmful to aquatic organisms. Based on long-term (chronic) toxicity study data, the product is very likely not harmful to aquatic organisms.

Persistence and degradability

Assessment biodegradation and elimination (H₂O)

Not applicable for inorganic substances.

Bioaccumulative potential

Assessment bioaccumulation potential

Significant accumulation in organisms is not to be expected.

Mobility in soil

Assessment transport between environmental compartments

Adsorption to solid soil phase is not expected.

Additional information

Other ecotoxicological advice:

The product has not been tested. The statement has been derived from the properties of the individual components. The product has been assessed on the basis of the components' available data. To some extent data gaps exist for individual components. According to our present knowledge and experience dangers which are not covered by the current labeling are not to be expected.

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13. Disposal considerations

Waste disposal of substance:

Dispose of in accordance with local authority regulations. Disposal requirements are dependent on the hazard classification and will vary by location and the type of disposal selected. All waste materials should be reviewed to determine the applicable hazards (testing may be necessary). Used catalysts may have different hazardous properties than the original products.

Container disposal:

Contaminated packaging should be emptied as far as possible and disposed of in the same manner as the substance/product.

14. Transport Information

Land transport

TDG

Not classified as a dangerous good under transport regulations

Sea transport

IMDG

Not classified as a dangerous good under transport regulations

Air transport

IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:

Chemical DSL, CA released / listed

NFPA Hazard codes:

Health: 0 Fire: 0 Reactivity: 0 Special:

16. Other Information

SDS Prepared by:

BASF NA Product Regulations

SDS Prepared on: 2025/08/19

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our

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operations on society and the environment during production, storage, transport, use and disposal of our products.

Date / Revised: 2025/08/19

Version: 4.0

Date / Previous version: 2024/03/01

Previous version: 3.1

END OF DATA SHEET

Sulfuric acid 96%

Version number: GHS 1.0

Date of compilation: 2020-11-02

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Identification of the substance	Sulfuric acid 96%
Registration number (REACH)	01-2119458838-20-xxxx
CAS number	7664-93-9
Alternative name(s)	Sulphuric acid, sulfuric acid
Article number	A0276434

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	General use
Uses advised against	Do not use for squirting or spraying. Do not use for products which come into direct contact with the skin.

1.3 Details of the supplier of the safety data sheet

Chemos GmbH & Co. KG
Sonnenring 7
84032 Altdorf
Germany

Telephone: +49 871-966346-0
Telefax: +49 871-966346-13
e-mail: chemos@chemos.de
Website: <http://www.chemos.de/>

e-mail (competent person) chemos@chemos.de

1.4 Emergency telephone number

Emergency information service +49 89 1 92 40

Poison centre				
Country	Name	Postal code/ city	Telephone	Telefax
United Kingdom	National Poison Information Centre Medical Toxicology Unit	SE14 5ER London	+44 171 635 91 91	

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

Section	Hazard class	Category	Hazard class and category	Hazard statement
2.16	substance or mixture corrosive to metals	1	Met. Corr. 1	H290
3.2	skin corrosion/irritation	1	Skin Corr. 1	H314
3.3	serious eye damage/eye irritation	1	Eye Dam. 1	H318

For full text of abbreviations: see SECTION 16.

Sulfuric acid 96%

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The most important adverse physicochemical, human health and environmental effects

Skin corrosion produces an irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

- Signal word danger

- Pictograms

GHS05



- Hazard statements

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

- Precautionary statements

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P330+P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 Immediately call a POISON CENTER/doctor.

P390 Absorb spillage to prevent material damage.

P501 Dispose of contents/container to industrial combustion plant.

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Sulfuric acid 96%
Identifiers	
REACH Reg. No	01-2119458838-20-xxxx
CAS No	7664-93-9
EC No	231-639-5
Index No	016-020-00-8
Molecular formula	H ₂ O ₄ S
Molar mass	98.07 g/mol

Sulfuric acid 96%

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SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Do not leave affected person unattended. Remove victim out of the danger area. Keep affected person warm, still and covered. Take off immediately all contaminated clothing. In all cases of doubt, or when symptoms persist, seek medical advice. In case of unconsciousness place person in the recovery position. Never give anything by mouth.

Following inhalation

If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. In case of respiratory tract irritation, consult a physician. Provide fresh air.

Following skin contact

Wash with plenty of soap and water.

Following eye contact

Remove contact lenses, if present and easy to do. Continue rinsing. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart.

Following ingestion

Rinse mouth with water (only if the person is conscious). Do NOT induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water spray, BC-powder, Carbon dioxide (CO₂)

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Substance or mixture corrosive to metals.

Hazardous combustion products

Sulphur oxides (SO_x)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

Sulfuric acid 96%

Version number: GHS 1.0

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Remove persons to safety.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains

Advice on how to clean up a spill

Wipe up with absorbent material (e.g. cloth, fleece). Collect spillage: sawdust, kieselgur (diatomite), sand, universal binder

Appropriate containment techniques

Neutralisation techniques. Use of adsorbent materials.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation

Use local and general ventilation. Use only in well-ventilated areas. Never add water to this product.

- Handling of incompatible substances or mixtures

Do not mix with alkali.

- Keep away from

Caustic solutions

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink and smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Never keep food or drink in the vicinity of chemicals. Never place chemicals in containers that are normally used for food or drink. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Managing of associated risks

- Corrosive conditions

Store in corrosive resistant container with a resistant inner liner.

- Packaging compatibilities

Only packagings which are approved (e.g. acc. to ADR) may be used.

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7.3 Specific end use(s)

See section 16 for a general overview.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values (Workplace Exposure Limits)											
Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m ³]	STEL [ppm]	STEL [mg/m ³]	Ceiling-C [ppm]	Ceiling-C [mg/m ³]	Notation	Source
EU	sulfuric acid	7664-93-9	IOELV		0.05					t, mist	2009/161/EU
GB	sulfuric acid	7664-93-9	WEL		0.05					t, mist	EH40/2005

Notation

Ceiling-C

mist

STEL

t

TWA

ceiling value is a limit value above which exposure should not occur

as mists

short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)

thoracic fraction

time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours

time-weighted average (unless otherwise specified)

Human health values

Relevant DNELs and other threshold levels				
Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
DNEL	0.05 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects
DNEL	0.1 mg/m ³	human, inhalatory	worker (industry)	acute - local effects

Environmental values

Relevant PNECs and other threshold levels				
Endpoint	Threshold level	Organism	Environmental compartment	Exposure time
PNEC	0.003 mg/l	aquatic organisms	freshwater	short-term (single instance)
PNEC	0 mg/l	aquatic organisms	marine water	short-term (single instance)
PNEC	8.8 mg/l	aquatic organisms	sewage treatment plant (STP)	short-term (single instance)
PNEC	0.002 mg/kg	aquatic organisms	freshwater sediment	short-term (single instance)
PNEC	0.002 mg/kg	aquatic organisms	marine sediment	short-term (single instance)

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Eye/face protection

Wear eye/face protection.

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Skin protection**- Hand protection**

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. Check leak-tightness/impermeability prior to use. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Respiratory protection

In case of inadequate ventilation wear respiratory protection.

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties****Appearance**

Physical state	liquid
Colour	colourless
Odour	odourless

Other safety parameters

pH (value)	<1 (20 °C) (acid)
Melting point/freezing point	-15 °C
Initial boiling point and boiling range	295 – 315 °C
Flash point	not determined
Evaporation rate	not determined
Flammability (solid, gas)	not relevant, (fluid)
Explosive limits	not determined
Vapour pressure	<0.01 hPa at 20 °C
Density	1.84 g/cm ³ at 20 °C
Vapour density	this information is not available
Solubility(ies)	not determined

Partition coefficient

- n-octanol/water (log KOW)	this information is not available

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Auto-ignition temperature	not determined
Decomposition temperature	338 °C

Viscosity

- Dynamic viscosity	26.9 mPa s at 20 °C
Explosive properties	none
Oxidising properties	none

9.2 Other information

Solvent content	100 %

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials". It's a reactive substance. Substance or mixture corrosive to metals.

10.2 Chemical stability

See below "Conditions to avoid".

10.3 Possibility of hazardous reactions

No known hazardous reactions.

10.4 Conditions to avoid

There are no specific conditions known which have to be avoided.

10.5 Incompatible materials

Bases

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Classification according to GHS (1272/2008/EC, CLP)

Acute toxicity

Shall not be classified as acutely toxic.

- Acute toxicity estimate (ATE)

Inhalation: dust/mist 0.85 mg/l/4h

Skin corrosion/irritation

Causes severe skin burns and eye damage.

Serious eye damage/eye irritation

Causes serious eye damage.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Sulfuric acid 96%

Version number: GHS 1.0

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Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Waste treatment-relevant information

Recycling/reclamation of other inorganic materials. Regeneration of acids.

Sewage disposal-relevant information

Do not empty into drains. Avoid release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packages

It is a dangerous waste; only packagings which are approved (e.g. acc. to ADR) may be used. Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

Sulfuric acid 96%

Version number: GHS 1.0

Date of compilation: 2020-11-02

SECTION 14: Transport information

14.1 UN number	1830
14.2 UN proper shipping name	SULPHURIC ACID
14.3 Transport hazard class(es)	
Class	8 (corrosive substances)
14.4 Packing group	II (substance presenting medium danger)
14.5 Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations
14.6 Special precautions for user	
Provisions for dangerous goods (ADR) should be complied within the premises.	
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code	
The cargo is not intended to be carried in bulk.	

Information for each of the UN Model Regulations

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN)

UN number	1830
Proper shipping name	SULPHURIC ACID
Class	8
Classification code	C1
Packing group	II
Danger label(s)	8



Excepted quantities (EQ)	E2
Limited quantities (LQ)	1 L
Transport category (TC)	2
Tunnel restriction code (TRC)	E
Hazard identification No	80
Emergency Action Code	2P

International Maritime Dangerous Goods Code (IMDG)

UN number	1830
Proper shipping name	SULPHURIC ACID
Class	8
Marine pollutant	-
Packing group	II
Danger label(s)	8



Special provisions (SP)	-

Sulfuric acid 96%

Version number: GHS 1.0

Date of compilation: 2020-11-02

Excepted quantities (EQ)	E2
Limited quantities (LQ)	1 L
EmS	F-A, S-B
Stowage category	C
Segregation group	1 - Acids
International Civil Aviation Organization (ICAO-IATA/DGR)	
UN number	1830
Proper shipping name	Sulphuric acid
Class	8
Packing group	II
Danger label(s)	8



Excepted quantities (EQ)	E2
Limited quantities (LQ)	0,5 L

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Deco-Paint Directive (2004/42/EC)

VOC content	0 %

Directive on industrial emissions (VOCs, 2010/75/EU)

VOC content	0 %

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
2009/161/EU	Commission Directive establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC
ADN	Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures

Sulfuric acid 96%

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Abbr.	Descriptions of used abbreviations
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EH40/2005	EH40/2005 Workplace exposure limits (http://www.nationalarchives.gov.uk/doc/open-government-licence/)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EmS	Emergency Schedule
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
IOELV	Indicative occupational exposure limit value
MARPOL	International Convention for the Prevention of Pollution from Ships (abbr. of "Marine Pollutant")
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
STEL	Short-term exposure limit
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative
WEL	Workplace exposure limit

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Regulation (EC) No. 1907/2006 (REACH), amended by 2015/830/EU.

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Sulfuric acid 96%

Version number: GHS 1.0

Date of compilation: 2020-11-02

List of relevant phrases (code and full text as stated in chapter 2 and 3)

Code	Text
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.



SAFETY DATA SHEET METHYLDIETHANOLAMINE (MDEA) REVISION 4, DATE 02 JAN 2023

1. IDENTIFICATION

Product Name	Methyldiethanolamine (MDEA)
Other Names	2,2'-(Methylimino)bis[ethanol; Ethanol, 2,2'-(methylimino)bis-
Uses	Chemical intermediate.
Chemical Family	No Data Available
Chemical Formula	C ₅ H ₁₃ NO ₂
Chemical Name	N-Methyldiethanolamine
Product Description	No Data Available

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Suite 13A.03, Menara Summit Persiaran Kewajipan USJ1 47600 UEP Subang Jaya Selangor, Malaysia	+60-3-5614-2111

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
Poisons Information Centre	Australia – Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
National Poison Centre	Malaysia	+60-4-6536-999
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust)

Not Scheduled



Globally Harmonised System

Hazard Classification		Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)	
Hazard Categories		Serious Eye Damage/Irritation - Category 2	
Pictograms			
Signal Word		Warning	
Hazard Statements		H319	Causes serious eye irritation.
Precautionary Statements	Prevention	P280	Wear eye protection/face protection.
		P264	Wash skin thoroughly after handling.
	Response	P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
		P337 + P313	If eye irritation persists: Get medical advice.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	NOT Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications	Health Hazards 6.4A	Substances that are irritating to the eye

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Methyldiethanolamine	C5H13NO2	105-59-9	>=60 - <=100 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	IF SWALLOWED: Rinse mouth. Do not induce vomiting without medical advice. Get medical advice/attention if you feel unwell. Never give anything by mouth to an unconscious person.
Eye	IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Remove contact lenses if present and easy to do. Continue rinsing for at least 15 minutes. If eye irritation persists, get medical advice/attention.
Skin	IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation

occurs, get medical advice/attention.

Inhaled	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing until recovered. If respiratory symptoms persist, get medical advice/attention. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult.
Advice to Doctor	Treat symptomatically. Show this safety data sheet (SDS) to the doctor in attendance.
Medical Conditions Aggravated by Exposure	No information available.

5. FIRE FIGHTING MEASURES

General Measures	If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out.
Flammability Conditions	Combustible liquid; may burn but does not ignite readily.
Extinguishing Media	Use dry chemical, Carbon dioxide (CO ₂), alcohol-resistant foam or water spray for extinction - Do not use water jet.
Fire and Explosion Hazard	Containers may explode when heated.
Hazardous Products of Combustion	Fire/thermal decomposition may produce irritating and/or toxic fumes, including Nitrogen oxides (NO _x), Carbon monoxide, Carbon dioxide.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may cause pollution.
Personal Protective Equipment	Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.
Flash Point	138 °C [Pensky-Martens Closed Cup]
Lower Explosion Limit	0.9 %
Upper Explosion Limit	8.4 %
Auto Ignition Temperature	280 °C
Hazchem Code	No Data Available

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Ensure adequate ventilation. ELIMINATE all ignition sources. Do not touch or walk through spilled material. Avoid breathing vapours and contact with eyes, skin and clothing.
Clean Up Procedures	Absorb with earth, sand or other non-combustible material and transfer to a container for disposal (see SECTION 13). *Do not flush into surface water or sanitary sewer system.
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas.
Decontamination	No information available.
Environmental Precautionary Measures	Prevent entry into drains and waterways. Local authorities should be advised if significant spillages cannot be contained.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away.
Personal Precautionary Measures	Use personal protective equipment as required (see SECTION 8).

7. HANDLING AND STORAGE

Handling	Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Avoid breathing mist/vapours/spray and contact with eyes, skin and clothing. Do not ingest. Use personal protective equipment as required (see SECTION 8). Combustible liquid: Keep away from heat and sources of ignition - No smoking. Take precautionary measures against static discharge.
Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Keep away from heat

and sources of ignition - No smoking. Keep away from incompatible materials (see SECTION 10).

Container

Keep in the original container.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	Contains no substances with occupational exposure limit values.
Exposure Limits	No Data Available
Biological Limits	No information available.
Engineering Measures	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.
Personal Protection Equipment	- Respiratory protection: Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Recommended: Organic vapour type (refer to AS/NZS 1715 & 1716). - Eye/face protection: Wear appropriate eye protection to avoid eye contact. Recommended: Safety glasses with side-shields; Face-shield. - Hand protection: Handle with gloves. Recommended: Rubber gloves; Neoprene gloves. - Skin/body protection: Wear appropriate personal protective clothing to avoid skin contact. Recommended: Complete suit protecting against chemicals.
Special Hazards Precautions	No information available.
Work Hygienic Practices	Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Take off contaminated clothing and wash it before reuse. Remove contaminated clothing and protective equipment before entering eating areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Ammoniacal
Colour	Colourless
pH	11.5 10 % (20 °C)
Vapour Pressure	0.0031 hPa (@ 20 °C)
Relative Vapour Density	4 Air = 1
Boiling Point	243.3 °C
Melting Point	No Data Available
Freezing Point	-21.3 °C
Solubility	Completely soluble in water
Specific Gravity	No Data Available
Flash Point	138 °C [Pensky-Martens Closed Cup]
Auto Ignition Temp	280 °C
Evaporation Rate	No Data Available
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	1.04 g/cm ³
Specific Heat	No Data Available
Molecular Weight	119.16 g/mol
Net Propellant Weight	No Data Available

Octanol Water Coefficient	Log Pow: -1.16 (23 °C)
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	99.05 mm ² /s (@ No Data Available)
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No information available.
Potential for Dust Explosion	Not applicable.
Fast or Intensely Burning Characteristics	No information available.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No information available.
Properties That May Initiate or Contribute to Fire Intensity	Combustible liquid; may burn but does not ignite readily.
Reactions That Release Gases or Vapours	Fire/thermal decomposition may produce irritating and/or toxic fumes, including Nitrogen oxides (NO _x), Carbon monoxide, Carbon dioxide.
Release of Invisible Flammable Vapours and Gases	No information available.

10. STABILITY AND REACTIVITY

General Information	No information available.
Chemical Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from heat and sources of ignition - No smoking. Take precautionary measures against static discharge.
Materials to Avoid	Incompatible/reactive with strong acids, oxidising agents, isocyanates.
Hazardous Decomposition Products	Fire/thermal decomposition may produce irritating and/or toxic fumes, including Nitrogen oxides (NO _x), Carbon monoxide, Carbon dioxide.
Hazardous Polymerisation	Does not occur.

11. TOXICOLOGICAL INFORMATION

General Information	- Acute toxicity: Not classified based on available information. Ingestion may cause gastrointestinal irritation, nausea, diarrhoea, vomiting. - Skin corrosion/irritation: Not classified based on available information. COMPONENT: Methyldiethanolamine: No skin irritation (Rabbit). - Eye damage/irritation: Cause serious eye irritation. COMPONENT: Methyldiethanolamine: Irritating (Rabbit). - Respiratory/skin sensitisation: Not classified based on available information. COMPONENT: Methyldiethanolamine: Non-sensitising (Guinea pig, skin). - Germ cell mutagenicity: Not classified based on available information. COMPONENT: Methyldiethanolamine: Did not show mutagenic effects in animal experiments. - Carcinogenicity: Not classified based on available information. COMPONENT: Methyldiethanolamine: Animal testing did not show any carcinogenic effects. - Reproductive toxicity: Not classified based on available information. COMPONENT: Methyldiethanolamine: No toxicity to reproduction; Did not show teratogenic effects in animal experiments. - STOT (single exposure): Not classified based on available information.

- STOT (repeated exposure): Not classified based on available information.
- Aspiration toxicity: Not classified based on available information.

Acute**Ingestion**

Acute toxicity (Oral):
COMPONENT: Methyldiethanolamine:
- LD50, Rat: 4,680 mg/kg [Supplier's SDS].

Other

Acute toxicity (Dermal):
COMPONENT: Methyldiethanolamine:
- LD50, Rabbit: >2,000 mg/kg [Supplier's SDS].

Chronic**Other**

Repeated dose toxicity (Dermal):
COMPONENT: Methyldiethanolamine:
- NOAEL, Rat: 750 mg/kg (90 days) [Supplier's SDS].

Carcinogen Category

None

12. ECOLOGICAL INFORMATION**Ecotoxicity**

Aquatic toxicity:
COMPONENT: Methyldiethanolamine:
- LC50, Fish (Leuciscus idus): 1,466 mg/L (96 h) [Supplier's SDS].
- EC50, Crustacea (Daphnia magna): 233 mg/L (48 h) [Supplier's SDS].
- EC50, Algae/aquatic plants (Pseudokirchneriella subcapitata): >100 mg/L (72 h) [Supplier's SDS].

Persistence/Degradability

COMPONENT: Methyldiethanolamine:
- Readily biodegradable (96 %, 18 days).

Mobility

Mobility in soil:
COMPONENT: Methyldiethanolamine:
- Koc: 42
- log Koc: 1.62

Environmental Fate

Prevent entry into drains and waterways.

Bioaccumulation Potential

COMPONENT: Methyldiethanolamine:
- Bioconcentration factor (BCF): 0.7 - 3.2
- log Pow: -1.08 (25 °C)

Environmental Impact

No Data Available

13. DISPOSAL CONSIDERATIONS**General Information**

Dispose of contents/container in accordance with local/regional/national regulations. Waste must be classified and labelled prior to recycling or disposal.

Special Precautions for Land Fill

Contaminated packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION**Land Transport (Australia)**

ADG Code

Proper Shipping Name

Methyldiethanolamine (MDEA)

SAFETY DATA SHEET METHYLDIETHANOLAMINE (MDEA) REVISION 4, DATE 02 JAN 2023

Class	C2 Combustible Liquids - Flash Point >93°C, Closed Cup, Not Excluded Flammable
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (Malaysia)

ADR Code

Proper Shipping Name	Methyldiethanolamine (MDEA)
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (New Zealand)

NZS5433

Proper Shipping Name	Methyldiethanolamine (MDEA)
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Land Transport (United States of America)

US DOT

Proper Shipping Name	Methyldiethanolamine (MDEA)
Class	No Data Available
Subsidiary Risk(s)	No Data Available
	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for LAND transport.

Sea Transport

IMDG Code

Proper Shipping Name	Methyldiethanolamine (MDEA)

SAFETY DATA SHEET METHYLDIETHANOLAMINE (MDEA) REVISION 4, DATE 02 JAN 2023

Class	No Data Available
Subsidiary Risk(s)	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
EMS	No Data Available
Marine Pollutant	No
Comments	NON-DANGEROUS GOODS: Not regulated for SEA transport.

Air Transport

IATA DGR

Proper Shipping Name	Methyldiethanolamine (MDEA)
Class	No Data Available
Subsidiary Risk(s)	No Data Available
UN Number	No Data Available
Hazchem	No Data Available
Pack Group	No Data Available
Special Provision	No Data Available
Comments	NON-DANGEROUS GOODS: Not regulated for AIR transport.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	NOT Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

15. REGULATORY INFORMATION

General Information	No Data Available
Poisons Schedule (Aust)	Not Scheduled

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

Approval Code	HSR002503 HSR003155 (Revoked)

National/Regional Inventories

Australia (AICC)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Not Determined
China (IECSC)	Listed

SAFETY DATA SHEET METHYLDIETHANOLAMINE (MDEA) REVISION 4, DATE 02 JAN 2023

Europe (EINECS)	Not Determined
Europe (REACH)	Not Determined
Japan (ENCS/METI)	Listed
Korea (KECI)	Listed
Malaysia (List of Classified Substances)	Not Determined
New Zealand (NZIoC)	Listed
Philippines (PICCS)	Listed
Taiwan (TCSI)	Listed
USA (TSCA)	Listed
Mexico (INSQ)	Not Determined

16. OTHER INFORMATION

Related Product Codes	MEDIET1000, MEDIET1001, MEDIET1002, MEDIET1003, MEDIET1004, MEDIET1100, MEDIET1101, MEDIET1200, MEDIET1300, MEDIET1400, MEDIET1401, MEDIET1420, MEDIET2000, MEDIET3000, MEDIET4000, MEDIET5000, MEDIET6000, MEDIET6001
Revision	4
Revision Date	02 Jan 2023
Key/Legend	< Less Than > Greater Than AICS Australian Inventory of Chemical Substances atm Atmosphere CAS Chemical Abstracts Service (Registry Number) cm² Square Centimetres CO₂ Carbon Dioxide COD Chemical Oxygen Demand deg C (°C) Degrees Celcius EPA (New Zealand) Environmental Protection Authority of New Zealand deg F (°F) Degrees Fahrenheit g Grams g/cm³ Grams per Cubic Centimetre g/l Grams per Litre HSNO Hazardous Substance and New Organism IDLH Immediately Dangerous to Life and Health immiscible Liquids are insoluble in each other. inHg Inch of Mercury inH₂O Inch of Water K Kelvin kg Kilogram kg/m³ Kilograms per Cubic Metre lb Pound LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours. LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. ltr or L Litre m³ Cubic Metre mbar Millibar mg Milligram mg/24H Milligrams per 24 Hours mg/kg Milligrams per Kilogram

mg/m³ Milligrams per Cubic Metre

Misc or Miscible Liquids form one homogeneous liquid phase regardless of the amount of either component present.

mm Millimetre

mmH₂O Millimetres of Water

mPa.s Millipascals per Second

N/A Not Applicable

NIOSH National Institute for Occupational Safety and Health

NOHSC National Occupational Health and Safety Commission

OECD Organisation for Economic Co-operation and Development

Oz Ounce

PEL Permissible Exposure Limit

Pa Pascal

ppb Parts per Billion

ppm Parts per Million

ppm/2h Parts per Million per 2 Hours

ppm/6h Parts per Million per 6 Hours

psi Pounds per Square Inch

R Rankine

RCP Reciprocal Calculation Procedure

STEL Short Term Exposure Limit

TLV Threshold Limit Value

tne Tonne

TWA Time Weighted Average

ug/24H Micrograms per 24 Hours

UN United Nations

wt Weight

Material Safety Data Sheet

according to Regulation (EC) No. 1907/2006

NPK Originale Gold® 15-9-15



Version: 1.6
Date of last issue: 23.12.2022
Date of first issue: 13.07.2016

Revision Date:
06.04.2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name : NPK Originale Gold® 15-9-15

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture : Fertilizer

1.3 Details of the supplier of the safety data sheet

Company : COMPO EXPERT GmbH
Krögerweg 10
D-48155 Münster

Telephone : +49 (0) 251 29 79 81 – 000

Telefax : +49 (0) 251 29 79 81 - 111

E-mail address of person responsible for the SDS : info@compo-expert.com

1.4 Emergency telephone number

GBK GmbH - Global Regulatory Compliance - 24h
Telephone: +49 (0) 6132 - 84463

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard statements : Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

Supplemental Hazard Statements : EUH210 Safety data sheet available on request.

Further information : German "Hazardous Substances" legislation (Gefahrstoffverordnung) appendix I, No. 5 (Ammonium Nitrate group C III)

Material Safety Data Sheet

according to Regulation (EC) No. 1907/2006

NPK Originale Gold® 15-9-15



Version: 1.6
Date of last issue: 23.12.2022
Date of first issue: 13.07.2016

Revision Date:
06.04.2023

2.3 Other hazards

None known.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : NPK-Fertilizer on basis: N,N'-(isobutylidene)diurea, ammonium nitrate, potassium salt, ammonium salts, phosphates, magnesium salts, calcium salts, other nutrients.

Hazardous components

Chemical Name	CAS-No. EC-No. Registration number	Classification	Concentration (% w/w)
ammonium nitrate	6484-52-2 229-347-8 01-2119490981-27-XXXX	Ox. Sol. 3; H272 Eye Irrit. 2; H319	>= 10 - <= 45
disodium [[N,N'-ethylenebis[N-(carboxymethyl)glycinato]](4-)-N,N',O,O',ON,ON']cuprate(2-)	14025-15-1 237-864-5 05-2114842509-41-0000	Acute Tox. 4; H302	<= 0,5

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Wash hands with water as a precaution.

If inhaled : Move to fresh air in case of accidental inhalation of fumes from overheating or combustion.
Obtain medical attention.
In case of lung irritation, first treatment with dexametason aerosol (spray).

In case of skin contact : Wash off with plenty of water.

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-
In case of eye contact	: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed	: Clean mouth with water and drink afterwards plenty of water. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms	: Ingestion may provoke the following symptoms: Methaemoglobinemia Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema).

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	: Treat symptomatically.
-

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	: Water
Unsuitable extinguishing media	: Foam Dry chemical Carbon dioxide (CO ₂) Sand

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting	: Can decompose at above 100 °C. Thermal decomposition products: Nitrogen monoxide, nitrogen dioxide, dinitrogenoxide, ammonia Isobutyraldehyd

5.3 Advice for firefighters

Special protective equipment for firefighters	: In the event of fire, wear self-contained breathing apparatus.
Further information	: Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
-

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	: Keep away from children.

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6.2 Environmental precautions

Environmental precautions : Do not flush into surface water or sanitary sewer system.
Retain and dispose of contaminated wash water.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Use mechanical handling equipment.

6.4 Reference to other sections

none

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Protect from contamination.
Keep away from direct sunlight.
Protect against heat.
Protect from moisture.

Advice on protection against fire and explosion : The product is not flammable. Keep away from sources of ignition - No smoking. Keep away from combustible materials. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Risk of explosion if heated under confinement.

Hygiene measures : Wash hands before breaks and at the end of workday.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : When stored loose do not mix with other fertilizers. Store well away from other substances. Keep away from direct sunlight. Protect against heat. Protect from contamination. Protect from moisture.

Storage class (TRGS 510) : 5.1C, Ammonium nitrate and ammonium nitrate containing preparations

Dampness : Keep in a dry place.

7.3 Specific end use(s)

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
disodium [[N,N'-	14025-15-1	TWA	1 mg/m ³	GB EH40

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ethylenebis[N-(carboxymethyl)glycinato]](4-N,N',O,O',ON,ON'] cuprate(2-)			(Copper)	

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
ammonium nitrate	Workers	Inhalation	Long-term systemic effects	36 mg/m ³
	Workers	Skin contact	Long-term systemic effects	5,12 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	2,56 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	8,9 mg/m ³
	Consumers	Skin contact, Ingestion	Long-term systemic effects	2,56 mg/kg bw/day

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
ammonium nitrate	Sewage treatment plant	18 mg/l

8.2 Exposure controls

Personal protective equipment

Eye protection : In case of dust formation:
Tightly fitting safety goggles

Hand protection
Material : Gloves

Skin and body protection : No special protective equipment required.

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Respiratory protection : respiratory protection only if aerosol or dust is formed.

Environmental exposure controls

General advice : Do not flush into surface water or sanitary sewer system.
Retain and dispose of contaminated wash water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	: granular
Colour	: red brown
Odour	: odourless
Odour Threshold	: No data available
pH	: ca. 6,2, Concentration: 100 g/l (20 °C)
Melting point/range	: No data available
Boiling point/boiling range	: Not applicable
Flash point	: Not relevant
Evaporation rate	: Not applicable
Flammability (solid, gas)	: The product is not flammable.
Upper explosion limit	: Not applicable
Lower explosion limit	: Not applicable
Vapour pressure	: Not applicable
Relative vapour density	: Not applicable
Bulk density	: ca. 860 kg/m ³
Solubility(ies)	
Water solubility	: soluble
Partition coefficient: n-	: Not applicable

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octanol/water

Auto-ignition temperature : Not applicable

Decomposition temperature : > 130 °C
To avoid thermal decomposition, do not overheat.

Viscosity

Viscosity, dynamic : Not applicable

Viscosity, kinematic : Not applicable

Explosive properties : Not explosive

Oxidizing properties : Not applicable

Particle characteristics

Particle Size Distribution : D50 = 1,5 mm
D50 Tolerance range = 1,1 mm - 1,9 mm
Measurement technique: Optoelectronic measurement method

9.2 Other information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Stable under recommended storage conditions.

10.2 Chemical stability

No decomposition if stored and applied as directed.
Decomposes on heating.

10.3 Possibility of hazardous reactions

Hazardous reactions : Evolution of ammonia under influence of alkalies.

10.4 Conditions to avoid

Conditions to avoid : Keep away from heat and sources of ignition.

10.5 Incompatible materials

Materials to avoid : oxidizable substances
Strong acids and strong bases

10.6 Hazardous decomposition products

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Hazardous decomposition products	: Nitrogen monoxide, nitrogen dioxide, dinitrogenoxide, ammonia Isobutyraldehyd

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Product:

Acute oral toxicity	: Remarks: No data available Health injuries are not known or expected under normal use.

Acute dermal toxicity	: Remarks: No data available Health injuries are not known or expected under normal use.

Components:

ammonium nitrate:

Acute oral toxicity	: LD50 (Rat): > 2.950 mg/kg Method: OECD Test Guideline 401

Acute inhalation toxicity	: > 88,8 mg/l Method: No information available.

Acute dermal toxicity	: LD50 (Rat): > 5.000 mg/kg Method: OECD Test Guideline 402

disodium [[N,N'-ethylenebis[N-(carboxymethyl)glycinato]](4-)-N,N',O,O',ON,ON']cuprate(2-):

Acute oral toxicity	: LD50 Oral (Rat): > 1.750 mg/kg

Skin corrosion/irritation

Product:

Result: non-irritant

Remarks: The product has not been tested. The information is derived from the properties of the individual components.

Components:

ammonium nitrate:

Species: Rabbit

Method: OECD Test Guideline 404

Result: non-irritant

Serious eye damage/eye irritation

Product:

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Species: Rabbit

Method: OECD Test Guideline 405

Result: non-irritant

Remarks: The product was not tested. The statement was derived from products of similar structure and composition.

Components:

ammonium nitrate:

Species: Rabbit

Method: OECD Test Guideline 405

Result: Irritant

Respiratory or skin sensitisation

Product:

Result: non-sensitizing

Remarks: The product has not been tested. The information is derived from the properties of the individual components.

Components:

ammonium nitrate:

Result: Does not cause skin sensitisation.

germ cell mutagenicity

Product:

Genotoxicity in vitro : Remarks: No data available

Components:

ammonium nitrate:

Genotoxicity in vitro : Method: OECD Test Guideline 471
Result: negative

Carcinogenicity

Product:

Remarks: Contains no ingredient listed as a carcinogen

Components:

ammonium nitrate:

Species: Rat

Remarks: Animal testing did not show any carcinogenic effects.

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Reproductive toxicity

Product:

Effects on fertility

:

Remarks: No toxicity to reproduction

The product has not been tested. The information is derived from the properties of the individual components.

Components:

ammonium nitrate:

Effects on fertility

: Species: Rat

Remarks: Animal testing did not show any effects on fertility.

Effects on foetal
development

: Species: Rat

Remarks: Did not show teratogenic effects in animal experiments.

STOT - single exposure

Product:

Assessment: The substance or mixture is not classified as specific target organ toxicant, single exposure.

Remarks: The product has not been tested. The information is derived from the properties of the individual components.

STOT - repeated exposure

Product:

Assessment: The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Remarks: The product has not been tested. The information is derived from the properties of the individual components.

Repeated dose toxicity

Components:

ammonium nitrate:

Species: Rat

NOAEL: > 1.500 mg/kg

Application Route: Oral

Exposure time: 28 d

Species: Rat

NOAEL: = 256 mg/kg

Application Route: Oral

Exposure time: 52 w

Method: OECD Test Guideline 453

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Species: Rat

NOAEL: $\geq$ 185 mg/kg

Application Route: by inhalation

Exposure time: 2 w

Method: Repeated Dose Inhalation Toxicity: 28-day or 14-day Study.

Aspiration hazard

Based on available data, the classification criteria are not met.

11.2 Information on other hazards

Endocrine disrupting properties

No data available

Further information

Product:

Remarks: Danger of methaemoglobin formation.

The product was not tested. The statement was derived from products of similar structure and composition.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Method: Directive 84/449/EEC, C.2

Toxicity to algae : EC50 (Scenedesmus subspicatus): > 100 mg/l
Exposure time: 72 h
Method: DIN 38412

Components:

ammonium nitrate:

Toxicity to fish : LC50 (Fish): > 100 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia (water flea)): 490 mg/l
Exposure time: 48 h

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LC50 : 490 mg/l

Toxicity to algae : EC50 (Selenastrum capricornutum (green algae)): 1.700 mg/l
Exposure time: 10 d

disodium [[N,N'-ethylenebis[N-(carboxymethyl)glycinato]](4-)-N,N',O,O',ON,ON']cuprate(2-):

Toxicity to fish : LC50 (Fish): > 100 mg/l

Toxicity to algae : EC50 : 30 mg/l
Exposure time: 96 h

12.2 Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Physico-chemical : DOC reduction
removability : ca. 85 %
Method: OECD 301E/92/69/EWG, C.4-B
Remarks: Readily eliminated from water

Components:

ammonium nitrate:

Biodegradability : Remarks: The methods for determining the biological
degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Bioaccumulation is unlikely.

Components:

ammonium nitrate:

Bioaccumulation : Remarks: Bioaccumulation is unlikely.

Partition coefficient: n- : log Pow: -3,1
octanol/water

12.4 Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among : Remarks: Moderately mobile in soils
environmental compartments

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12.5 Results of PBT and vPvB assessment

Product:

Assessment : Remarks: Not applicable

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Product:

Additional ecological information : Inhibition of degradation activity in activated sludge is not to be anticipated during correct introduction of low concentrations.
There is a high probability that the product is acute not harmful to aquatic organisms.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Check if agriculture use is possible.
Contact manufacturer.

Contaminated packaging : Contaminated packaging should be emptied as far as possible; then it can be passed on for recycling after being thoroughly cleaned.

SECTION 14: Transport information

14.1 UN number or ID number

Not regulated as a dangerous good

14.2 UN proper shipping name

Not regulated as a dangerous good

14.3 Transport hazard class(es)

Not regulated as a dangerous good

14.4 Packing group

Not regulated as a dangerous good

14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Not applicable

14.7 Maritime transport in bulk according to IMO instruments

Remarks : Not relevant

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SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Water contaminating class : WGK 1 slightly water endangering
(Germany)

Other regulations : TRGS 511 'Ammonium nitrate'

This product is subject to Regulation (EU) 2019/1148;
suspicious transactions, disappearance or theft of the product
must be reported to the relevant authority.

15.2 Chemical Safety Assessment

A Chemical Safety Assessment is not required for this product.

SECTION 16: Other information

Full text of H-Statements

H272 : May intensify fire; oxidizer.
H302 : Harmful if swallowed.
H319 : Causes serious eye irritation.

Full text of other abbreviations

Acute Tox. : Acute toxicity
Eye Irrit. : Eye irritation
Ox. Sol. : Oxidizing solids

(Q)SAR - (Quantitative) Structure Activity Relationship; ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; DIN - Standard of the German Institute for Standardisation; ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISO - International Organisation for Standardization; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC

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- No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TRGS - Technical Rule for Hazardous Substances; UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative; DSL - Domestic Substances List (Canada); KECI - Korea Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); AICS - Australian Inventory of Chemical Substances; IECSC - Inventory of Existing Chemical Substances in China; ENCS - Existing and New Chemical Substances (Japan); ISHL - Industrial Safety and Health Law (Japan); PICCS - Philippines Inventory of Chemicals and Chemical Substances; NZIoC - New Zealand Inventory of Chemicals; TCSI - Taiwan Chemical Substance Inventory; CMR - Carcinogen, Mutagen or Reproductive Toxicant; GLP - Good Laboratory Practice

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

DE / EN

SAFETY DATA SHEET

Compiled in accordance with REACH Regulation (EC) No 1907/2006, as retained and amended in UK law.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: CPI®-4624-68-F

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Formulated Industrial Lubricant

Uses advised against: None identified.

1.3 Details of the supplier of the safety data sheet

Supplier

Company Name: LUBRIZOL LIMITED
Address: THE KNOWLE, NETHER LANE
HAZELWOOD, DERBYSHIRE, DE56 4AN
GB
Telephone: (44) 01332-842211
E-mail contact: EUSDS@lubrizol.com {Lubrizol Safety Data Sheets can be obtained at
www.mylubrizol.com}

1.4 Emergency telephone number:

FOR TRANSPORT EMERGENCY CALL CHEMTREC (+1) 703 527 3887

Poison Information Centre: National Poisons Information Service (NPIS); 0344 892 0111 (For Health Professionals only); 24/7

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

This product does not meet the classification requirements of the current European legislation.

Classified in accordance with CLP Regulation (EC) No 1272/2008, as retained and amended in UK law.

Not classified

2.2 Label elements in accordance with CLP Regulation (EC) No 1272/2008, as retained and amended in UK law.

Signal Words: Not applicable

Hazard Statement(s): Not applicable

Precautionary Statements

Supplemental label information

EUH210: Safety data sheet available on request.

2.3 Other hazards:

Endocrine Disruption- Toxicity

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Endocrine Disruption- Ecotoxicity

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Compiled in accordance with CLP Regulation (EC) No 1272/2008, as retained and amended in UK law.

Chemical name	Concentration	EC No.	REACH Registration No.	M-Factor:	Notes
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	0.1 - 1%	270-128-1	UK-01-8621217137-4		

600, 700 and 900 ECHA List Numbers do not have any legal significance; rather they are purely technical identifiers and are displayed for informational purposes only.

Compiled in accordance with CLP Regulation (EC) No 1272/2008, as retained and amended in UK law.

Chemical name	Classification	Notes
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Repr. 2; H361	

The full text for all H-phrases is displayed in section 16.

See Section 15 for Regulation (EC) No. 1907/2006 REACH Article 59(1). Candidate List (Substances of Very High Concern (SVHC))

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation: Remove exposed person to fresh air if adverse effects are observed.

Eye contact: Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses.

Skin Contact: Wash with soap and water. If skin irritation occurs, get medical attention.

Ingestion:	Treat symptomatically. Get medical attention.
4.2 Most important symptoms and effects, both acute and delayed:	See section 11.
4.3 Indication of any immediate medical attention and special treatment needed	
Hazards:	No data available.
Treatment:	Treat symptomatically.

SECTION 5: Firefighting measures

General Fire Hazards:	No unusual fire or explosion hazards noted.
5.1 Extinguishing media	
Suitable extinguishing media:	CO2, dry chemical, foam, water spray, water fog.
Unsuitable extinguishing media:	Not determined.
5.2 Special hazards arising from the substance or mixture:	See section 10 for additional information. Water may cause splattering.
5.3 Advice for firefighters	
Special fire-fighting procedures:	No data available.
Special protective equipment for fire-fighters:	Recommend wearing self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:	Personal Protective Equipment must be worn, see Personal Protection Section for PPE recommendations. Ventilate area if spilled in confined space or other poorly ventilated areas.
6.2 Environmental Precautions:	Avoid release to the environment. Do not contaminate water sources or sewer. Environmental manager must be informed of all major spillages. Prevent further leakage or spillage if safe to do so.
6.3 Methods and material for containment and cleaning up:	Dike far ahead of larger spill for later recovery and disposal. Pick up free liquid for recycle and/or disposal. Residual liquid can be absorbed on inert material.
6.4 Reference to other sections:	See sections 8 and 13 for additional information.

SECTION 7: Handling and storage:

- 7.1 Precautions for safe handling:** Observe good industrial hygiene practices. Provide adequate ventilation. Wear appropriate personal protective equipment.
- Maximum Handling Temperature:** Not determined.
- 7.2 Conditions for safe storage, including any incompatibilities:** Store away from incompatible materials. See section 10 for incompatible materials.
- Maximum Storage Temperature:** Not determined.
- 7.3 Specific end use(s):** End uses are listed in an attached exposure scenario when one is required.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

DNEL-Values

Critical component	Type	Route of Exposure	Health Warnings	Remarks
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	General population	Oral	Systemic, long-term; 0.04 mg/kg	Repeated dose toxicity
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Workers	Dermal	Systemic, long-term; 0.08 mg/kg	Repeated dose toxicity
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	General population	Dermal	Systemic, long-term; 0.04 mg/kg	Repeated dose toxicity
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Workers	Inhalation	Systemic, long-term; 0.6 mg/m3	Repeated dose toxicity
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	General population	Inhalation	Systemic, long-term; 0.14 mg/m3	Repeated dose toxicity
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	General population	Eyes	Local effect;	No hazard identified
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Workers	Eyes	Local effect;	No hazard identified

PNEC-Values

Critical component	Environmental compartment	PNEC-Values	Remarks

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Soil	1.76 mg/kg	
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Sediment (marine water)	0.045 mg/kg	
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Sediment (freshwater)	0.446 mg/kg	
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Aquatic (marine water)	0.003 mg/l	
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Sewage treatment plant	10 mg/l	
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Aquatic (freshwater)	0.034 mg/l	

8.2 Exposure controls

Appropriate engineering controls:

No special requirements under ordinary conditions of use and with adequate ventilation.

Individual protection measures, such as personal protective equipment

General information:

Please follow the recommended personal protective equipment (PPE) guidelines below and refer to the appropriate EN standard where applicable. Use personal protective equipment as required.

Eye/face protection:

If contact is likely, safety glasses with side shields are recommended. Eye protection should meet the standards set out in EN 166.

Skin protection

Hand Protection:

Nitrile.

General:

Because specific work environments and material handling practices vary, safety procedures should be specific for each intended application. The correct choice of protective gloves depends upon the chemicals being handled, and the conditions of work and use. Most gloves provide protection for only a limited time before they must be discarded and replaced (even the best chemically resistant gloves will break down after repeated chemical exposures). Gloves should be chosen in consultation with the supplier / manufacturer and taking account of a full assessment of the working conditions. For typical use and handling of chemical substances, gloves should meet the standards set out in EN 374. For applications involving mechanical risks with potential for abrasion or puncture, the standards set out in EN 388 should be considered. For tasks involving thermal hazards, the standards set out in EN 407 should be considered.

Break-through time: Breakthrough time data are generated by glove manufacturers under laboratory test conditions and represent how long a glove can be expected to provide effective permeation resistance. It is important when following breakthrough time recommendations that actual workplace conditions are taken into account. Always consult with your glove supplier for up-to-date technical information on breakthrough times for the recommended glove type.

For continuous contact, we suggest gloves with a minimum breakthrough time of 240 minutes, or > 480 minutes if suitable gloves can be obtained. If suitable gloves are not available to offer that level of protection, gloves with shorter breakthrough times may be acceptable as long as appropriate glove maintenance and replacement regimes are determined and adhered to.

For short-term, transient exposures and splash protection, gloves with shorter breakthrough times may commonly be used. Therefore, appropriate maintenance and replacement regimes must be determined and rigorously followed.

Glove thickness: For general applications, we recommend gloves with a thickness typically greater than 0.35 mm.

It is important to note that glove thickness is not the only predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material.

Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.

Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, before being disposed of. Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential.

Other: No data available.

Respiratory Protection: Consult with an industrial hygienist to determine the appropriate respiratory protection for your specific use of this material. A respiratory protection program compliant with all applicable regulations must be followed whenever workplace conditions require the use of a respirator.

Respiratory Protective Equipment (RPE) is not normally required where there is adequate natural or local exhaust ventilation to control exposure. In case of insufficient ventilation, wear suitable respiratory equipment. The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Please refer to the relevant EN standards for the RPE selected.

Hygiene measures:	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.
Environmental Controls:	No data available. See section 6 for details.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state:	liquid
Form:	liquid
Color:	Colorless to yellow
Odor:	Mild
Odor Threshold:	No data available.
pH:	Not applicable
Freezing point:	No data available.
Boiling Point:	No data available.
Flash Point:	268 °C (Cleveland Open Cup)
Evaporation Rate:	No data available.
Flammability (solid, gas):	No data available.

Upper/lower limit on flammability or explosive limits

Flammability Limit - Upper (%):	No data available.
Flammability Limit - Lower (%):	No data available.
Vapor pressure:	No data available.
Relative vapor density:	No data available.
Relative density:	0.835 (15.6 °C)
Solubility(ies)	
Solubility in Water:	Slightly Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.

Decomposition Temperature:	No data available.
Viscosity:	68.5 mm ² /s (40 °C); 10.4 mm ² /s (100 °C)
Explosive properties:	No data available.
Oxidizing properties:	No data available.
VOC Content:	No data available.

Particle characteristics

Particle Size:	Not applicable
Particle Size Distribution:	Not applicable
Specific surface area:	Not applicable
Surface charge/Zeta potential:	Not applicable
Assessment:	Not applicable
Shape:	Not applicable
Crystallinity:	Not applicable
Surface treatment:	Not applicable

Other information

Pour Point Temperature:	< -51 °C

SECTION 10: Stability and reactivity

10.1 Reactivity:	No data available.
10.2 Chemical Stability:	Material is stable under normal conditions.
10.3 Possibility of hazardous reactions:	Will not occur.
10.4 Conditions to avoid:	None known.
10.5 Incompatible Materials:	Strong oxidizing agents.
10.6 Hazardous Decomposition Products:	Thermal decomposition or combustion may generate smoke, carbon monoxide, carbon dioxide, and other products of incomplete combustion.

SECTION 11: Toxicological information

Information on likely routes of exposure

Inhalation:	No data available.
Ingestion:	No data available.
Skin Contact:	No data available.
Eye contact:	No data available.

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Oral

Product: Not classified for acute toxicity based on available data.

Dermal

Product: Not classified for acute toxicity based on available data.

Inhalation

Product: Not classified for acute toxicity based on available data.

Skin Corrosion/Irritation:

Product: Remarks: Not classified as a primary skin irritant. Prolonged or repeated contact may cause irritation.

Serious Eye Damage/Eye Irritation:

Product: Remarks: Not classified as a primary eye irritant.

Respiratory sensitization:

No data available

Skin sensitization:

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene Classification: Not a skin sensitizer. (Literature) Not a skin sensitizer.

Specific Target Organ Toxicity - Single Exposure:

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.

Aspiration Hazard:

No data available

Other effects:

Product: If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.

Chronic Effects

Carcinogenicity:

No data available

Germ Cell Mutagenicity:

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene In vitro and in vivo genetic toxicity studies were negative.

Reproductive toxicity:

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene Suspected of damaging fertility or the unborn child.

Specific Target Organ Toxicity - Repeated Exposure:

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene

Oral: Target Organ(s): Liver, Kidney

11.2 Information on other hazards

Other hazards

Product:

If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.;

Endocrine Disruption

Product:

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

SECTION 12: Ecological information

12.1 Toxicity

Fish

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene

LC 50 (Zebra Fish, 4 d): > 100 mg/l

Aquatic Invertebrates

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene

EC 50 (Water flea (Daphnia magna), 2 d): 51 mg/l
NOEC (Water Flea (Daphnia Magna), 21 d): 1.69 mg/l

Toxicity to Aquatic Plants

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene

EC 50 (Green algae (Scenedesmus quadricauda), 3 d): > 100 mg/l
NOEC (Green algae (Scenedesmus quadricauda), 3 d): 10 - 100 mg/l

Toxicity to soil dwelling organisms

No data available

Sediment Toxicity

No data available

Toxicity to Terrestrial Plants

No data available

Toxicity to Above-Ground Organisms

No data available

Toxicity to microorganisms

Benzenamine, N-phenyl-,
reaction products with 2,4,4-
trimethylpentene

EC 50 (Sludge, 3 h): > 100 mg/l

12.2 Persistence and Degradability

Biodegradation

Benzenamine, N-phenyl-, reaction
products with 2,4,4-
trimethylpentene

OECD TG 301 B, 1 %, 28 d, Not readily degradable. (The product is not biodegradable.)

BOD/COD Ratio

No data available

12.3 Bioaccumulative potential

Bioconcentration Factor (BCF)

Benzenamine, N-phenyl-, reaction
products with 2,4,4-
trimethylpentene

Common Carp, Bioconcentration Factor (BCF): 1,730 (Read across)
Based on experimental data this material is not bioaccumulative.

Partition Coefficient n-octanol / water (log Kow)

Benzenamine, N-phenyl-, reaction
products with 2,4,4-
trimethylpentene

Log Kow: > 5 25 °C (calculated)

12.4 Mobility in soil:

No data available

12.5 Results of PBT and vPvB assessment

No data available

12.6 Endocrine disrupting properties:

Product:

The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Disposal methods: Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Since emptied containers retain product residue, follow label warnings even after container is emptied.

Contaminated Packaging: Container packaging may exhibit hazards.

SECTION 14: Transport information

ADR
Not Regulated.

IMDG
Not Regulated.

IATA
Not Regulated.

14.7 Maritime transport in bulk according to IMO instruments

None known.

Shipping descriptions may vary based on mode of transport, quantities, temperature of the material, package size, and/or origin and destination. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material. For transportation, steps must be taken to prevent load shifting or materials falling, and all relating legal statutes should be obeyed. Review classification requirements before shipping materials at elevated temperatures.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

EU Regulations

EU. Regulation 1005/2009/EC on substances that deplete the ozone layer, Annex I, Controlled Substances:

None present or none present in regulated quantities.

EU. Regulation 2019/1021/EU on persistent organic pollutants (POPs) (recast), as amended:

None present or none present in regulated quantities.

EU. Chemicals Subject to PIC Procedure: Regulation 649/2012/EU on export and import of dangerous chemicals, as amended:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Article 59(1). Candidate List:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:

None present or none present in regulated quantities.

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.:

None present or none present in regulated quantities.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:

None present or none present in regulated quantities.

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I:

None present or none present in regulated quantities.

EU. Regulation No. 166/2006 PRTR (Pollutant Release and Transfer Registry), Annex II: Pollutants:

None present or none present in regulated quantities.

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

None present or none present in regulated quantities.

Inventory Status

Australia (AIC)

All components are in compliance with chemical notification requirements in Australia.

Canada (DSL/NDSL)

All substances contained in this product are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Substances List (DSL) or are exempt.

China (IECSC)

All components of this product are listed on the Inventory of Existing Chemical Substances in China.

European Union (REACH)

To obtain information on the REACH compliance status of this product, please e-mail REACH@SDSInquiries.com.

Great Britain (UK REACH)

To obtain information on the UK REACH compliance status of this product, please e-mail REACH@SDSInquiries.com.

Japan (ENCS)

All components are in compliance with the Chemical Substances Control Law of Japan.

Korea (ECL)

All components are in compliance in Korea.

New Zealand (NZIoC)

All components are in compliance with chemical notification requirements in New Zealand.

Philippines (PICCS)

All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).

Switzerland (SWISS)

All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.

Taiwan (TCSCA)

All components of this product are listed on the Taiwan inventory.

Turkey (KKDIK)

To obtain information on the KKDIK compliance status of this product, please e-mail REACH@SDSInquiries.com.

United States (TSCA)

All substances contained in this product are listed on the TSCA inventory or are exempt.

The information that was used to confirm the compliance status of this product may deviate from the chemical information shown in Section 3.

15.2 Chemical safety assessment:

No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Key literature references and sources for data: Internal company data and other publically available resources.

Wording of the H-statements in section 2 and 3:

H361 Suspected of damaging fertility or the unborn child.

Other information:

Revision(s) are noted by the double bar in the margin and the light gray box.

Abbreviations and acronyms:

ACGIH – American Conference of Governmental Industrial Hygienist
ADR - International Carriage of Dangerous Goods by Road
AICS - Australian Inventory of Chemical Substances
ATEmix - Acute Toxicity Estimate for the mixture
BCF - Bio concentration factor
DMSO - Dimethyl sulfoxide
DSL - Domestic Substance List

EC50 - Effective concentration that gives a response in 50% of the population
ECHA - European Chemical Agency
ECL - Existing Chemical List
ENCS - Existing and New Chemical Substances
EPA – Environmental Protection Agency
IARC - International Agency for Research on Cancer
IATA - International Air Transport Association
IECSC - Inventory of Existing Chemical Substances
IMDG - International Maritime Dangerous Goods
IP 346 – A gravimetric assay used to determine the percentage weight of polycyclic aromatics in oil, via a DMSO extraction technique
LC50 - Lethal concentration required to kill 50% of the population
MARPOL - International Conventions for the Prevention of Pollution from Ships
NDSL - Non Domestic Substance List
NOAEC - No observed adverse effect concentration
NOAEL - No observed adverse effect level
NOEC - No observed effective concentration
NTP - National Toxicology Program
NZloc - New Zealand Inventory of chemicals
OECD TG - Organization for Economic Cooperation and Development Test Guidelines
OSHA – Occupational, Safety, and Health Administration
PBT – Persistent bioaccumulative toxic chemical
PEL – Permissible Exposure Level
PICCS - Philippine Inventory of Chemicals and Chemical Substances
PPE - Personal Protective Equipment
PRTR - Pollutant Release and Transfer Register
REACH - Registration, Evaluation, Authorization & restriction of Chemicals
SVHC - Substance of Very High Concern
SWISS - Switzerland chemical ordinance
TCSCA - Toxic Chemical Substance Control Act
TLV – Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA – Time Weighted Average
vPvB – very Persistent very Bioaccumulative

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Reference to Regulation (EC) No. 1907/2006 (EU REACH), including but not limited to EU REACH registration numbers is provided for informational purposes only. UK REACH (EU Exit Regulation as amended) data and information will be provided as it becomes available.

SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: **CPI®-1516-150**

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Formulated Industrial Lubricant
Uses advised against: None identified.

1.3 Details of the supplier of the safety data sheet

Supplier

Company Name: LUBRIZOL LIMITED
Address: THE KNOWLE, NETHER LANE
HAZELWOOD, DERBYSHIRE, DE56 4AN
GB
Telephone: (44) 01332-842211
E-mail contact: EUSDS@lubrizol.com {Lubrizol Safety Data Sheets can be obtained at
www.mylubrizol.com}

1.4 Emergency telephone number:

FOR TRANSPORT EMERGENCY CALL CHEMTREC (+1) 703 527 3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

The product has been classified according to the legislation in force.

Classification according to Regulation (EC) No 1272/2008 as amended.

Chronic hazards to the aquatic environment	Category 3	H412: Harmful to aquatic life with long lasting effects.

The full text for all H-phrases is displayed in section 16.

2.2 Label elements according to Regulation (EC) No 1272/2008 as amended

Signal Words: Not applicable

Hazard Statement(s): H412: Harmful to aquatic life with long lasting effects.

Precautionary Statements

Disposal: P501: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Supplemental label information

EUH208: Contains:
N-1-naphthylaniline
May produce an allergic reaction.

2.3 Other hazards: None identified.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Regulation No. 1272/2008.

Chemical name	Concentration	EC No.	REACH Registration No.	M-Factor:	Notes
N-1-naphthylaniline	0.25 - 1%	201-983-0			

600, 700 and 900 ECHA List Numbers do not have any legal significance; rather they are purely technical identifiers and are displayed for informational purposes only.

Classification Regulation No. 1272/2008.

Chemical name	Classification	Notes
N-1-naphthylaniline	STOT RE 2; H373 Skin Sens. 1B; H317 Acute Tox. 4; H302 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	

The full text for all H-phrases is displayed in section 16.

See Section 15 for Regulation (EC) No. 1907/2006 REACH Article 59(1). Candidate List (Substances of Very High Concern (SVHC))

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation:	Remove exposed person to fresh air if adverse effects are observed.
Eye contact:	Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses.
Skin Contact:	Wash skin thoroughly with soap and water. If skin irritation or rash occurs: Get medical attention. Launder contaminated clothing before reuse.
 Ingestion:	Call a POISON CENTER/doctor if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed: See section 11.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards:	No data available.
Treatment:	Treat symptomatically.

SECTION 5: Firefighting measures

General Fire Hazards: No unusual fire or explosion hazards noted.

5.1 Extinguishing media

Suitable extinguishing media: CO₂, dry chemical, foam, water spray, water fog.

Unsuitable extinguishing media: Not determined.

5.2 Special hazards arising from the substance or mixture:

See section 10 for additional information.

5.3 Advice for firefighters

Special fire fighting procedures: No data available.

Special protective equipment for fire-fighters: Recommend wearing self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unauthorized personnel away. See Section 8 of the SDS for Personal Protective Equipment.

6.2 Environmental Precautions:

Avoid release to the environment. Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up:

Dike far ahead of larger spill for later recovery and disposal. Pick up free liquid for recycle and/or disposal. Residual liquid can be absorbed on inert material.

6.4 Reference to other sections:

See sections 8 and 13 for additional information.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling:

Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Observe good industrial hygiene practices. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. Launder contaminated clothing before reuse. Avoid environmental contamination.

Maximum Handling Temperature:

Not determined.

7.2 Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials. See section 10 for incompatible materials.

Maximum Storage Temperature: Not determined.

7.3 Specific end use(s): End uses are listed in an attached exposure scenario when one is required.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

8.2 Exposure controls

Appropriate engineering controls: No special requirements under ordinary conditions of use and with adequate ventilation.

Individual protection measures, such as personal protective equipment

General information: Please follow the recommended personal protective equipment (PPE) guidelines below and refer to the appropriate EN standard where applicable. Use personal protective equipment as required.

Eye/face protection: If contact is likely, safety glasses with side shields are recommended. Eye protection should meet the standards set out in EN 166.

Skin protection

Hand Protection: Suitable gloves can be recommended by the glove supplier.

General: Because specific work environments and material handling practices vary, safety procedures should be specific for each intended application. The correct choice of protective gloves depends upon the chemicals being handled, and the conditions of work and use. Most gloves provide protection for only a limited time before they must be discarded and replaced (even the best chemically resistant gloves will break down after repeated chemical exposures). Gloves should be chosen in consultation with the supplier / manufacturer and taking account of a full assessment of the working conditions. For typical use and handling of chemical substances, gloves should meet the standards set out in EN 374. For applications involving mechanical risks with potential for abrasion or puncture, the standards set out in EN 388 should be considered. For tasks involving thermal hazards, the standards set out in EN 407 should be considered.

Break-through time: Breakthrough time data are generated by glove manufacturers under laboratory test conditions and represent how long a glove can be expected to provide effective permeation resistance. It is important when following breakthrough time recommendations that actual workplace conditions are taken into account. Always consult with your glove supplier for up-to-date technical information on breakthrough times for the recommended glove type.

For continuous contact, we suggest gloves with a minimum breakthrough time of 240 minutes, or > 480 minutes if suitable gloves can be obtained. If suitable gloves are not available to offer that level of protection, gloves with shorter breakthrough times may be acceptable as long as appropriate glove maintenance and replacement regimes are determined and adhered to.

For short-term, transient exposures and splash protection, gloves with shorter breakthrough times may commonly be used. Therefore, appropriate maintenance and replacement regimes must be determined and rigorously followed.

Glove thickness: For general applications, we recommend gloves with a thickness typically greater than 0.35 mm.

It is important to note that glove thickness is not the only predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material.

Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.

Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, before being disposed of. Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential.

Other: Gloves, coveralls, apron, boots as necessary to minimize contact. Do not wear rings, watches or similar apparel that could entrap the material.

Respiratory Protection: Consult with an industrial hygienist to determine the appropriate respiratory protection for your specific use of this material. A respiratory protection program compliant with all applicable regulations must be followed whenever workplace conditions require the use of a respirator.

Respiratory Protective Equipment (RPE) is not normally required where there is adequate natural or local exhaust ventilation to control exposure. In case of insufficient ventilation, wear suitable respiratory equipment. The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Please refer to the relevant EN standards for the RPE selected.

Hygiene measures: Observe good industrial hygiene practices. Avoid contact with skin. Contaminated work clothing should not be allowed out of the workplace.

Environmental Controls: No data available.
See section 6 for details.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state: liquid
Form: liquid
Color: Colorless to yellow

Odor: Mild

Odor Threshold: No data available.

pH: No data available.

Freezing point: No data available.

Boiling Point: No data available.

Flash Point: 260 °C (Cleveland Open Cup)

Evaporation Rate: No data available.

Flammability (solid, gas): No data available.

Upper/lower limit on flammability or explosive limits

Flammability Limit - Upper (%): No data available.

Flammability Limit - Lower (%): No data available.

Vapor pressure: No data available.

Vapor density (air=1): No data available.

Relative density: 0.995 (15.6 °C)

Solubility(ies)

Solubility in Water: Soluble

Solubility (other): No data available.

Partition coefficient (n-octanol/water): No data available.

Autoignition Temperature: No data available.

Decomposition Temperature: No data available.

Viscosity: 153 mm²/s (40 °C); 23.5 mm²/s (100 °C)

Explosive properties: No data available.

Oxidizing properties: No data available.
VOC Content: No data available.

Other information

Bulk density: 8.29 lb/gal (25 °C)
Pour Point Temperature: -34 °C

SECTION 10: Stability and reactivity

10.1 Reactivity: No data available.

10.2 Chemical Stability: Material is stable under normal conditions.

10.3 Possibility of hazardous reactions: Will not occur.

10.4 Conditions to avoid: None known.

10.5 Incompatible Materials: Strong acids. Strong oxidizing agents. Strong bases.

10.6 Hazardous Decomposition Products: Thermal decomposition or combustion may generate smoke, carbon monoxide, carbon dioxide, and other products of incomplete combustion.

SECTION 11: Toxicological information

Information on likely routes of exposure

Inhalation: No data available.

Ingestion: May be harmful if swallowed.

Skin Contact: No data available.

Eye contact: No data available.

11.1 Information on toxicological effects

Acute toxicity

Oral

Product: Swallowing material may cause irritation of the gastrointestinal lining, nausea, vomiting, diarrhea, and abdominal pain.
Not classified for acute toxicity based on available data.

Dermal

Product: Not classified for acute toxicity based on available data.

Inhalation

Product: Not classified for acute toxicity based on available data.

Skin Corrosion/Irritation:

Product: Not classified as a primary skin irritant.

Serious Eye Damage/Eye Irritation:

Product: Remarks: Not classified as a primary eye irritant.

Respiratory sensitization:

No data available

Skin sensitization:

N-1-naphthylaniline

Remarks: Category 1B Classification: Skin sensitizer (Literature)

Specific Target Organ Toxicity - Single Exposure:

No data available

Aspiration Hazard:

No data available

Chronic Effects

Carcinogenicity:

No data available

Germ Cell Mutagenicity:

N-1-naphthylaniline

Negative for mutagenicity studies but did induce a slight increase in unscheduled DNA synthesis in human cells and a significant increase in sister chromatid exchange rates after incubation in rat liver S9 fraction.

Reproductive toxicity:

No data available

Specific Target Organ Toxicity - Repeated Exposure:

N-1-naphthylaniline

Oral: Target Organ(s): Blood

SECTION 12: Ecological information

12.1 Ecotoxicity

Fish

N-1-naphthylaniline

LC 50 (Rainbow Trout, 4 d): 0.44 mg/l

Aquatic Invertebrates

N-1-naphthylaniline

EC 50 (Water flea (Daphnia magna), 2 d): 0.32 mg/l

EC 50 (Water flea (Daphnia magna), 21 d): 0.06 mg/l

NOEC (Water flea (Daphnia magna), 21 d): 0.025 mg/l

Toxicity to Aquatic Plants

N-1-naphthylaniline

EC 50 (Alga, 3 d): 0.25 mg/l

Toxicity to soil dwelling organisms

No data available

Sediment Toxicity

No data available

Toxicity to Terrestrial Plants

No data available

Toxicity to Above-Ground Organisms

No data available

Toxicity to microorganisms

N-1-naphthylaniline

EC 50 (Sludge, 0.1 d): > 10,000 mg/l

12.2 Persistence and Degradability

Biodegradation

N-1-naphthylaniline

Oxygen depletion 0 % (28 d, OECD TG 301 C)

BOD/COD Ratio

No data available

12.3 Bioaccumulative Potential

Bioconcentration Factor (BCF)

N-1-naphthylaniline

Bioconcentration Factor (BCF): 2,691.53 (Measured)

Partition Coefficient n-octanol / water (log Kow)

|| N-1-naphthylaniline

Log Kow: 4.228 (Read across)

12.4 Mobility:

No data available

12.5 Results of PBT and vPvB assessment

No data available

12.6 Other Adverse Effects:

No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Disposal methods:

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.
Dispose of packaging or containers in accordance with local, regional, national and international regulations. Empty container contains product residue which may exhibit hazards of product.

Contaminated Packaging:

Container packaging may exhibit hazards.

SECTION 14: Transport information

ADR

Not regulated.

IMDG

Not regulated.

IATA

Not regulated.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code

None known.

Shipping descriptions may vary based on mode of transport, quantities, temperature of the material, package size, and/or origin and destination. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material. For transportation, steps must be taken to prevent load shifting or materials falling, and all relating legal statutes should be obeyed. Review classification requirements before shipping materials at elevated temperatures.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

EU Regulations

Regulation (EC) No. 2037/2000 Substances that deplete the ozone layer:

None present or none present in regulated quantities.

Regulation (EC) No. 850/2004 on persistent organic pollutants:

None present or none present in regulated quantities.

Regulation (EC) No. 689/2008 Import and export of dangerous chemicals:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Article 59(1). Candidate List:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended:

None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:

None present or none present in regulated quantities.

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.:

None present or none present in regulated quantities.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:

None present or none present in regulated quantities.

Directive 96/82/EC (Seveso III): on the control of major accident hazards involving dangerous substances:

None present or none present in regulated quantities.

EU. Regulation No. 166/2006 PRTR (Pollutant Release and Transfer Registry), Annex II: Pollutants:

None present or none present in regulated quantities.

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

None present or none present in regulated quantities.

Inventory Status

Australia (AICS)

All components are in compliance with chemical notification requirements in Australia.

Canada (DSL/NDSL)

All substances contained in this product are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Substances List (DSL) or are exempt.

China (IECSC)

All components of this product are listed on the Inventory of Existing Chemical Substances in China.

European Union (REACH)

To obtain information on the REACH compliance status of this product, please e-mail REACH@SDSInquiries.com.

Japan (ENCS)

All components are in compliance with the Chemical Substances Control Law of Japan.

Korea (ECL)

All components are in compliance in Korea.

New Zealand (NZIoC)

All components are in compliance with chemical notification requirements in New Zealand.

Philippines (PICCS)

All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).

Switzerland (SWISS)

All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.

Taiwan (TCSCA)

All components of this product are listed on the Taiwan inventory.

United States (TSCA)

All substances contained in this product are listed on the TSCA inventory or are exempt.

The information that was used to confirm the compliance status of this product may deviate from the chemical information shown in Section 3.

15.2 Chemical safety assessment:

No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Key literature references and sources for data: Internal company data and other publically available resources.

Wording of the H-statements in section 2 and 3:

H302	Harmful if swallowed.
H317	May cause an allergic skin reaction.
H373	May cause damage to organs through prolonged or repeated

	exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.

Other information: Revision(s) are noted by the double bar in the margin and the light gray box.
Text that has been removed from the previous version can be found in the Revision Information summary table.

Abbreviations and acronyms:

ACGIH – American Conference of Governmental Industrial Hygienist
 ADR - International Carriage of Dangerous Goods by Road
 AICS - Australian Inventory of Chemical Substances
 ATEmix - Acute Toxicity Estimate for the mixture
 BCF - Bio concentration factor
 DMSO - Dimethyl sulfoxide
 DSL - Domestic Substance List
 EC50 - Effective concentration that gives a response in 50% of the population
 ECHA - European Chemical Agency
 ECL - Existing Chemical List
 ENCS - Existing and New Chemical Substances
 EPA – Environmental Protection Agency
 IARC - International Agency for Research on Cancer
 IATA - International Air Transport Association
 IECSC - Inventory of Existing Chemical Substances
 IMDG - International Maritime Dangerous Goods
 IP 346 – A gravimetric assay used to determine the percentage weight of polycyclic aromatics in oil, via a DMSO extraction technique
 LC50 - Lethal concentration required to kill 50% of the population
 MARPOL - International Conventions for the Prevention of Pollution from Ships
 NDSL - Non Domestic Substance List
 NOAEC - No observed adverse effect concentration
 NOAEL - No observed adverse effect level
 NOEC - No observed effective concentration
 NTP - National Toxicology Program
 NZloc - New Zealand Inventory of chemicals
 OECD TG - Organization for Economic Cooperation and Development Test Guidelines
 OSHA – Occupational, Safety, and Health Administration
 PBT – Persistent bioaccumulative toxic chemical
 PEL – Permissible Exposure Level
 PICCS - Philippine Inventory of Chemicals and Chemical Substances
 PPE - Personal Protective Equipment
 PRTR - Pollutant Release and Transfer Register
 REACH - Registration, Evaluation, Authorization & restriction of Chemicals
 SVHC - Substance of Very High Concern
 SWISS - Switzerland chemical ordinance
 TCSCA - Toxic Chemical Substance Control Act
 TLV – Threshold Limit Value
 TSCA - Toxic Substances Control Act
 TWA – Time Weighted Average
 vPvB – very Persistent very Bioaccumulative

Issue Date: 29.01.2019

Disclaimer:

As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this product. Information contained herein is believed to be true and accurate but all statements or suggestions are made without warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof. Compliance with all applicable federal, state, and local regulations remains the responsibility of the user.

Revision Information:

SECTION 2: Hazards identification	Deleted	Phrase text	not applicable
SECTION 2: Hazards identification	Deleted	Phrase text	Precautionary Statement
SECTION 4: First aid measures	Deleted	Advice	Call a POISON CENTER/doctor/.../if you feel unwell.
SECTION 12: Ecological information	Deleted	Value logPow	4.2
SECTION 14: Transport information	Deleted	Phrase text	Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
SECTION 14: Transport information	Deleted	Phrase text	Shipping descriptions may vary based on mode of transport, quantities ,temperature of the material, package size,a
SECTION 14: Transport information	Deleted	Phrase text	and destination It is the responsibility of the transporting organization to follow all applicable laws, regulatio
SECTION 14: Transport information	Deleted	Phrase text	relating to the transportation of the material.
SECTION 15: Regulatory information	Deleted	Phrase text	Directive 96/82/EC (Seveso II): on the control of major accident hazards involving dangerous substances
SECTION 15: Regulatory information	Deleted	Remarks	All components are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Su
SECTION 15: Regulatory information	Deleted	Remarks	All components of this material are on the US TSCA Inventory.

NECA|active® gc 50 / 55 / 60

Pelletized activated carbon - nominal diameter 4 mm

Resource base:

- calcined coal, mineralizes binder, steam activated

Particular qualities:

- very high physical adsorption capacity
- excellent mechanical stability

Application:

- removal of volatile organic compounds from the gas phase
- removal of siloxanes D3-D5 from technical gas stream
- VOC, BTEX, BTX, LHKW, LCKW, LFKW
- solvent recovery
- adsorption tasks in industry

Specification	Unit	gc 50	gc 55	gc 60	Test method
<i>Pellet diameter > 3,9 mm</i>	wt.-%	> 96	> 96	> 96	NEC LV 01
<i>Bulk density, compacted</i>	kg/m ³	540 ± 20	510 ± 20	480 ± 20	DIN EN ISO 787 part 11
<i>Iodine</i>	g/kg	≥ 900	≥ 950	≥ 1000	AWWA B 600-78
<i>hardness (abrasion hardness)</i>	wt.-%	> 98	> 97	> 96	NEC LV 03
<i>moisture – at packing</i>	wt.-%	< 7	< 7	< 7	DIN 51718

General Characteristics (Information)					
<i>Bulk density loos</i>	kg/ m ³	555 ± 20	505 ± 20	475 ± 20	
<i>BET - surface 0,005 < p/p_s < 0,2</i>	m ² /g	> 850	> 900	> 950	DIN 66131
<i>Benzene loading from the air, 20 °C (calculated from cyclohexane load) at p/p_s * 0.9 0.1 0.01</i>	wt.-%	> 33 > 28 > 20	> 36 > 32 > 22	> 39 > 36 > 24	NEC LV 04
<i>CTC (25 °C)</i>	wt.-%	≥ 50	≥ 55	≥ 60	ASTM D 5742-95
<i>Total ash content</i>	wt.-%	< 8	< 9	< 10	DIN 51719 (650° C)
<i>pH-value</i>		8-9	8-9	8-9	CEFIC 3.6

*p_s: vapour pressure benzene, saturation concentration 320 g/m³

The typical product characteristics based on mean values from current production.
The specification data represent our standard product specifications.

Standard packaging:

approx. 500kg Big-Bag on pallet
25kg small bag on pallet

several packaging on request

Data sheet

Version: 1.3

Date of revision: 15/05/2025

NECA|active® sulfo pro / plus / basic

Catalytic pelletised activated carbon according to ISDAC® process / nominal diameter 4 mm

Raw material basis:

- calcined anthracite coal, mineral binder; steam activated
- doped activated carbon according to ISDAC® technology

Special properties:

- chemisorptive high-performance activated carbon with catalytic centres
- completely open pore system (including micropores)
- very good physical adsorption performance thanks to a distinctive mesopore system
- very good loading performance for acid gases (H₂S, CS₂, Mercaptans)
- Low self-heating! No fire hazard after removal due to O₂ deficiency**!

Field of application:

- Desulphurisation of technical and biogenic gas streams (oxygen-rich, oxygen-poor)

Specification	Unit	pro	plus	basic	Test method
Pellet diameter > 3.9 mm	% wt	> 96	> 96	> 96	NEC LV 01
Vibration density	kg/m ³	470 ± 20	490 ± 25	540 ± 25	DIN EN ISO 787 Part 11
BET - Surface area	m ² /g	> 950	> 900	> 800	DIN 66 131
Hardness (rolling abrasion hardness)	% wt	> 96	> 98	> 98	NEC LV 03
Water content - at packaging	% wt	8 - 12	8 - 12	8 - 12	DIN 51718

Further product specifications (informative)					
Bulk density	kg/m ³	465 ± 20	485 ± 25	535 ± 25	
Benzene loading from air, 20 °C (calculated from cyclohexane loading) at p/p _s * 0.9	% wt				
	0.1	> 38	> 36	> 34	
	0.01	> 33	> 30	> 28	
	0.01	> 22	> 20	> 18	
Micropore volume	ml/g	> 0.38	> 0.36	> 0.34	DIN 66 135
Total ash content	% wt	15 ± 3	14 ± 3	13 ± 3	DIN 51719 (650°C)
pH value		10 - 11	10 - 11	10 - 11	CEFIC 3.6

*p_s: Vapour pressure benzene, saturation concentration 320 g/m³; ** Attention must be paid to delayed self-heating due to VOC e.g. buthene!

The typical product properties are based on average values from current production.
The specification data represent our standard product specifications.

Standard packaging:

470kg (per) [1m³] or 500kg big bag on pallet

20/25kg (42l) PP bag

other packaging on request

Safety Data Sheet

According to 1907/2006, article 31 as amended

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name **DESOREX G 50**
Registration number (REACH) not relevant (mixture)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses Adsorbent

1.3 Details of the supplier of the safety data sheet

Donau Carbon GmbH
Gwinnerstraße 27-33
60388 Frankfurt
Telephone: +49 69-4011-650
e-mail: office@donau-carbon.com
Website: <https://www.donau-carbon.com>

National contact
Abteilung Produktsicherheit / Abteilung SUQ
Telephone: +49 69-4011-650
This number is only available during the following office hours
Mon - Thu 08:00 AM - 05:00 PM
Fri 08:00 AM - 03:00 PM
e-mail: MSDS@donau-carbon.com

1.4 Emergency telephone number

Emergency information service
+49 69-4011-650
This number is only available during the following office hours: Mon - Thu 08:00 AM - 05:00 PM, Fri 08:00 AM - 03:00 PM

Country	Name	Postal code/city	Telephone
United Kingdom	Guy's & St Thomas' Poisons Unit	London	0870 243 2241
United Kingdom	National Poisons Information Service (Belfast Centre)	Belfast	0870 600 6266 (UK only)
United Kingdom	National Poisons Information Service (Cardiff Centre)	Cardiff	0870 600 6266 (UK only)
United Kingdom	Scottish Poisons Information Bureau	Edinburgh	0870 600 6266 (UK only)

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

Section	Hazard class	Cat-egory	Hazard class and category	Hazard state-ment
3.2	skin corrosion/irritation	2	Skin Irrit. 2	H315
3.3	serious eye damage/eye irritation	2	Eye Irrit. 2	H319

For full text of abbreviations: see SECTION 16.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

- Signal word warning

- Pictograms

GHS07



- Hazard statements

H315 Causes skin irritation.
H319 Causes serious eye irritation.

- Precautionary statements

P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P264 Wash thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
P301+P330+P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER/doctor.
P363 Wash contaminated clothing before reuse.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards

Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

SECTION 3: Composition/information on ingredients

3.1 Substances

Not relevant (mixture)

Chemical identity of the main constituent

Activated carbon, water steam activated (High Density Skeleton)

3.2 Mixtures

Description of the mixture

Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms
Potassium hydroxide	CAS No 1310-58-3 EC No 215-181-3 Index No 019-002-00-8 REACH Reg. No 01-2119487136-33	1 – < 5	Met. Corr. 1 / H290 Acute Tox. 4 / H302 Skin Corr. 1A / H314 Eye Dam. 1 / H318	 

Name of substance	Specific Conc. Limits	M-Factors	ATE	Exposure route
Potassium hydroxide	Skin Corr. 1A; H314: $C \geq 5\%$ Skin Corr. 1B; H314: $2\% \leq C < 5\%$ Skin Irrit. 2; H315: $0.5\% \leq C < 2\%$ Eye Dam. 1; H318: $C \geq 2\%$ Eye Irrit. 2; H319: $0.5\% \leq C < 2\%$	-	334 mg/kg	oral

For full text of abbreviations: see SECTION 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Do not leave affected person unattended. Remove victim out of the danger area. In all cases of doubt, or when symptoms persist, seek medical advice. Self-protection of the first aider.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Brush off loose particles from skin. Wash with plenty of soap and water.

Following eye contact

Keep the eyelids open. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician immediately.

Following ingestion

Rinse mouth immediately and drink plenty of water.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water, Water spray, Foam, Fire extinguishing powder

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products

Carbon monoxide (CO), Carbon dioxide (CO₂)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

Special protective equipment for firefighters

Chemical protective clothing, Wear self-contained breathing apparatus

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Provision of sufficient ventilation. Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. Removal of ignition sources.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains, Take up mechanically

Advice on how to clean up a spill

Take up mechanically.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation
Keep container tightly closed. Use local and general ventilation. Keep away from sources of ignition - No smoking.
- Specific notes/details
Dust deposits may accumulate on all deposition surfaces in a technical room.
- Handling of incompatible substances or mixtures
- Keep away from
Oxidisers

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink and smoke in work areas.

7.2 Conditions for safe storage, including any incompatibilities

Managing of associated risks

- Explosive atmospheres
Removal of dust deposits.
- Incompatible substances or mixtures
- Do not mix with
Oxidisers
- Ventilation requirements
Use local and general ventilation.
- Specific designs for storage rooms or vessels
Store in a dry place.
- Storage temperature
- Packaging compatibilities
Keep only in original container.

Recommended storage temperature: 0 – 40 °C

7.3 Specific end use(s)

See section 16 for a general overview.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values (Workplace Exposure Limits)											
Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
GB	dust		WEL		10					i	EH40/2005
GB	dust		WEL		4					r	EH40/2005

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

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Occupational exposure limit values (Workplace Exposure Limits)

Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
GB	potassium hydroxide	1310-58-3	WEL				2				EH40/2005
GB	graphite	7440-44-0	WEL		10					i	EH40/2005
GB	graphite	7440-44-0	WEL		4					r	EH40/2005

Notation

Ceiling-C ceiling value is a limit value above which exposure should not occur
i inhalable fraction
r respirable fraction
STEL short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)
TWA time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours
time-weighted average (unless otherwise specified)

Human health values

Relevant DNELs of components of the mixture

Name of substance	CAS No	EC No	Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
Potassium hydroxide	1310-58-3	215-181-3	DNEL	1 mg/m³	human, inhalatory	worker (industry)	chronic - local effects
Potassium hydroxide	1310-58-3	215-181-3	DNEL	1 mg/m³	human, inhalatory	consumer (private households)	chronic - local effects

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Personal protective equipment must comply with Regulation (EU) 425/2016. Other national regulations must be observed. The standards listed below are minimum standards. The user must check whether additional standards must be complied with.

Eye/face protection

Use safety goggles with side protection. (EN 166).



Skin protection

- Hand protection

Chemical protection gloves are suitable, which are tested according to EN 374. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

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- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Respiratory protection

In case of dust formation: respiratory protection. Particulate filter device (EN 143). P2 (filters at least 94 % of airborne particles, colour code: White).

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Colour	black
Odour	odourless
Melting point/freezing point	not determined
Boiling point or initial boiling point and boiling range	not determined
Evaporation rate	not determined
Flammability	non-combustible
Lower and upper explosion limit	not determined
Flash point	not applicable
Auto-ignition temperature	>250 °C
Decomposition temperature	not relevant
pH (value)	~ 12 (4 g / 100 ml) Suspension

Solubility(ies)

Water solubility	insoluble

Partition coefficient

Partition coefficient n-octanol/water (log value)	this information is not available

Vapour pressure	not determined

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
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Revision: 2021-07-21

Density and/or relative density

Density	not determined
Relative vapour density	information on this property is not available
Bulk density	300 – 550 kg/m ³

Particle characteristics	no data available

9.2 Other information

Information with regard to physical hazard classes	hazard classes acc. to GHS (physical hazards): not relevant
Other safety characteristics	there is no additional information

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability

See below "Conditions to avoid".

10.3 Possibility of hazardous reactions

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.4 Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Test data are not available for the complete mixture.

Classification procedure

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Classification according to GHS (1272/2008/EC, CLP)

Acute toxicity

Shall not be classified as acutely toxic.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

Acute toxicity			
Exposure route	Endpoint	Value	Species
oral	LD50	6,687 mg/kg	rat
dermal	LD50	25,301 mg/kg	rabbit

Acute toxicity of components of the mixture					
Name of substance	CAS No	Exposure route	Endpoint	Value	Species
Potassium hydroxide	1310-58-3	oral	LD50	334 – 388 mg/kg	rat

Skin corrosion/irritation

Causes skin irritation.

Serious eye damage/eye irritation

Causes serious eye irritation.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

11.2 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

Aquatic toxicity (acute)

Test data are not available for the complete mixture.

Aquatic toxicity (chronic)

Test data are not available for the complete mixture.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

DESOREX G 50

Version number: GHS 3.0
Replaces version of: 2021-07-21 (GHS 2)

Revision: 2021-07-21

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

12.6 Endocrine disrupting properties

None of the ingredients are listed.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

This material and its container must be disposed of as hazardous waste.

Waste treatment-relevant information

Recycling/reclamation of other inorganic materials.

Sewage disposal-relevant information

Do not empty into drains. Avoid release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packagings

Only packagings which are approved (e.g. acc. to ADR) may be used. Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Relevant provisions relating to waste

List of wastes

Disposal code numbers according to the European Waste Catalogue are defined according to origin of the waste. As this product is used in several branches of industry, no disposal code number can be specified by the manufacturer. The waste code number must be determined in consultation with the disposal company or the competent authority.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

SECTION 14: Transport information

Important note: Studies according to OECD Guidelines 435 and 437 certify that the product DESOREX G 50 has no corrosive effect on skin and eyes (ICCR Rossdorf GmbH - 2021). Therefore, there is no classification as dangerous goods:

14.1	UN number or ID number	not assigned
14.2	UN proper shipping name	not assigned
14.3	Transport hazard class(es)	not assigned
14.4	Packing group	not assigned
14.5	Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations

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acc. to Regulation (EC) No. 1907/2006 (REACH)

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14.6 Special precautions for user

Provisions for dangerous goods (ADR) should be complied within the premises.

14.7 Maritime transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

Information for each of the UN Model Regulations

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN) - Additional information

not assigned

International Maritime Dangerous Goods Code (IMDG) - Additional information

not assigned

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

not assigned

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Restrictions according to REACH, Annex XVII

none of the ingredients are listed

List of substances subject to authorisation (REACH, Annex XIV) / SVHC - candidate list

none of the ingredients are listed

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

none of the ingredients are listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

none of the ingredients are listed

Water Framework Directive (WFD)

none of the ingredients are listed

Regulation on the marketing and use of explosives precursors

none of the ingredients are listed

Regulation on drug precursors

none of the ingredients are listed

Regulation on persistent organic pollutants (POP)

None of the ingredients are listed.

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National inventories

Country	Inventory	Status
AU	AICS	all ingredients are listed
CA	DSL	all ingredients are listed
CN	IECSC	all ingredients are listed
EU	ECSI	all ingredients are listed
EU	REACH Reg.	all ingredients are listed
JP	CSCL-ENCS	not all ingredients are listed
KR	KECI	all ingredients are listed
MX	INSQ	all ingredients are listed
NZ	NZIoC	all ingredients are listed
PH	PICCS	all ingredients are listed
TR	CICR	all ingredients are listed
TW	TCSI	all ingredients are listed
US	TSCA	all ingredients are listed

Legend

AICS	Australian Inventory of Chemical Substances
CICR	Chemical Inventory and Control Regulation
CSCL-ENCS	List of Existing and New Chemical Substances (CSCL-ENCS)
DSL	Domestic Substances List (DSL)
ECSI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
INSQ	National Inventory of Chemical Substances
KECI	Korea Existing Chemicals Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical Safety Assessment

Chemical safety assessments for substances in this mixture were not carried out.

SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
14	SECTION 14: Transport information	SECTION 14: Transport information: Important note: Studies according to OECD Guidelines 435 and 437 certify that the product DESOREX G 50 has no corrosive effect on skin and eyes (ICCR Rossdorf GmbH - 2021). Therefore, there is no classification as dangerous goods:	yes

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Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
Acute Tox.	Acute toxicity
ADN	Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
ATE	Acute Toxicity Estimate
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EH40/2005	EH40/2005 Workplace exposure limits (http://www.nationalarchives.gov.uk/doc/open-government-licence/)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
Eye Dam.	Seriously damaging to the eye
Eye Irrit.	Irritant to the eye
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
Met. Corr.	Substance or mixture corrosive to metals
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
Skin Corr.	Corrosive to skin
Skin Irrit.	Irritant to skin

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Abbr.	Descriptions of used abbreviations
STEL	Short-term exposure limit
SVHC	Substance of Very High Concern
TWA	Time-weighted average
vPvB	Very Persistent and very Bioaccumulative
WEL	Workplace exposure limit

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU.

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties: The classification is based on tested mixture.

Health hazards, Environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

List of relevant phrases (code and full text as stated in chapter 2 and 3)

Code	Text
H290	May be corrosive to metals.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Safety Data Sheet

According to 1907/2006, article 31 as amended

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name **OXORBON K 20 J / K 30 J / K 40 J / C 38 J**

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses Adsorbent

1.3 Details of the supplier of the safety data sheet

Donau Carbon GmbH
Gwinnerstraße 27-33
60388 Frankfurt
Telephone: +49 69-4011-650
e-mail: office@donau-carbon.com
Website: <https://www.donau-carbon.com>

National contact

Abteilung Produktsicherheit / Abteilung SUQ
Telephone: +49 69-4011-650
This number is only available during the following office hours
Mon - Thu 08:00 AM - 05:00 PM
Fri 08:00 AM - 03:00 PM
e-mail: MSDS@donau-carbon.com

1.4 Emergency telephone number

Emergency information service +49 69-4011-650
This number is only available during the following office hours: Mon - Thu 08:00 AM - 05:00 PM, Fri 08:00 AM - 03:00 PM

Country	Name	Postal code/city	Telephone
United Kingdom	Guy's & St Thomas' Poisons Unit	London	0870 243 2241
United Kingdom	National Poisons Information Service (Belfast Centre)	Belfast	0870 600 6266 (UK only)
United Kingdom	National Poisons Information Service (Cardiff Centre)	Cardiff	0870 600 6266 (UK only)
United Kingdom	Scottish Poisons Information Bureau	Edinburgh	0870 600 6266 (UK only)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification acc. to GHS

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Section	Hazard class	Cat-egory	Hazard class and category	Hazard state-ment
3.9	specific target organ toxicity - repeated exposure	2	STOT RE 2	H373

For full text of abbreviations: see SECTION 16.

The most important adverse physicochemical, human health and environmental effects

Delayed or immediate effects can be expected after short or long-term exposure.

2.2 Label elements

Labelling

- Signal word warning

- Pictograms

GHS08



- Hazard statements

H373 May cause damage to organs through prolonged or repeated exposure.

- Precautionary statements

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P314 Get medical advice/attention if you feel unwell.

P501 Dispose of contents/container to industrial combustion plant.

- Hazardous ingredients for labelling potassium iodide

2.3 Other hazards

Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

SECTION 3: Composition/information on ingredients

3.1 Substances

Not relevant (mixture)

Chemical identity of the main constituent

Activated carbon, water steam activated (High Density Skeleton)

3.2 Mixtures

Description of the mixture

Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms
Activated carbon	CAS No 7440-44-0 EC No 931-328-0	90 – 99		

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Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms
potassium iodide	CAS No 7681-11-0 EC No 231-659-4	1 – 10	STOT RE 1 / H372	

For full text of abbreviations: see SECTION 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Do not leave affected person unattended. Remove victim out of the danger area. In all cases of doubt, or when symptoms persist, seek medical advice. Self-protection of the first aider.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Brush off loose particles from skin. Wash with plenty of soap and water.

Following eye contact

Keep the eyelids open. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician immediately.

Following ingestion

Rinse mouth immediately and drink plenty of water.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water, Water spray, Foam, Fire extinguishing powder

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Deposited combustible dust has considerable explosion potential.

Hazardous combustion products

Carbon monoxide (CO), Carbon dioxide (CO₂)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

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Special protective equipment for firefighters

Chemical protective clothing, Wear self-contained breathing apparatus

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Provision of sufficient ventilation. Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. Removal of ignition sources.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains, Take up mechanically

Advice on how to clean up a spill

Take up mechanically.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation

Keep container tightly closed. Use local and general ventilation. Keep away from sources of ignition - No smoking.

- Specific notes/details

Dust deposits may accumulate on all deposition surfaces in a technical room. The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

- Handling of incompatible substances or mixtures

- Keep away from

Oxidisers

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink and smoke in work areas.

7.2 Conditions for safe storage, including any incompatibilities

Managing of associated risks

- Explosive atmospheres

Removal of dust deposits.

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- Incompatible substances or mixtures
- Do not mix with
Oxidisers
- Ventilation requirements
Use local and general ventilation.
- Specific designs for storage rooms or vessels
Store in a dry place.
- Packaging compatibilities
Keep only in original container. Only packagings which are approved (e.g. acc. to ADR) may be used.

7.3 Specific end use(s)

See section 16 for a general overview.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values (Workplace Exposure Limits)											
Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m ³]	STEL [ppm]	STEL [mg/m ³]	Ceiling-C [ppm]	Ceiling-C [mg/m ³]	Notation	Source
GB	dust		WEL		10					i	EH40/2005
GB	dust		WEL		4					r	EH40/2005
GB	graphite	7440-44-0	WEL		10					i	EH40/2005
GB	graphite	7440-44-0	WEL		4					r	EH40/2005

Notation

Ceiling-C

i

r

STEL

TWA

ceiling value is a limit value above which exposure should not occur

inhalable fraction

respirable fraction

short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)

time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours

time-weighted average (unless otherwise specified)

Human health values

Relevant DNELs of components of the mixture							
Name of substance	CAS No	EC No	Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
Activated carbon	7440-44-0	931-328-0	DNEL	1.84 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects
Activated carbon	7440-44-0	931-328-0	DNEL	0.9 mg/m ³	human, inhalatory	consumer (private households)	chronic - local effects

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acc. to Regulation (EC) No. 1907/2006 (REACH)

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Relevant DNELs of components of the mixture

Name of substance	CAS No	EC No	Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
potassium iodide	7681-11-0	231-659-4	DNEL	0.07 mg/m ³	human, inhalatory	worker (industry)	chronic - systemic effects
potassium iodide	7681-11-0	231-659-4	DNEL	1 mg/kg bw/day	human, dermal	worker (industry)	chronic - systemic effects
potassium iodide	7681-11-0	231-659-4	DNEL	0.035 mg/m ³	human, inhalatory	consumer (private households)	chronic - systemic effects
potassium iodide	7681-11-0	231-659-4	DNEL	1 mg/kg bw/day	human, dermal	consumer (private households)	chronic - systemic effects
potassium iodide	7681-11-0	231-659-4	DNEL	0.01 mg/kg bw/day	human, oral	consumer (private households)	chronic - systemic effects
potassium iodide	7681-11-0	231-659-4	DNEL	0.01 mg/kg bw/day	human, oral	consumer (private households)	acute - systemic effects

Environmental values

Relevant PNECs of components of the mixture

Name of substance	CAS No	EC No	Endpoint	Threshold level	Organism	Environmental compartment	Exposure time
Activated carbon	7440-44-0	931-328-0	PNEC	10 mg/kg	terrestrial organisms	soil	short-term (single instance)
potassium iodide	7681-11-0	231-659-4	PNEC	0.007 mg/l	aquatic organisms	freshwater	short-term (single instance)
potassium iodide	7681-11-0	231-659-4	PNEC	0.007 mg/kg	aquatic organisms	freshwater sediment	short-term (single instance)

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Personal protective equipment must comply with Regulation (EU) 425/2016. Other national regulations must be observed. The standards listed below are minimum standards. The user must check whether additional standards must be complied with.

Eye/face protection

Use safety goggle with side protection. (EN 166).



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Skin protection

- Hand protection

Chemical protection gloves are suitable, which are tested according to EN 374. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.



- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Respiratory protection

In case of dust formation: respiratory protection. Particulate filter device (EN 143). P2 (filters at least 94 % of airborne particles, colour code: White).

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Colour	black
Odour	characteristic
Melting point/freezing point	not determined
Boiling point or initial boiling point and boiling range	not determined
Evaporation rate	not determined
Flammability	this material is combustible, but will not ignite readily
Flash point	not applicable
Auto-ignition temperature	>250 °C
Decomposition temperature	not relevant
pH (value)	not applicable

Solubility(ies)

Water solubility	insoluble

Partition coefficient

Partition coefficient n-octanol/water (log value)	this information is not available

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Vapour pressure	not determined

Density and/or relative density

Density	not determined
Relative vapour density	information on this property is not available
Bulk density	350 – 550 kg/m ³

Particle characteristics	no data available

Other safety parameters

Explosive properties	none
Oxidising properties	none

9.2 Other information

Information with regard to physical hazard classes	hazard classes acc. to GHS (physical hazards): not relevant

Other safety characteristics

Solid content	100 %

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability

See below "Conditions to avoid".

10.3 Possibility of hazardous reactions

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.4 Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Hints to prevent fire or explosion

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Test data are not available for the complete mixture.

Classification procedure

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Classification acc. to GHS

Acute toxicity

Shall not be classified as acutely toxic.

Acute toxicity of components of the mixture					
Name of substance	CAS No	Exposure route	Endpoint	Value	Species
Activated carbon	7440-44-0	oral	LD50	>2,000 mg/kg	rat
potassium iodide	7681-11-0	oral	LD50	3,118 mg/kg	rat

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

11.2 Information on other hazards

There is no additional information.

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acc. to Regulation (EC) No. 1907/2006 (REACH)

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SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

Aquatic toxicity (acute)

Test data are not available for the complete mixture.

Aquatic toxicity (acute) of components of the mixture					
Name of substance	CAS No	Endpoint	Value	Species	Exposure time
potassium iodide	7681-11-0	LC50	3,780 mg/l	fish	96 h
potassium iodide	7681-11-0	EC50	7.5 mg/l	aquatic invertebrates	48 h

Aquatic toxicity (chronic)

Test data are not available for the complete mixture.

Aquatic toxicity (chronic) of components of the mixture					
Name of substance	CAS No	Endpoint	Value	Species	Exposure time
potassium iodide	7681-11-0	EC50	10.6 mg/l	aquatic invertebrates	24 h

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

This mixture does not contain any substances that are assessed to be a PBT or a vPvB.

12.6 Endocrine disrupting properties

None of the ingredients are listed.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

This material and its container must be disposed of as hazardous waste.

Sewage disposal-relevant information

Do not empty into drains. Avoid release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packagings

Only packagings which are approved (e.g. acc. to ADR) may be used. Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

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Relevant provisions relating to waste

List of wastes

Not assigned Disposal code numbers according to the European Waste Catalogue are defined according to origin of the waste. As this product is used in several branches of industry, no disposal code number can be specified by the manufacturer. The waste code number must be determined in consultation with the disposal company or the competent authority.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

SECTION 14: Transport information

- 14.1 UN number or ID number** not subject to transport regulations
- 14.2 UN proper shipping name** not relevant
- 14.3 Transport hazard class(es)** none
- 14.4 Packing group** not assigned
- 14.5 Environmental hazards** non-environmentally hazardous acc. to the dangerous goods regulations
- 14.6 Special precautions for user**
There is no additional information.
- 14.7 Maritime transport in bulk according to IMO instruments**
The cargo is not intended to be carried in bulk.

Information for each of the UN Model Regulations

International Maritime Dangerous Goods Code (IMDG) - Additional information

Not subject to IMDG.

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Not subject to ICAO-IATA.

SECTION 15: Regulatory information

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
Relevant provisions of the European Union (EU)
Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Deco-Paint Directive

VOC content	0 %

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

OXORBON K 20 J / K 30 J / K 40 J / C 38 J

Version number: GHS 3.0
Replaces version of: 2022-09-23 (GHS 2)

Revision: 2022-09-26

Industrial Emissions Directive (IED)

VOC content	0 %

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

none of the ingredients are listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

none of the ingredients are listed

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

OXORBON K 20 J / K 30 J / K 40 J / C 38 J

Version number: GHS 3.0
Replaces version of: 2022-09-23 (GHS 2)

Revision: 2022-09-26

none of the ingredients are listed

Regulation on the marketing and use of explosives precursors

none of the ingredients are listed

Regulation on drug precursors

none of the ingredients are listed

Regulation on persistent organic pollutants (POP)

None of the ingredients are listed.

National inventories

Country	Inventory	Status
EU	REACH Reg.	all ingredients are listed

Legend

REACH Reg. REACH registered substances

15.2 Chemical Safety Assessment

Chemical safety assessments for substances in this mixture were not carried out.

SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
2.2		- Precautionary statements: change in the listing (table)	yes
7.2		- Ventilation requirements: Use local and general ventilation.	yes
8.1		Occupational exposure limit values (Workplace Exposure Limits): change in the listing (table)	yes
9.1	Flammability: non-combustible	Flammability: this material is combustible, but will not ignite readily	yes
9.1	Auto-ignition temperature: not determined	Auto-ignition temperature: >250 °C	yes
9.1	Bulk density: 350 – 550 g/cm ³	Bulk density: 350 – 550 kg/m ³	yes

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

OXORBON K 20 J / K 30 J / K 40 J / C 38 J

Version number: GHS 3.0
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Abbr.	Descriptions of used abbreviations
EC50	Effective Concentration 50 %. The EC50 corresponds to the concentration of a tested substance causing 50 % changes in response (e.g. on growth) during a specified time interval
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EH40/2005	EH40/2005 Workplace exposure limits (http://www.nationalarchives.gov.uk/doc/open-government-licence/)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
LC50	Lethal Concentration 50%: the LC50 corresponds to the concentration of a tested substance causing 50 % lethality during a specified time interval
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
STEL	Short-term exposure limit
STOT RE	Specific target organ toxicity - repeated exposure
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative
WEL	Workplace exposure limit

Key literature references and sources for data

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties: The classification is based on tested mixture.

Health hazards, Environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

OXORBON K 20 J / K 30 J / K 40 J / C 38 J

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List of relevant phrases (code and full text as stated in section 2 and 3)

Code	Text
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Safety Data Sheet

According to 1907/2006, article 31 as amended

HYDRAFFIN - Granulate

Version number: GHS 5.0
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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Identification of the substance	HYDRAFFIN - Granulate
EC number	931-328-0
CAS number	7440-44-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Adsorbent

1.3 Details of the supplier of the safety data sheet

Donau Carbon GmbH
Gwinnerstraße 27-33
60388 Frankfurt
Telephone: +49 69-4011-650
e-mail: office@donau-carbon.com
Website: <https://www.donau-carbon.com>

National contact

Abteilung Produktsicherheit / Abteilung SUQ
Telephone: +49 69-4011-650
This number is only available during the following office hours
Mon - Thu 08:00 AM - 05:00 PM
Fri 08:00 AM - 03:00 PM
e-mail: MSDS@donau-carbon.com

1.4 Emergency telephone number

Emergency information service

+49 69-4011-650
This number is only available during the following office hours: Mon - Thu 08:00 AM - 05:00 PM, Fri 08:00 AM - 03:00 PM

Country	Name	Postal code/city	Telephone
United Kingdom	Guy's & St Thomas' Poisons Unit	London	0870 243 2241
United Kingdom	National Poisons Information Service (Belfast Centre)	Belfast	0870 600 6266 (UK only)
United Kingdom	National Poisons Information Service (Cardiff Centre)	Cardiff	0870 600 6266 (UK only)
United Kingdom	Scottish Poisons Information Bureau	Edinburgh	0870 600 6266 (UK only)

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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification acc. to GHS

This substance does not meet the criteria for classification.

2.2 Label elements

Labelling

not required

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

Endocrine disrupting properties

Does not contain an endocrine disruptor (EDC) in a concentration of $\geq 0,1\%$.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical identity of the main constituent

Activated carbon, water steam activated (High Density Skeleton)

Name of substance

Activated carbon

Identifiers

CAS No

7440-44-0

EC No

931-328-0

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Do not leave affected person unattended. Remove victim out of the danger area. In all cases of doubt, or when symptoms persist, seek medical advice. Self-protection of the first aider.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Brush off loose particles from skin. Wash with plenty of soap and water.

Following eye contact

Keep the eyelids open. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician immediately.

Following ingestion

Rinse mouth immediately and drink plenty of water.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water, Water spray, Foam, Fire extinguishing powder

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Deposited combustible dust has considerable explosion potential.

Hazardous combustion products

Carbon monoxide (CO), Carbon dioxide (CO₂)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance.

Special protective equipment for firefighters

Chemical protective clothing, Wear self-contained breathing apparatus

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Provision of sufficient ventilation. Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing. Removal of ignition sources.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains, Take up mechanically

Advice on how to clean up a spill

Take up mechanically.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

Safety Data Sheet
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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation
Keep container tightly closed. Use local and general ventilation. Keep away from sources of ignition - No smoking.
- Specific notes/details
Dust deposits may accumulate on all deposition surfaces in a technical room. The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.
- Handling of incompatible substances or mixtures
- Keep away from
Oxidisers

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink and smoke in work areas.

7.2 Conditions for safe storage, including any incompatibilities

Managing of associated risks

- Explosive atmospheres
Removal of dust deposits.
- Incompatible substances or mixtures
- Do not mix with
Oxidisers
- Ventilation requirements
Use local and general ventilation.
- Specific designs for storage rooms or vessels
Store in a dry place.
- Storage temperature
- Packaging compatibilities
Keep only in original container.

Recommended storage temperature: 0 – 40 °C

7.3 Specific end use(s)

See section 16 for a general overview.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values (Workplace Exposure Limits)											
Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
GB	dust		WEL		10					i	EH40/2005
GB	dust		WEL		4					r	EH40/2005

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

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Occupational exposure limit values (Workplace Exposure Limits)

Country	Name of agent	CAS No	Identifier	TWA [ppm]	TWA [mg/m³]	STEL [ppm]	STEL [mg/m³]	Ceiling-C [ppm]	Ceiling-C [mg/m³]	Notation	Source
GB	graphite	7440-44-0	WEL		10					i	EH40/2005
GB	graphite	7440-44-0	WEL		4					r	EH40/2005

Notation

Ceiling-C

ceiling value is a limit value above which exposure should not occur

i

inhalable fraction

r

respirable fraction

STEL

short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)

TWA

time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

Human health values

Relevant DNELs and other threshold levels

Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
DNEL	1.84 mg/m³	human, inhalatory	worker (industry)	chronic - local effects
DNEL	0.9 mg/m³	human, inhalatory	consumer (private households)	chronic - local effects

Environmental values

Relevant PNECs and other threshold levels

End-point	Threshold level	Organism	Environmental compartment	Exposure time
PNEC	10 mg/kg	terrestrial organisms	soil	short-term (single instance)

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Personal protective equipment must comply with Regulation (EU) 425/2016. Other national regulations must be observed. The standards listed below are minimum standards. The user must check whether additional standards must be complied with.

Eye/face protection

Use safety goggle with side protection. (EN 166).



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Skin protection

- Hand protection

Chemical protection gloves are suitable, which are tested according to EN 374. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.



- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Respiratory protection

In case of dust formation: respiratory protection. Particulate filter device (EN 143). P2 (filters at least 94 % of airborne particles, colour code: White).

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid (granulate)
Colour	black
Odour	characteristic
Melting point/freezing point	not determined
Boiling point or initial boiling point and boiling range	not determined
Evaporation rate	not determined
Flammability	this material is combustible, but will not ignite readily
Flash point	not applicable
Auto-ignition temperature	> 400 °C
Decomposition temperature	not relevant
pH (value)	not applicable

Solubility(ies)

Water solubility	insoluble

Partition coefficient

Partition coefficient n-octanol/water (log value)	this information is not available

Safety Data Sheet

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Vapour pressure	not determined

Density and/or relative density

Density	not determined
Relative vapour density	information on this property is not available
Bulk density	350 – 600 kg/m ³

Particle characteristics	no data available

Other safety parameters

Explosive properties	none
Oxidising properties	none

9.2 Other information

Information with regard to physical hazard classes	hazard classes acc. to GHS (physical hazards): not relevant
Other safety characteristics	there is no additional information

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.4 Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Hints to prevent fire or explosion

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

Safety Data Sheet
acc. to Regulation (EC) No. 1907/2006 (REACH)

HYDRAFFIN - Granulate

Version number: GHS 5.0
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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Classification acc. to GHS

This substance does not meet the criteria for classification.

Acute toxicity

Shall not be classified as acutely toxic.

Acute toxicity			
Exposure route	Endpoint	Value	Species
oral	LD50	>2,000 mg/kg	rat

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

11.2 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

Safety Data Sheet
acc. to Regulation (EC) No. 1907/2006 (REACH)

HYDRAFFIN - Granulate

Version number: GHS 5.0
Replaces version of: 2023-06-19 (GHS 4)

Revision: 2023-06-21

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (EDC) in a concentration of $\geq 0,1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Sewage disposal-relevant information

Do not empty into drains. Avoid release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packagings

Only packagings which are approved (e.g. acc. to ADR) may be used. Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Relevant provisions relating to waste

List of wastes

Not assigned Disposal code numbers according to the European Waste Catalogue are defined according to origin of the waste. As this product is used in several branches of industry, no disposal code number can be specified by the manufacturer. The waste code number must be determined in consultation with the disposal company or the competent authority.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

SECTION 14: Transport information

14.1 UN number or ID number	not assigned
14.2 UN proper shipping name	not assigned
14.3 Transport hazard class(es)	none
14.4 Packing group	not assigned
14.5 Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations
14.6 Special precautions for user	Provisions for dangerous goods (ADR) should be complied within the premises.
14.7 Maritime transport in bulk according to IMO instruments	The cargo is not intended to be carried in bulk.

Information for each of the UN Model Regulations

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) - Additional information

not assigned

Safety Data Sheet
acc. to Regulation (EC) No. 1907/2006 (REACH)

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International Maritime Dangerous Goods Code (IMDG) - Additional information

not assigned

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

not assigned

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Industrial Emissions Directive (IED)

VOC content	0 %

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

not listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

not listed

Regulation on the marketing and use of explosives precursors

not listed

Regulation on drug precursors

not listed

Regulation on persistent organic pollutants (POP)

Not listed.

National inventories

Country	Inventory	Status
EU	REACH Reg.	substance is listed
AU	AIIC	substance is listed
CA	DSL	substance is listed
CN	IECSC	substance is listed
EU	ECSI	substance is listed
KR	KECI	substance is listed
MX	INSQ	substance is listed
NZ	NZIoC	substance is listed

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

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Country	Inventory	Status
PH	PICCS	substance is listed
TR	CICR	substance is listed
TW	TCSI	substance is listed
US	TSCA	substance is listed

Legend

AIIC	Australian Inventory of Industrial Chemicals
CICR	Chemical Inventory and Control Regulation
DSL	Domestic Substances List (DSL)
ECSI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
INSQ	National Inventory of Chemical Substances
KECI	Korea Existing Chemicals Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EH40/2005	EH40/2005 Workplace exposure limits (http://www.nationalarchives.gov.uk/doc/open-government-licence/)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
NLP	No-Longer Polymer

Safety Data Sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)

HYDRAFFIN - Granulate

Version number: GHS 5.0
Replaces version of: 2023-06-19 (GHS 4)

Revision: 2023-06-21

Abbr.	Descriptions of used abbreviations
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
STEL	Short-term exposure limit
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative
WEL	Workplace exposure limit

Key literature references and sources for data

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.



Safety Data Sheet

Section 01 Identification

Product Identifier	Hydrochloric Acid, Inhibited Hydrochloric Acid, Inhibited A31 Hydrochloric Acid, Inhibited C07 Hydrochloric Acid, Inhibited C15 Hydrochloric Acid, Inhibited C27 Hydrochloric Acid, Inhibited C28 Hydrochloric Acid, Inhibited C31 Hydrochloric Acid, Inhibited C35 Hydrochloric Acid, Inhibited E15 Hydrochloric Acid, Inhibited E35 Hydrochloric Acid, Inhibited M8 Hydrochloric Acid, Inhibited M15 Hydrochloric Acid, Inhibited T15 Hydrochloric Acid, Inhibited T35
Other Means of Identification	Not available
Product Use and Restrictions on Use	Acidizing (activation) of petroleum wells, scale removal, ore reduction, metal cleaning, pH adjustment, industrial acidizing, generation of chlorine dioxide, regeneration of ion exchange resins.
Initial Supplier Identifier	ClearTech Industries Inc 1500 Quebec Avenue Saskatoon, SK. Canada S7K 1V7 Phone: 800.387.7503 Fax: 888.281.8109 www.cleartech.ca
Prepared By	ClearTech Industries Inc. technical writer
24-Hour Emergency Phone	306.664.2522

Section 02 Hazard Identification

Physical Hazards

Corrosive to metals	Category 1

Health Hazards

Acute toxicity - inhalation	Category 4
Acute toxicity - oral	Category 4
Skin corrosion / irritation	Category 1B
Serious eye damage / eye irritation	Category 1
Specific target organ toxicity - single exposure	Category 3

Signal Word

Customer Service: 800.387.7503

www.cleartech.ca

Emergency: 306.664.2522

Revision Date: September 22, 2020

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Danger

Hazard Statements

- H290 May be corrosive to metals.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

Pictograms



Precautionary Statements

Prevention

- P234 Keep only in original packaging.
P260 Do not breathe vapours, fumes, or mists.
P264 Wash affected body parts thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves, protective clothing, eye protection, face protection

Response

- P301 P312 P330 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Call a POISON CENTER or doctor if you feel unwell.
P303 P361 P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse.
P304 P340 P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor.
P305 P351 P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P390 Absorb spillage to prevent material damage.

Storage

- P403 Store in a well-ventilated place.
P233 Keep container tightly closed.
P405 Store locked up.

Disposal

- P501 Dispose of contents / container in accordance with all federal, provincial and / or local regulations including the Canadian Environmental Protection Act.

Hazards Not Otherwise Classified

Not available

Supplemental Information

Not available

Section 03 Composition / Information on Ingredients

Hazardous Ingredients:

Chemical name	Common name(s)	CAS number	Concentration (w/w%)
Hydrogen Chloride	Hydrochloric Acid	7647-01-0	6-36%

Section 04 First-Aid Measures

Description of necessary first-aid measures

Inhalation	Take precautions to ensure your own safety before attempting a rescue (wear appropriate protective equipment, use the buddy system). Remove source of exposure or move person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor. If breathing has stopped, trained personnel should begin rescue breathing or if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Avoid mouth to mouth contact by using a barrier device. Call a POISON CENTER or doctor if you feel unwell.
Ingestion	Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor. If vomiting occurs naturally, lie on your side, in the recovery position.
Skin contact	Avoid direct contact. Wear chemical protective clothing, if necessary. Take off immediately contaminated clothing, shoes and leather goods. Rinse skin with lukewarm, gently flowing water / shower for 30 minutes. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before re-use, or discard.
Eye contact	Avoid direct contact. Wear chemical protective gloves, if necessary. Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for 30 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a POISON CENTER or doctor.

Most important symptoms and effects, both acute and delayed

Inhalation	Causes severe burns to the mouth and throat (mist). May cause respiratory irritation.
Ingestion	Causes burns to the mouth and throat. Harmful if swallowed.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Further information	For further information see Section 11 Toxicological Information.

Section 05 Fire Fighting Measures

Suitable extinguishing media	Extinguish fire using extinguishing agents suitable for the surrounding fire.
Unsuitable extinguishing media	Water jets are not recommended in fires involving chemicals.
Specific hazards arising from the chemical	Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. Heat may liberate corrosive and toxic Hydrogen Chloride gas. Hydrogen Chloride is denser than air and will accumulate in low lying areas.
Special protective equipment for fire-fighters	Wear NIOSH-approved self-contained breathing apparatus and chemical-protective clothing.

Section 06 Accidental Release Measures

Personal Precautions / Protective Equipment / Emergency Procedures	Wear appropriate personal protective equipment (See Section 08 Exposure Controls and Personal Protection). Stay upwind, ventilate area. Do not breathe vapours, fumes, or mists. Do not use material handling equipment with exposed metal surfaces.
Environmental Precautions	Prevent material from entering waterways, sewers or confined spaces. Notify local health and wildlife officials. Notify operators of nearby water intakes.
Methods and Materials for Containment and Cleaning Up	SMALL SPILLS: Stop or reduce leak if safe to do so. Clean up spill with non-reactive absorbent and place in suitable, covered, labeled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product. LARGE SPILLS: Contact fire and emergency services and supplier for advice.

Section 07 Handling and Storage

Precautions for Safe Handling	Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Prevent the release of vapours, fumes, or mists into the workplace air. Inspect containers for damage or leaks before handling. If the original label is damaged or missing replace with a workplace label. Have suitable emergency equipment for fires, spills and leaks readily available. Never add water to a corrosive. Always add corrosives to water. When mixing with water, stir small amounts in slowly. Use cold water to prevent excessive heat generation. Never return contaminated material to its original container.
Conditions for Safe Storage	Store in a cool, dry, well-ventilated area, out of direct sunlight, away from heat sources and incompatible materials. Always store in original labeled container. Keep containers tightly closed when not in use and when empty. Empty containers may contain hazardous residues. Protect label and keep it visible. Do not transfer to metal containers.
Incompatibilities	Bases, such as potassium hydroxide, sodium hydroxide, calcium hydroxide (slaked lime), ammonia, carbonates. Metals, such as aluminum, steel, and brass.

Section 08 Exposure Controls and Personal Protection

Exposure limits

Component	Regulation	Type of listing	Value
Hydrogen Chloride	ACGIH	TLV-Ceiling	2 ppm

Engineering controls

Ventilation Requirements	Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems.
Other	An emergency shower and eyewash station should be available, tested, and be in close proximity to the product being handled in accordance with provincial regulations.

Protective equipment

The following are recommendations only. It is the responsibility of the employer / user to conduct a hazard assessment of the process in which this product being used and determine the proper engineering controls and PPE for their process. Additional regulatory and safety information should be sought from local authorities and, if needed, a professional industrial hygienist.

Eye and face protection	Where there is potential eye or face exposure, tightly fitting safety goggles and a face shield or a full face respirator or similar protective equipment which protects the wearer's face and eyes are recommended. Contact lenses are not recommended; they may contribute to severe eye injury.
Hand and body protection	Disposable latex or nitrile gloves are recommended to prevent incidental contact. Butyl rubber, neoprene, or PVC skin protection is recommended for extended contact. Leather gloves are not recommended for chemical protection. Refer to manufacturer's specifications for breakthrough times and permeability information; note that breakthrough times and permeability vary with temperature, application and age of material. Continued use of contaminated safety gear or clothing is not recommended; wash before reuse or discard.
Respiratory protection	In case of insufficient ventilation wear suitable respiratory equipment. NIOSH respirator recommendations for: Hydrogen Chloride Up to: 50 ppm (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against Hydrogen Chloride (APF = 10) Any supplied-air respirator (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against Hydrogen Chloride (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Hydrogen Chloride (APF = 50) Any self-contained breathing apparatus with a full facepiece. Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Hydrogen Chloride Any appropriate escape-type, self-contained breathing apparatus
Thermal hazards	Not available

Section 09 Physical and Chemical Properties

Appearance

Physical state	Liquid
Colour	Colourless to straw coloured
Odour	Pungent
Odour threshold	1-5 ppm

Property

pH	<1.0
Melting point / freezing point	For product concentration range: -57 to -10 °C
Initial boiling point and boiling range	For product concentration range: 62-90 °C

Safety Data Sheet

Hydrochloric Acid, Inhibited
ClearTech Industries Inc

Flash point	Not applicable
Evaporation rate	Not available
Flammability	Not applicable
Upper flammable limit	Not applicable
Lower flammable limit	Not applicable
Vapour pressure	For product concentration range: negligible to 200 mmHg @ 20 °C
Vapour density	1.268
Relative density	Not applicable
Solubility	Soluble in water
Partition coefficient: n-octanol/water	Not available
Auto-ignition temperature	Not applicable
Decomposition temperature	Not available
Viscosity	Not available
Specific gravity	For product concentration range: 1.028-1.188 g/mL @ 20 °C
Formula	HCl
Molecular weight	34.46 g/mol

Section 10 Stability and Reactivity

Reactivity	May be corrosive to metals. Reacts with many metals to liberate hydrogen gas that can form explosive mixtures. Reacts with water to generate heat. Reacts violently with bases.
Stability	This product is stable if stored according to the recommendations in Section 07.
Possibility of hazardous reactions	Hazardous polymerization is not known to occur.
Conditions to avoid	Avoid contact with incompatible materials.
Incompatible materials	Bases, such as potassium hydroxide, sodium hydroxide, calcium hydroxide (slaked lime), ammonia, carbonates. Metals, such as aluminum, steel, and brass.
Hazardous decomposition products	Not available

Section 11 Toxicological Information

Acute Toxicity (LD50 / LC50 values)

Component	Route	Species	Value	Exposure time
Hydrogen Chloride	Oral	Rat	238-277 mg/kg	
	Dermal	Mouse	1449 mg/kg	
	Inhalation (gas)	Mouse	1108 ppm	1 hour
	Inhalation (mist)	Guinea pig	2.0 mg/L	30 minutes

Toxic Health Effect Summary

Chemical characteristics	Hydrogen chloride rapidly dissociates and most of it's toxic effects are thought to be the result of pH change.
Skin	Causes severe skin burns.

Safety Data Sheet

Hydrochloric Acid, Inhibited
ClearTech Industries Inc

Ingestion	Causes burns to the mouth and throat. Harmful if swallowed.
Inhalation	Causes severe burns to the mouth and throat (mist). May cause respiratory irritation. Hydrogen chloride gas is severely irritating to all mucous membranes.
Eye contact	Causes serious eye damage.
Sensitization	This product and its components at their listed concentration have no known sensitizing effects.
Mutagenicity	This product and its components at their listed concentration have no known mutagenic effects.
Carcinogenicity	IARC has classified this product or one or more of its components as group 3, not classifiable as to its carcinogenicity to humans.
Reproductive toxicity	This product and its components at their listed concentration have no known reproductive effects.
Specific organ toxicity	Frequent contact may lead to dermatitis. Dental decay, with changes in tooth structure, yellowing, softening and breaking of teeth, and related digestive diseases are frequent after exposures to hydrochloric acid
Aspiration hazard	Not available
Synergistic materials	Not available

Section 12 Ecological Information

Ecotoxicity

Component	Type	Species	Value	Exposure Time
Hydrogen Chloride	LC50	Freshwater fish	20.5 mg/L	96 hours
	EC50	Freshwater invertebrates	0.45 mg/L	48 hours
	EC50	Freshwater algae	0.73 mg/L	72 hours

Biodegradability	The domestic substance list categorizes hydrochloric acid as persistent.
Bioaccumulation	The domestic substance list categorizes hydrochloric acid as non-bioaccumulative.
Mobility	This product is water soluble, is not predicted to adsorb to soil and may contaminate ground water. This product will evaporate and may be spread via wind.
Other adverse effects	Not available

Section 13 Disposal Considerations

Waste From Residues / Unused Products	Dispose in accordance with all federal, provincial, and local regulations including the Canadian Environmental Protection Act.
Contaminated Packaging	Do not remove label, follow label warnings even after the container is empty. Empty containers should be recycled or disposed of at an approved waste handling facility.

Section 14 Transport Information

UN number	UN1789
UN proper shipping name and description	HYDROCHLORIC ACID
Transport hazard class(es)	8
Packing group	II
Excepted quantities	1 L

Safety Data Sheet

Hydrochloric Acid, Inhibited
ClearTech Industries Inc

Environmental hazards	Not listed as a marine pollutant under Canadian TDG Regulations, schedule III.
Special precautions	No special provisions
Transport in bulk	ERAP index: 3000 L
	MARPOL 73/78 and IBC Code:
	Product name: Hydrochloric Acid
	Pollution category: Z
	Hazards: the product is included in the Code because of both its safety and pollution hazards.
	Ship type: ship type 3
	Tank type: independent gravity tank
	Tank vents: controlled venting
	Tank environmental control: no special requirements under this Code
	Temperature classes
	Electrical equipment: Apparatus group
	Flash point non-flammable product
	Gauging: restricted gauging
	Vapour detection: toxic vapours
	Fire protection: no special requirements under this Code
	Emergency equipment see 14.3.1
	Specific and operational requirements 15.11
Additional information	Secure containers (full or empty) during shipment and ensure all caps, valves, or closures are secured in the closed position.

TDG PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and published test data regarding the classification of this product are listed in the references at section 16 of this SDS.

Section 15 Regulatory Information.

NOTE: THE PRODUCT LISTED ON THIS SAFETY DATA SHEET HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN HAZARDOUS PRODUCTS REGULATIONS. THIS SAFETY DATA SHEET CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.

All components of this product appear on the domestic substance list.

Hydrochloric Acid (>1%) is listed in the National Pollutant Release Inventory (NPRI). Reporting threshold: 10 tonnes manufactured, processed or otherwise used.

Hydrochloric Acid is listed in the Environmental Emergency Regulations, Schedule 1. Concentration: 30% w/w Minimum Quantity: 6.8 tonnes Hazard Category: Inhalation hazard

Section 16 Other Information

Date of latest revision: September 22, 2020

Note: The responsibility to provide a safe workplace remains with the buyer / user. The buyer / user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the buyer / user to comply with all applicable laws and regulations regarding handling, using, reselling and shipping this product.

Attention: Receiver of the chemical goods / SDS coordinator

As part of our commitment to the RDC Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.

If you have any questions or concerns please call our customer service center.

References:

- 1) CHEMINFO
- 2) TOXNET
- 3) eChemPortal
- 4) ECHA
- 5) Transportation of Dangerous Goods Canada
- 6) HSDB
- 7) PAN

SAFETY DATA SHEET

Creation Date 22-Sep-2009

Revision Date 18-Dec-2025

Revision Number 13

This safety data sheet was created pursuant to the requirements of: US OSHA Hazard Communication Standard 2024 (29 CFR 1910.1200)

1. Identification

Product Name Hydrogen Peroxide (30% in water)

Cat No. : BP2633-500; NC1592410

Synonyms Hydrogen Dioxide; Peroxide; Carbamide Peroxide

Recommended Use Laboratory chemicals.

Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99
CHEMTREC Tel. No. **US**:001-800-424-9300 / **Europe**:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous according to [US] OSHA (29 CFR 1910.1200, 2024)

Oxidizing liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 4
Skin Corrosion/Irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word

Danger

Hazard Statements

May intensify fire; oxidizer
Harmful if swallowed or if inhaled

Causes severe skin burns and eye damage



Precautionary Statements

Prevention

Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
Keep away from clothing and other combustible materials
Take any precaution to avoid mixing with combustibles

Response

Immediately call a POISON CENTER or doctor

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower
Take off contaminated clothing and wash before reuse

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Ingestion

Rinse mouth

Do NOT induce vomiting

Fire

In case of fire: Use water spray/fog or regular foam to extinguish

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

Hazards classified under paragraph (d)(1)(ii) of 1910.1200

No information available

3. Composition/information on Ingredients

Component	CAS No	Weight %
Water	7732-18-5	65 - 80
Hydrogen peroxide	7722-84-1	20 - 35

4. First-aid measures

General Advice

Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Call a physician immediately.
Inhalation	If not breathing, give artificial respiration. Remove from exposure, lie down. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician immediately.
Ingestion	Do NOT induce vomiting. Clean mouth with water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Most important symptoms and effects	Causes severe eye damage. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Foam. Carbon dioxide (CO ₂).
Unsuitable Extinguishing Media	Dry chemical
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Oxidizing Properties	Oxidizer
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Oxidizer: Contact with combustible/organic material may cause fire. In the event of fire and/or explosion do not breathe fumes. Containers may explode when heated. May ignite combustibles (wood paper, oil, clothing, etc.).

Hazardous Combustion Products

Hydrogen. Oxygen.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health
3

Flammability
0

Instability
2

Physical hazards
OX

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional Ecological Information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and Storage

Handling

Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance. Ensure adequate ventilation.

Storage.

Keep away from combustible material. Keep cool and protect from sunlight. Keep container tightly closed in a dry and well-ventilated place. Do not store in metal containers. Keep only in the original container. Incompatible Materials. Finely powdered metals. copper. Reducing Agent. Strong bases. Combustible material. Organic materials.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Hydrogen peroxide	TWA: 1 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 1.4 mg/m ³ TWA: 1 ppm TWA: 1.4 mg/m ³	IDLH: 75 ppm REL = 1 ppm (TWA) REL = 1.4 mg/m ³ (TWA)	TWA: 1 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Recommended Filter type:

Particulates filter conforming to EN 143. Inorganic gases and vapours filter. Type B. Grey. conforming to EN14387.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance

Physical State

Liquid

Color

Clear

Odor

pungent

Odor Threshold

No information available

Property

Values

Melting Point/Range

-33 °C / -27.4 °F

Softening Point

No data available

Boiling Point/Range

108 °C / 226.4 °F

Remarks

• Method

@ 760 mmHg

Flash Point	Not applicable	Method - No information available
Flammability (liquid)	No data available	
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	No data available	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
pH	3.3	(30 %)
Viscosity	No data available	
Water Solubility	Miscible	
Solubility in other solvents	No information available	
Partition Coefficient (n-octanol/water)		
Component	log Pow	
Hydrogen peroxide	-1.1	
Vapor Pressure	23 mmHg @ 30 °C	
Density / Specific Gravity	1.11	
Bulk Density	Not applicable	Liquid
Vapor Density	1.10	(Air = 1.0)
Particle characteristics	Not applicable (liquid)	
Other Information		
Molecular Formula	H2O2	
Molecular Weight	34.01	
Oxidizing Properties	Oxidizer	
Evaporation Rate	>1.0 (Butyl Acetate = 1.0)	

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Oxidizer: Contact with combustible/organic material may cause fire. Light sensitive.
Conditions to Avoid	Incompatible products. Excess heat. Exposure to light. Combustible material.
Incompatible Materials	Finely powdered metals, copper, Reducing Agent, Strong bases, Combustible material, Organic materials
Hazardous Decomposition Products	Hydrogen, Oxygen
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Information on expected route of exposure

Inhalation	Harmful by inhalation.
Ingestion	May be harmful if swallowed.
Eyes	Avoid contact with eyes. Corrosive to the eyes and may cause severe damage including blindness.
Skin	Avoid contact with skin. Causes burns.

Toxicology data for the components

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	-	-
Hydrogen peroxide	376 mg/kg (Rat) (90%) 910 mg/kg (Rat) (20-60%)	>2000 mg/kg (Rabbit)	LC50 = 2000 mg/m ³ (Rat) 4 h

	1518 mg/kg (Rat) (8-20% sol)	

Toxicologically Synergistic Products No information available

(b) skin corrosion/irritation; No data available

(c) serious eye damage/irritation; Category 1
Bridging principle "Dilution"

(d) respiratory or skin sensitization;
Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity;

The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed
Hydrogen peroxide	7722-84-1	Not listed	Not listed	A3	Not listed	A3

IARC (International Agency for Research on Cancer)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

IARC (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans

Group 2B - Possibly Carcinogenic to Humans

A1 - Known Human Carcinogen

A2 - Suspected Human Carcinogen

A3 - Animal Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

A1 - Confirmed Human Carcinogen

A2 - Suspected Human Carcinogen

A3 - Confirmed Animal Carcinogen

A4 - Not Classifiable as a Human Carcinogen

A5 - Not Suspected as a Human Carcinogen

(g) reproductive toxicity; No data available

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs No information available.

(j) aspiration hazard; No data available

Symptoms / effects, both acute and delayed Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

Other Adverse Effects The toxicological properties have not been fully investigated.

Endocrine Disrupting Properties This product does not contain any known or suspected endocrine disruptors.

12. Ecological information

Ecotoxicity

Contains a substance which is: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Hydrogen peroxide	EC50 2.5 mg/L/72h	LC50: 16.4 mg/L/96h (P.promelas)	Not listed	EC50 7.7 mg/L/24h

Persistence and Degradability Persistence is unlikely based on information available. Miscible with water

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Hydrogen peroxide	-1.1

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS
 Hazard Class 5.1
 Subsidiary Hazard Class 8
 Packing Group II

TDG

UN-No UN2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard Class 5.1
 Subsidiary Hazard Class 8
 Packing Group II

IATA

UN-No UN2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard Class 5.1
 Subsidiary Hazard Class 8
 Packing Group II

IMDG/IMO

UN-No UN2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard Class 5.1
 Subsidiary Hazard Class 8
 Packing Group II

15. Regulatory Information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Water	7732-18-5	X	ACTIVE	-
Hydrogen peroxide	7722-84-1	X	ACTIVE	-

Legend:

TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

X - Listed

'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT)

Not applicable

TSCA 12(b) - Notices of Export

Not applicable

International Inventories

Canada (DSL/NDL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Water	7732-18-5	X	-	231-791-2	X	X		X	X	KE-35400
Hydrogen peroxide	7722-84-1	X	-	231-765-0	X	X	X	X	X	KE-20204

KECL - NIER number or KE number (<http://ncis.nier.go.kr/en/main.do>)

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Not applicable

Clean Air Act

Not applicable

OSHA - Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Hydrogen peroxide	-	TQ: 7500 lb

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
Hydrogen peroxide	-	1000 lb	-

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Water	-	-	X	-	-
Hydrogen peroxide	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Hydrogen peroxide	Theft STQs - 400lb (concentration >=35%)

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Water	7732-18-5	-	-	-
Hydrogen peroxide	7722-84-1	-	Use restricted. See entry 75. (see link for restriction details)	-

REACH links
<https://echa.europa.eu/substances-restricted-under-reach>
Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Water	7732-18-5	Listed	Not applicable	Not applicable	Not applicable
Hydrogen peroxide	7722-84-1	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?

Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Water	7732-18-5	Not applicable	Not applicable	Not applicable	Not applicable
Hydrogen peroxide	7722-84-1	Not applicable	Not applicable	Not applicable	Not applicable

16. Other Information**Prepared By**

Product stewardship (Regulatory Affairs)
 Thermo Fisher Scientific
 email - begel.sdsdesk@thermofisher.com

Creation Date

22-Sep-2009

Revision Date 18-Dec-2025**Print Date** 18-Dec-2025**Revision Summary** Updated to the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) which published its Final Rule in the Federal Register revising the Hazard Communication Standard (HCS/HazCom), 29 CFR 1910.1200 (2024) (HCS §1910.1200, 2024), May 20, 2024, effective July 19, 2024.**Disclaimer**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

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SECTION 1. IDENTIFICATION

Product name : LCG-100

Article-No. : 340207

Manufacturer or supplier's details

Company name of supplier : Klüber Lubrication NA LP
9010 County Road 2120
Tyler, Texas 75707
USA
Phone: +1 903 534 8021
Fax: +1 903 581 4376
info@us.kluber.com

Klüber Lubrication NA LP
32 Industrial Drive
Londonderry, NH 03053
USA
Phone: +1 603 647 4104
Fax: +1 603 647 4106
info@us.kluber.com

E-mail address of person responsible for the SDS : mcm@us.kluber.com

Emergency telephone number : +1 517 545 7070 NCEC

Recommended use of the chemical and restrictions on use

Recommended use : Lubricating oil

Restrictions on use : Restricted to professional users.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin sensitisation : Category 1

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GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : May cause an allergic skin reaction.

Precautionary statements :

Prevention:
Avoid breathing mist or vapours.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves.

Response:
If skin irritation or rash occurs: Get medical advice/ attention.
Take off contaminated clothing and wash it before reuse.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Chemical nature : Synthetic hydrocarbon oil

Components

Chemical name	CAS No./Unique ID	Concentration (% w/w)	Trade secret
2,5-bis(octyldithio)-1,3,4-thiadiazole	13539-13-4*	$\geq 0.1 - < 1$	TSC

* Indicates that the identifier is a CAS No.

TSC- the actual concentration or concentration range is withheld as a trade secret

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

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- If inhaled : Remove person to fresh air. If signs/symptoms continue, get medical attention.
Keep patient warm and at rest.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
If breathing is irregular or stopped, administer artificial respiration.
- In case of skin contact : Take off all contaminated clothing immediately.
Wash off immediately with soap and plenty of water.
Get medical attention immediately if irritation develops and persists.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.
- In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 10 minutes.
If eye irritation persists, consult a specialist.
- If swallowed : Move the victim to fresh air.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
Do NOT induce vomiting.
Rinse mouth with water.
Never give anything by mouth to an unconscious person.
- Most important symptoms and effects, both acute and delayed : No symptoms known or expected.
May cause an allergic skin reaction.
- Notes to physician : Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
- Unsuitable extinguishing media : High volume water jet
- Hazardous combustion products : Carbon oxides
- Further information : Standard procedure for chemical fires.

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Special protective equipment : In the event of fire, wear self-contained breathing apparatus.
for firefighters Use personal protective equipment.
Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, : Evacuate personnel to safe areas.
protective equipment and Use personal protective equipment.
emergency procedures Ensure adequate ventilation.
Do not breathe vapours or spray mist.
Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Do not allow contact with soil, surface or ground water.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform
respective authorities.

Methods and materials for : Contain spillage, and then collect with non-combustible
containment and cleaning up absorbent material, (e.g. sand, earth, diatomaceous earth,
vermiculite) and place in container for disposal according to
local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Do not breathe vapours or spray mist.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the
application area.
Wash hands and face before breaks and immediately after
handling the product.
Do not get in eyes or mouth or on skin.
Do not get on skin or clothing.
Do not ingest.
Do not repack.
Do not re-use empty containers.
These safety instructions also apply to empty packaging which
may still contain product residues.
Keep container closed when not in use.

Conditions for safe storage : Store in original container.

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Keep container closed when not in use.
Keep in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store in accordance with the particular national regulations.
Keep in properly labelled containers.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures : none

Personal protective equipment

Respiratory protection : Not required; except in case of aerosol formation.

Filter type : Filter type A-P

Hand protection

Material : Nitrile rubber

Break through time : > 10 min

Protective index : Class 1

Remarks : Wear protective gloves. The break through time depends amongst other things on the material, the thickness and the type of glove and therefore has to be measured for each case.

Eye protection : Safety glasses with side-shields

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

Protective measures : The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures : Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid

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Colour	:	yellow
Odour	:	characteristic
Odour Threshold	:	No data available
Melting point/ range	:	No data available
Boiling point/boiling range	:	No data available
Flammability	:	Flammability (solid, gas): Not applicable
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Flash point	:	$\geq 500^{\circ}\text{F}$ / 260°C Method: ISO 2592, open cup
Auto-ignition temperature	:	No data available
Self-ignition	:	No data available
Decomposition temperature	:	No data available
pH	:	Not applicable substance/mixture is non-soluble (in water)
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	100 mm ² /s (104°F / 40°C)
Solubility(ies)		
Water solubility	:	insoluble
Solubility in other solvents	:	No data available

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Partition coefficient: n-octanol/water	:	No data available
Vapour pressure	:	< 0.001 hPa (68 °F / 20 °C)
Density	:	0.84 g/cm ³ (68 °F / 20 °C)
Relative density	:	0.84 (68 °F / 20 °C) Reference substance: Water The value is calculated
Relative vapour density	:	No data available
Bulk density	:	No data available
Particle characteristics Other information Evaporation rate	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	No data available
Sublimation point	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No hazards to be specially mentioned.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	No conditions to be specially mentioned.
Incompatible materials	:	No materials to be especially mentioned.
Hazardous decomposition products	:	No decomposition if stored and applied as directed.

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SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Based on available data, the classification criteria are not met.

Product:

Acute oral toxicity : Remarks: This information is not available.

Acute inhalation toxicity : Remarks: This information is not available.

Acute dermal toxicity : Symptoms: Redness, Local irritation

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg

Acute inhalation toxicity : LC50 (Rat): 3.08 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Product:

Remarks : This information is not available.

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Species : Rabbit
Assessment : Irritating to skin.
Result : Irritating to skin.

Serious eye damage/eye irritation

Based on available data, the classification criteria are not met.

Product:

Remarks : This information is not available.

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Species : Rabbit

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Result : Irritating to eyes.
Assessment : Irritating to eyes.

Respiratory or skin sensitisation

Skin sensitisation

May cause an allergic skin reaction.

Respiratory sensitisation

Based on available data, the classification criteria are not met.

Product:

Remarks : May cause sensitisation of susceptible persons by skin contact.

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Test Type	: Buehler Test
Species	: Guinea pig
Assessment	: The product is a skin sensitiser, sub-category 1A.
Result	: The product is a skin sensitiser, sub-category 1A.

Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Product:

Genotoxicity in vitro : Remarks: No data available

Genotoxicity in vivo : Remarks: No data available

Carcinogenicity

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**IARC
OSHA** No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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Reproductive toxicity

Based on available data, the classification criteria are not met.

Product:

Effects on fertility : Remarks: No data available

Effects on foetal development : Remarks: No data available

STOT - single exposure

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Assessment : The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Assessment : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Repeated dose toxicity

Product:

Remarks : This information is not available.

Aspiration toxicity

Based on available data, the classification criteria are not met.

Product:

This information is not available.

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Components:

2,5-bis(octyldithio)-1,3,4-thiadiazole:

No aspiration toxicity classification

Further information

Product:

Remarks : Information given is based on data on the components and the toxicology of similar products.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish : Remarks: Harmful to aquatic organisms.

Toxicity to daphnia and other aquatic invertebrates : Remarks: No data available

Toxicity to algae/aquatic plants : Remarks: No data available

Toxicity to microorganisms : Remarks: No data available

Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Physico-chemical removability : Remarks: No data available

Bioaccumulative potential

Product:

Bioaccumulation : Remarks: No data available

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Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among environmental compartments : Remarks: No data available

Other adverse effects

Product:

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

Additional ecological information : No information on ecology is available.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
Do not dispose of with domestic refuse.
Dispose of as hazardous waste in compliance with local and national regulations.

Contaminated packaging : Packaging that is not properly emptied must be disposed of as the unused product.
Dispose of waste product or used containers according to local regulations.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

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IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to IMO instruments

Not applicable for product as supplied.

National Regulations

49 CFR

Not regulated as a dangerous good

Special precautions for user

Not applicable

SECTION 15. REGULATORY INFORMATION

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Respiratory or skin sensitisation

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16. OTHER INFORMATION

Further information

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Revision Date : 05/20/2025

|| Relevant changes compared to the last edition are highlighted at the left margin. This version replaces all previous editions.

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RHT-68 RE

Version	Revision Date:	Date of last issue: -	Print Date:
1.0	01/07/2025	Date of first issue: 01/07/2025	01/08/2025

SECTION 1. IDENTIFICATION

Product name : RHT-68 RE

Article-No. : 340595

Manufacturer or supplier's details

Company name of supplier : Klüber Lubrication NA LP
9010 County Road 2120
Tyler, Texas 75707
USA
Phone: +1 903 534 8021
Fax: +1 903 581 4376
info@us.kluber.com

Klüber Lubrication NA LP
32 Industrial Drive
Londonderry, NH 03053
USA
Phone: +1 603 647 4104
Fax: +1 603 647 4106
info@us.kluber.com

E-mail address of person responsible for the SDS : mcm@us.kluber.com

Emergency telephone number : +1 517 545 7070 NCEC

Recommended use of the chemical and restrictions on use

Recommended use : Lubricating oil

Restrictions on use : Restricted to professional users.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Not a hazardous substance or mixture.

GHS label elements

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

RHT-68 RE

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Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Chemical nature : Mineral oil.

Components

No hazardous ingredients

SECTION 4. FIRST AID MEASURES

If inhaled	: Remove person to fresh air. If signs/symptoms continue, get medical attention. Keep patient warm and at rest. If breathing is irregular or stopped, administer artificial respiration.
In case of skin contact	: Remove contaminated clothing. If irritation develops, get medical attention. In case of contact, immediately flush skin with plenty of water.
In case of eye contact	: Rinse immediately with plenty of water, also under the eyelids, for at least 10 minutes. If eye irritation persists, consult a specialist.
If swallowed	: Move the victim to fresh air. Do NOT induce vomiting. Rinse mouth with water.
Most important symptoms and effects, both acute and delayed	: None known. No symptoms known or expected.
Notes to physician	: Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing	: High volume water jet

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media

Hazardous combustion products : Carbon oxides

Further information : Standard procedure for chemical fires.

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.
Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Evacuate personnel to safe areas.
Use personal protective equipment.
Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Try to prevent the material from entering drains or water courses.
Prevent further leakage or spillage if safe to do so.
Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Wash hands and face before breaks and immediately after handling the product.

Conditions for safe storage : Store in original container.
Keep container closed when not in use.
Keep in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store in accordance with the particular national regulations.
Keep in properly labelled containers.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Distillates (petroleum), hydrotreated heavy paraffinic	64742-54-7	TWA (Mist)	5 mg/m ³	OSHA Z-1 (2018-03-15)
		TWA (Inhalable particulate matter)	5 mg/m ³	ACGIH (2013-03-01)
		TWA (Mist)	5 mg/m ³	NIOSH REL (2019-10-04)
		ST (Mist)	10 mg/m ³	NIOSH REL (2019-10-04)
Lubricating oils (petroleum), hydrotreated spent	64742-58-1	TWA (Inhalable particulate matter)	5 mg/m ³	ACGIH (2013-03-01)

Engineering measures : none

Personal protective equipment

Respiratory protection : Not required; except in case of aerosol formation.

Filter type : Filter type A-P

Hand protection

Material : Nitrile rubber
Break through time : > 10 min
Protective index : Class 1

Remarks : For prolonged or repeated contact use protective gloves. The break through time depends amongst other things on the material, the thickness and the type of glove and therefore has to be measured for each case.

Eye protection : Safety glasses with side-shields

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

Protective measures : The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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Hygiene measures : Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : yellow

Odour : characteristic

Odour Threshold : No data available

pH : Not applicable
substance/mixture is non-soluble (in water)

Melting point/range : No data available

Boiling point/boiling range : No data available

Flash point : $\geq 428\text{ }^{\circ}\text{F}$ / $220\text{ }^{\circ}\text{C}$
Method: open cup

Evaporation rate : No data available

Flammability (solid, gas) : Not applicable

Self-ignition : No data available

Upper explosion limit / Upper flammability limit : No data available

Lower explosion limit / Lower flammability limit : No data available

Vapour pressure : $< 0.001\text{ hPa}$ ($68\text{ }^{\circ}\text{F}$ / $20\text{ }^{\circ}\text{C}$)

Relative vapour density : No data available

Relative density : 0.857 ($68\text{ }^{\circ}\text{F}$ / $20\text{ }^{\circ}\text{C}$)
Reference substance: Water

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The value is calculated

Bulk density	:	No data available
Solubility(ies)	:	
Water solubility	:	insoluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	68 mm ² /s (104 °F / 40 °C)
Explosive properties	:	Not explosive
Oxidizing properties	:	No data available
Sublimation point	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No hazards to be specially mentioned.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	No conditions to be specially mentioned.
Incompatible materials	:	No materials to be especially mentioned.
Hazardous decomposition products	:	No decomposition if stored and applied as directed.

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SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : Remarks: This information is not available.

Acute inhalation toxicity : Remarks: This information is not available.

Acute dermal toxicity : Remarks: This information is not available.

Skin corrosion/irritation

Product:

Remarks : This information is not available.

Serious eye damage/eye irritation

Product:

Remarks : This information is not available.

Respiratory or skin sensitisation

Product:

Remarks : This information is not available.

Germ cell mutagenicity

Product:

Genotoxicity in vitro : Remarks: No data available

Genotoxicity in vivo : Remarks: No data available

Carcinogenicity

Product:

Remarks : No data available

IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**IARC
OSHA** No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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Reproductive toxicity

Product:

Effects on fertility : Remarks: No data available

Effects on foetal development : Remarks: No data available

STOT - single exposure

Product:

Remarks : No data available

STOT - repeated exposure

Product:

Remarks : No data available

Repeated dose toxicity

Product:

Remarks : This information is not available.

Aspiration toxicity

Product:

This information is not available.

Further information

Product:

Remarks : Information given is based on data on the components and the toxicology of similar products.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish :
Remarks: No data available

Toxicity to daphnia and other :

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aquatic invertebrates Remarks: No data available

Toxicity to algae/aquatic plants : Remarks: No data available

Toxicity to microorganisms : Remarks: No data available

Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Physico-chemical removability : Remarks: No data available

Bioaccumulative potential

Product:

Bioaccumulation : Remarks: No data available

Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among environmental compartments : Remarks: No data available

Other adverse effects

Product:

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I
Substances
Remarks: This product neither contains, nor was
manufactured with a Class I or Class II ODS as defined by the
U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A +
B).

Additional ecological information : No information on ecology is available.

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SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

- Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
- Contaminated packaging : Packaging that is not properly emptied must be disposed of as the unused product.
Dispose of waste product or used containers according to local regulations.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations

49 CFR

Not regulated as a dangerous good

Special precautions for user

Not applicable

SECTION 15. REGULATORY INFORMATION

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

TSCA list

No substances are subject to TSCA 12(b) export notification requirements.

No substances are subject to a Significant New Use Rule.

SECTION 16. OTHER INFORMATION

Further information

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
OSHA Z-1 / TWA	:	8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test

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population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Revision Date : 01/07/2025

|| Relevant changes compared to the last edition are highlighted at the left margin. This version replaces all previous editions.

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Safety Data Sheet

according to Regulation (EU) No 2020/878 (REACH)

Trade name: NECA|active® gc

Extruded activated carbon, high skeleton density

Version: 1.5

Revision date: 25-06-2025

Section 1 Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name:

NECA|active® gc

Extruded activated carbon, high skeleton density

Steam activated activated carbon with a mineralised binder

Additional identification:

EINECS: 931-328-0

CAS number: 7440-44-0

UFI CODE: not applicable

REACH registration number: 01-2119488894-16-0036

1.2 Relevant identified uses of the substance or mixture and uses advised against advised against

Recommended uses

Use as adsorbent in industrial, commercial and consumer applications.

Uses advised against

Currently no uses advised against are known.

1.3 Details of the supplier of the safety data sheet

Necatec AG

Bredeneyer 2B

D-45133 Essen

Essen, Germany

Tel: 0049 (201) 6120 4397

FAX: 0049 (201) 6120 4399

E-mail: info@necatec.de

1.4 Emergency number

0049 (152 2278 039)

For urgent information, please contact the poison control centre in Munich:

Phone: +49 89 192 40

Section 2 Possible dangers

2.1 Classification of the substance or mixture

Not classified according to Regulation (EC) No 1272/2008 (CLP).

Not classified as dangerous according to Directives 67/548/EEC or 1999/45/EC.

Further information

No further information available.

Information relating to particular hazards for human and environment

No specific hazards have been identified.

2.2 Labelling elements

As the substance is not classified as hazardous, a hazard label is not required.

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2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is neither a PBT nor a vPvB substance.

Heating, strong heating, ignition sources and contact with strong oxidising agents such as ozone, liquid oxygen, chlorine, permanganate, etc. may cause fires.

Wet activated carbon consumes oxygen from the air, so dangerously low oxygen concentrations can occur. Whenever workers enter a container with activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-depleted areas should be followed.

This material can be self-heating under certain conditions (e.g. high humidity). The absorption of moisture promotes the self-heating tendency. Do not place Big Bags with activated carbon on a wet surface.

Spent (or used) activated carbon may exhibit the properties of the adsorbents.

Section 3 Composition/information on ingredients

3.1 Substance related information

Extruded activated carbon, high skeleton density

A porous, amorphous adsorbent with a large surface area, consisting largely of elemental carbon, with a high skeletal density.

CAS No: 7440-44-0

EC No: 931-328-0

REACH Registration No: 01-211948884-16-0036

Purity: 85%

Synonyms: -

Stabilisers: -

Hazardous additions: -

Other admixtures:

Admixture	Typical concentration	Concentration range	Remarks
Calcium oxide ; EINECS 215-138-9	approx. 0.5% (w/w)	>= 0.0 - <= 1.0 % (w/w)	
Iron oxide ; EINECS 215-721-8	approx. 1.0% (w/w)	>= 0.0 - <= 2.0 % (w/w)	
Potassium carbonate ; EINECS 209-529-3	approx. 0.04 % (w/w)	>= 0.0 - <= 0.3 % (w/w)	
Aluminium oxide ; EINECS: 215-691-6	approx. 0.9% (w/w)	>= 0.0 - <= 2.0 % (w/w)	Mixed oxides may also occur
Silicon oxide ; EINECS 234-368-0	approx. 3.0 % (w/w)	>= 0.0 - <= 10.0 % (w/w)	Mixed oxides may also occur

3.2 Mixtures

Hazardous ingredients

No hazardous ingredients contained.

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Section 4 First aid measures

4.1 Description of first aid measures

General information

As non-powdered activated carbon has a low dusting behaviour, the risk of accidental exposure in the workplace is low. The following first aid information is based on contact with activated carbon in powder form.

After inhalation

Move to fresh air. If coughing or breathing difficulties occur, seek medical attention.

After skin contact

Remove contaminated clothing; wash skin with soap and water. If irritation occurs, seek medical attention.

After eye contact

Rinse immediately with plenty of water (remove contact lenses if easily possible). If irritation occurs, seek medical attention.

After ingestion

Rinse out mouth and give at least half a litre of water to drink. If gastrointestinal symptoms occur, consult a doctor.

Self-protection of first aiders

Ensure self-protection before entering a hazardous environment.

4.2 Most important symptoms and effects, both acute and delayed

Ingestion of large quantities may cause constipation.

Contact with eyes, skin or mucous membranes may cause irritation.

4.3 Indication of any immediate medical attention and special treatment needed

Not applicable.

Section 5 Fire fighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water spray, water mist, powder extinguisher, carbon dioxide or foam.

Unsuitable extinguishing agents

None.

5.2 Special hazards arising from the substance or mixture

Avoid dust formation.

Wet activated carbon can lead to oxygen depletion in closed rooms.

Hazardous decomposition products: Carbon monoxide. Used activated carbon may lead to other combustion products.

After a fire, smouldering hotspots may be present within the activated charcoal for a long time.

Activated carbon that has been allowed to smoulder for a long time in a confined space can accumulate carbon monoxide above the lower explosion limit.

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5.3 Advice for firefighters

Personal protective equipment for firefighting

Standard personal protective equipment for firefighting including self-contained breathing apparatus for all indoor fires and large outdoor fires.

Further advice for firefighting

If possible, move smouldering activated charcoal to a safe area (preferably outside).

Section 6 **Accidental release measures**

6.1 Personal precautions, protective equipment and emergency procedures

No personal precautions are required for virgin activated charcoal (fresh charcoal). See section 8 for information on personal protective equipment.

6.2 Environmental precautions

Do not allow to enter drains or waterways.

6.3 Methods and material for containment and cleaning up

Soak up spilt product and rinse remaining product with plenty of water. Avoid dust formation.

6.4 Further information

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur. Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-deficient areas should be followed.

Used or spent activated carbon may contain contaminants that require the material to be handled in accordance with national laws or local permits and require the use of risk management measures when handling the materials.

Section 7 **Handling and storage**

7.1 Precautions for safe handling

Protective measures:

Wear suitable protective equipment (see section 8).

Technical measures:

Measures to avoid dust formation: Use good working practices and engineering procedures during emptying.

Measures required to protect the environment:

Provide containment and adequate ventilation.

Specific requirements or regulations for handling:

Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-deficient areas should be followed.

Fire and explosion protection instructions:

Avoid dust formation and dust deposits on exposed surfaces. Keep activated carbon away from sources of ignition.

Further information:

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur.

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7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions:

Do not store at high temperatures or in direct sunlight.

Packaging materials: Store in the original packaging.

Storage instructions: Keep away from strong oxidising agents (e.g. ozone, liquid oxygen, chlorine, permanganate etc.) and strong acids. Keep away from heat sources.

Requirements for storage rooms and containers: Store in a cool, well-ventilated area away from sources of contamination.

away from sources of contamination. Do not place Big Bags with activated carbon on a wet surface.

Storage class: not applicable

Further information on storage conditions:

The quantity of wet activated carbon stored should be limited. Oxygen content warning devices are recommended in closed storage rooms containing wet activated carbon.

7.3 Specific end uses

Not applicable

Section 8 Exposure controls/personal protective equipment

8.1 Parameters to be monitored

Components with occupational or biological limit values that require monitoring

Occupational exposure limits

Air limit values:

Limit value type (country of origin)	Substance name	Workplace limit value		Recommended monitoring methods	Peak limitation	Source
		Long term (mg/m ³)	Short term			
Germany	Activated carbon alveolar fraction	1,5	-	Personal air sampling for the alveolar fraction	-	DFG Deutsche Forschungsgemei- nschaft: MAK- und BAT-Werte- Liste 2010, Senate Commission for the Investigation of Health Hazards of Chemical Compounds, Communication 46; VCH
	Activated carbon respirable fraction	4	-	Personal air sampling for the respirable fraction	-	

Biological limit values: No biological limit value has been set.

Additional exposure limits under the conditions of use: None.

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DNEL/DMEL and PNEC values

DNEL/DMEL		Route of exposure	Exposure frequency	Critical component	Remark
Worker	Consumer				
3 mg/m ³	0.5 mg/m ³	Inhalation	Short term (acute) Long-term (repeated)	Activated carbon	The preliminary long-term inhalation DNEL for local effects is based on the OEL (TWA, 8 h) established by the American Conference of Governmental Industrial Hygienists (ACGIH, 2001) for inhalable carbon black dust. The OEL is intended to minimise excessive pollution and effects on lung function.

No PNEC was derived as the substance is very poorly soluble and no ecotoxicity data are available.

8.2 Exposure controls and monitoring

Control of exposure in the workplace:

- Good basic industrial hygiene practice must be applied to any handling of activated carbon outside a container.

Safety controls:

- Work procedures for low oxygen levels should be in place - Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen levels can occur. Whenever workers enter a vessel containing activated carbon, the oxygen level in the vessel should be determined beforehand and work procedures for potentially low oxygen areas should be followed. Alternatively, the room can be fitted with oxygen content sensors with an alarm setting at 18 vol%.

Technical measures to prevent exposure:

- For industrial and commercial use of granular activated carbon and slurries of granular activated carbon, no engineering controls to prevent exposure are required.
- For industrial use of powdered activated carbons stored in high containment with only occasional possibility of exposure, no engineering controls are required.
- For commercial use of powdered activated carbons stored in high containment with up to no possibility of exposure, no engineering controls are required.
- Provide local exhaust ventilation with a minimum efficiency of 90% for all activities.

Personal protective equipment:

- No personal protective equipment is required when handling non-pulverised or slurried activated carbon.
- Respiratory protection: Use a half-face mask equipped with a P2 filter (minimum efficiency of 90%) or better for handling powdered activated carbon (high skeleton density). Reduce dust exposure to a minimum.
- Hand protection: No uses requiring hand protection have been specifically identified, but the use of gloves is recommended as good working practice.
- Eye protection: Wear safety goggles with side shields if contact with powdered activated carbon may occur.
- Body protection: Standard protective clothing.

8.3 Environmental precautions

Product-related measures to prevent exposure:

- Local exhaust ventilation to remove material at source
- Storage in containers
- Regulated waste disposal

Training measures to prevent exposure:

- Incorporation of ISO 14001
- Appropriate documentation such as work instruction procedures

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Organisational measures to prevent exposure:

- Education of the workforce
- Regular process review
- Environmental audits carried out by certified personnel

Technical measures to prevent exposure: none

8.4 Control of consumer exposure

Normal use of activated carbon (high skeletal density) in household products sold as filter products is safe under all foreseeable circumstances.

Section 9 Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Form: Solid

Colour: Black

Odour: Odourless

Important health, safety and environmental information

Basic safety data

Endpoint	Value	Method	Remark
pH (20 °C):	8 - 9		
Melting point/melting range (°C)	> 1000		The melting point of activated carbon (high skeleton density) is estimated to be well above 1000 °C in an inert environment.
Boiling point/boiling range (°C)	> 1000		The boiling point of activated carbon (high skeleton density) is estimated to be well above 1000 °C in an inert environment.
Flash point (°C)	-		
Ignition temperature (°C)	350 - 450		
Vapour pressure (°C)	-		
Skeleton density (g/cm ³)	2,10 - 2,20		
Bulk density (kg/m ³)	480 - 500		
Water solubility (20 °C in g/L)	0		The water solubility of activated carbon (high skeleton density) was determined according to OECD guideline 105 according to GLP using the column elution method. The substance was found to be insoluble in water at pH 6.8 and a temperature of 20 °C.
Partition coefficient n-octanol/water (log P _{ow})	-		The water solubility of activated carbon (high skeleton density) was determined according to OECD guideline 105 in accordance with GLP using the column elution method. It was found that the substance is insoluble in water at pH 6.8 and a temperature of 20 °C.
Viscosity, dynamic (mPa-s)	-		The substance is a solid.
Explosion limits for dust explosion hazard: - Lower - Upper	-		

9.2 Other information

The physical and chemical properties of the spent material may differ from those of the virgin activated carbon (fresh carbon).

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Section 10 Stability and reactivity

10.1 Reactivity

This product shows no reactivity under the specified conditions of storage, transport and use.

10.2 Chemical stability

This product is stable under the specified conditions of storage, transport and use.

10.3 Possibility of hazardous reactions

Contact with strong oxidising agents e.g. chlorine, liquid oxygen, permanganate, ozone can lead to rapid combustion / possible explosion.

10.4 Conditions to avoid

Keep working temperatures below 70 °C. Do not store in direct sunlight.

10.5 Incompatible materials

Keep away from strong oxidising agents and strong acids.

10.6 Hazardous decomposition products

Carbon monoxide or carbon dioxide.

Section 11 Toxicological information

11.1 Toxicokinetics, metabolism and distribution

Based on the physical and chemical properties of activated carbon, the lack of effects in toxicological studies and the therapeutic use of activated carbon as an adsorbent for the treatment of acute poisoning and acute diarrhoea, it can be expected that activated carbon (high skeletal density) is not absorbed by the oral, dermal and inhalation routes.

Toxicological data for humans

This information is not available and it is not a standard requirement under REACH.

11.2 Acute effects (toxicity tests)

	Active dose	Species	Method	Remark
Acute oral toxicity	LD50: > 2000 mg/kg bw (female) (No treatment-related effects were observed.)	Rat, female	OECD Guideline 423 (Acute oral toxicity - Acute toxic class method) EU method B.1 tris (Acute oral toxicity - Acute toxic class method)	reliable without restriction
Acute dermal toxicity	No data available	-	-	In accordance with column 2 REACH Annex VII: no acute dermal toxicity study (required in section 8.5) needs to be conducted as acute oral and inhalation toxicity studies are available.
Acute inhalation toxicity	LC0 (1 h): 64.4 mg/L air (nominal) or 8.5 mg/L air (analytical) (male/female) (No fatalities, but several effects were observed (fur contamination, general stress, lung rales, weight loss, lung discolouration)) LC100 (1 h): 235 mg/L air (nominal) (All animals died (initial test))	Rat	equivalent or similar to OECD Guideline 403 (Acute Inhalation Toxicity)	reliable with restrictions

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Specific target organ toxicity, (STOT)

No information available on individual organ toxicities.

Specific symptoms in animal studies:

After ingestion: None

After skin contact: none

After inhalation: Weight loss, irritation of the respiratory mucosa and - at necropsy - lung discolouration were observed. The LC50 value for the inhalation route was determined to be > 8.5 mg/L.

After eye contact: None

Irritant/corrosive effect:

	Exposure time	Species	Evaluation	Method	Remark
Primary irritation to the skin:	4 hrs	rabbit	not irritating	OECD Guideline 404	reliable with restrictions
Irritation of the eyes		rabbit	not irritating	OECD Guideline 405 (Acute eye irritation/corrosion) (2002) EU Method B.5 (Acute toxicity: eye irritation/corrosion) (2008)	reliable without restriction

Irritation of the respiratory tract: no data available

Sensitisation

In contact with skin: not sensitising

If inhaled: no data available

Repeated dose toxicity (subacute, subchronic, chronic)

	Active dose	Value	Exposure period	Species	Method	Evaluation	Remark
Chronic inhalative		no NOAEC identified	7 h/day for 5 days/week for 1 year.	Rat Guinea pig Mouse	Non-standardised method		Study not reliable.

CMR effects (carcinogenic, mutagenic and toxic for reproduction).

Carcinogenicity:	No data available.
In-vitro mutagenicity:	No data available.
Genotoxicity:	No data available.
In vivo mutagenicity:	No data available.
Germ cell mutagenicity:	Negative with and without metabolic activation
Reproductive toxicity:	No data available.

Summarised assessment of CMR properties:

All 3 in vitro *key* studies show that the substance has no genotoxic potential. Therefore, it can be concluded that the substance is not mutagenic and therefore does not need to be classified for mutagenicity according to the criteria in Annex I of Regulation 1272/2008/EC (CLP/EU-GHS) and Annex VI of Directive 67/548/EEC.

Three in vitro genotoxicity studies have shown that the substance has no genotoxic properties (non-mutagen cat. 3) and a supporting chronic toxicity study in three species has shown no systemic effects (hyperplasia and/or preneoplastic lesions).

11.3 Experience from practice

Observations relevant to classification: none

Further observations: none

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11.4 General remarks

none

Section 12 Environmental information

12.1 Toxicity

No data available. As activated carbon is highly insoluble in water, no toxicity is expected.

12.2 Persistence and degradability

Activated carbon (high skeletal density) is a solid inorganic material and is not amenable to degradation by natural chemical or enzymatic processes.

Activated carbon (high skeleton density) is only degraded under extreme conditions - such as heating under reflux with mixtures of concentrated sulphuric acid/nitric acid - when the carbon eventually oxidises to CO₂. Activated carbon (high skeletal density) cannot be converted into a soluble, absorbable form. Therefore, activated carbon (high skeletal density) cannot find its way to any cell site where it could conceivably be biodegraded. Furthermore, biodegradability testing is not feasible as the substance is insoluble in water.

The bioaccumulation study was omitted as the substance does not have a log K_{ow} (the substance is an inorganic substance or can be considered to behave like an inorganic substance). In addition, the size of the substance will prevent it from passing through the membranes, as the substance consists of particles > 0.5 µm in size. The particles are not soluble in water.

12.3 Bioaccumulative potential

The substance has a very low potential for bioaccumulation in aquatic organisms (e.g. fish), i.e. a BCF < 10.

12.4 Mobility in soil

Known or predicted distribution in the environmental compartments: -

Surface tension: No information available as the material is insoluble.

Adsorption/desorption:

Adsorption/desorption studies are not technically feasible as the substance is not soluble in water or organic solvents; and analysis is not possible as no distinction can be made between C of the activated carbon (high skeletal density) and C of the sediment/soil in the analysis. Furthermore, activated carbon (high skeleton density) consists largely of elemental carbon and is chemically inert. No further biodegradation will occur.

12.5 Result of the PBT and vPvB assessment

As activated carbon (high skeleton density) is considered to be an inorganic substance, a PBT assessment is not applicable.

12.6 Other adverse effects

A water slurry containing large amounts of activated carbon (high skeletal density) may have high pH values.

Section 13 Disposal considerations

13.1 Waste treatment methods

There are no specified disposal methods for virgin activated carbon (fresh carbon). Do not allow to enter the sewage system.

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13.2 Waste codes / waste designations according to EWC / AVV

Waste code: EWC 15.02.03

13.3 Suitable packaging

Big bag with inlay

13.4 Further information

Spent activated carbon may require special disposal/packaging instructions.

Section 14 Transport information

ADR/RID The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a volume of 3 m³ or less (3 m³ maximum)

AND The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m³ (3 m³ maximum)

IMDG/IMO The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m³ (3 m³ maximum)

ICOA/IATA The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m³ (3 m³ maximum)

Environmental hazards

Not classified as dangerous for the environment for transport.

Special precautions for user

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur. Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially low oxygen areas should be followed.

Do not place big bags with activated carbon on a wet surface.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

14.1 UN number or ID number

ADR / RID / ADN, IMDG, IATA not applicable

14.2 UN proper shipping name

ADR / RID / ADN, IMDG, IATA not applicable

14.3 Transport hazard classes

ADR / RID / ADN, IMDG, IATA not applicable

14.4 Packaging group

ADR / RID / ADN, IMDG, IATA not applicable

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-
- 14.5 Environmental hazards
ADR / RID / ADN, IMDG, IATA not applicable
- 14.6 Special precautions for user
not applicable
- 14.7 Transport in bulk by sea according to IMO instruments
not applicable
- Transport / further information: no dangerous goods according to the above regulations
 - UN "Model Regulation": not applicable

Section 15 Legal provisions

- 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
EU regulations:
Authorisations and/or restrictions on use
- Authorisations: none
 - Restrictions on use: none
 - Other EU regulations: none
- National regulations:
none
- 15.2 Chemical safety assessment
Chemical safety assessment: A chemical safety assessment has been carried out in accordance with the rules prescribed in the REACH Regulation. The annexes contain an overview of the risk management measures based on this assessment.

Section 16 Other information

The information is based on our current knowledge, but does not constitute a guarantee of product properties and does not establish a contractual legal relationship.
This safety data sheet complies with Regulation (EC) No 1272/2008 [CLP], Article 31 as amended by Regulation (EU) 2020/878.

- 16.1 Changes in this version
Rev. 1.5; new creation: 15/08/2024
Inclusion of the UFI code.
Adaptation of the ingredients.
Adaptation of the form to the ECHA Guidance version 4.0/12/20.
- 16.2 Abbreviations and acronyms
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement on the Transport of Dangerous Goods by Road). Agreement on the International Carriage of Dangerous Goods by Road)
AwSV: Ordinance on Installations for the Handling of Substances Hazardous to Water
AVV: Waste Catalogue Ordinance
CAS: Chemical Abstracts Service
CLP: Classification, Labelling and Packaging of substances and mixtures
DNEL: Derived No Effect Level

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d: day(s)

EWC: European Waste Catalogue according to the draft Waste Catalogue Ordinance

EINECS: European INventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

ECHA: European Chemicals Agency

EWC: European Waste Catalogue

IARC: INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)

ICAO: International Civil Aviation Organisation

ICAO-TI: Technical Instructions by the "International Civil Aviation Organisation" (ICAO)

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

GefStoffV: Ordinance on Hazardous Substances (Germany)

h: hour

LOAEL: Lowest observed adverse effect level

LOAEC: Lowest observed adverse effect concentration

LC50: Lethal concentration, 50 per cent

LD50: Lethal dose, 50 per cent

NOAEL: No observed adverse effect level

NOAEC: No observed adverse effect concentration

NLP: No-Longer Polymers

N/A: not applicable

OECD: Organisation for Economic Co-operation and Development

PNEC: predicted no effect concentration

PBT: Persistent bioaccumulative toxic

(Regulations Concerning the International Transport of Dangerous Goods by Rail)

REACH: Registration, Evaluation, Authorisation of Chemicals

SVHC: substance of very high concern

TRGS: Technical Rules for Hazardous Substances

UN/NU: United Nations (United Nations)

VOC: Volatile Organic Compounds

VwVwS: Administrative regulation for substances hazardous to water

WGK: Water hazard class

Classification of mixtures and assessment method used in accordance with Regulation (EC) No. 1272/2008 [CLP]

Classification	Classification method
Resp. Sens. 1; H334	Calculation method
Skin Sens. 1; H317	Calculation method
Muta. 2; H341	Calculation method
Carc. 1A; H350i	Calculation method
Repr. 1B; H360D	Calculation method
STOT RE 1; H372	Calculation method
Aquatic Chronic 2; H411	Calculation method

16.3 Important literature and data sources

Regulation (EC) No 1272/2008 [CLP]

Regulation (EU) 2020/878

ECHA Guidance version 4.0/12.20

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Training advice

Basic training on the hazards of the substance and the use of risk management measures is required.

Recommended restrictions on use

Avoid contact with strong oxidising agents (and strong acids).

Exposure	Industrial use:	Commercial use:	Private use:
Human, oral, short-term:	0	0	0
Human, oral, long-term/repeated:	0	0	0
Human, dermal, short-term:	+	+	+
Human, dermal, long-term/repeated:	+	+	+
Human, inhalation short-term:	+	+	+
Human, inhalation, long-term/repeated:	+	+	+
Environment, water, short-term/one-time:	+	+	+
Environment, water, continuous:	+	+	+
Environment, air, short-term/once:	+	+	+
Environment, air, continuous:	+	+	+
Environment, soil, short-term/once:	+	+	+
Environment, soil, continuous:	+	+	+

Recommended use (+)

Use advised against (-)

Use not identified (0)

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----- END OF SAFETY DATA SHEET -----

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Section 1 Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name:

NECA|active® sulfo

Extruded activated carbon, high skeleton density

Steam activated activated carbon with a mineralised binder

Additional identification:

EINECS: 931-328-0

CAS number: 7440-44-0

UFI CODE: not applicable

REACH registration number: 01-2119488894-16-0036

1.2 Relevant identified uses of the substance or mixture and uses advised against advised against

Recommended uses

Use as adsorbent in industrial, commercial and consumer applications.

Uses advised against

Currently no uses advised against are known.

1.3 Details of the supplier of the safety data sheet

Necatec AG

Bredeneyer 2B

D-45133 Essen

Essen, Germany

Tel: 0049 (201) 6120 4397

FAX: 0049 (201) 6120 4399

E-mail: info@necatec.de

1.4 Emergency number

0049 (152 2278 039)

For urgent information, please contact the poison control centre in Munich:

Phone: +49 89 192 40

Section 2 Possible dangers

2.1 Classification of the substance or mixture

Not classified according to Regulation (EC) No 1272/2008 (CLP).

Not classified as dangerous according to Directives 67/548/EEC or 1999/45/EC.

Further information

No further information available.

Information relating to particular hazards for human and environment

No specific hazards have been identified.

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2.2 Labelling elements

As the substance is not classified as hazardous, a hazard label is not required.

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is neither a PBT nor a vPvB substance.

Heating, strong heating, ignition sources and contact with strong oxidising agents such as ozone, liquid oxygen, chlorine, permanganate, etc. may cause fires.

Wet activated carbon consumes oxygen from the air, so dangerously low oxygen concentrations can occur. Whenever workers enter a container with activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-depleted areas should be followed.

This material can be self-heating under certain conditions (e.g. high humidity). The absorption of moisture promotes the self-heating tendency. Do not place Big Bags with activated carbon on a wet surface.

Spent (or used) activated carbon may exhibit the properties of the adsorbents.

Section 3 Composition/information on ingredients

3.1 Substance related information

Extruded activated carbon, high skeleton density

A porous, amorphous adsorbent with a large surface area, consisting largely of elemental carbon, with a high skeletal density.

CAS No: 7440-44-0

EC No: 931-328-0

REACH Registration No: 01-211948884-16-0036

Purity: 85%

Synonyms: -

Stabilisers: -

Hazardous additions: -

Other admixtures:

Admixture	Typical concentration	Concentration range	Remarks
Calcium oxide ; EINECS 215-138-9	approx. 0.5% (w/w)	>= 0.0 - <= 1.0 % (w/w)	
Iron oxide ; EINECS 215-721-8	approx. 1.0% (w/w)	>= 0.0 - <= 2.0 % (w/w)	
Potassium carbonate ; EINECS 209-529-3	approx. 0.04 % (w/w)	>= 0.0 - <= 0.3 % (w/w)	
Aluminium oxide ; EINECS: 215-691-6	approx. 0.9% (w/w)	>= 0.0 - <= 2.0 % (w/w)	Mixed oxides may also occur
Silicon oxide ; EINECS 234-368-0	approx. 3.0 % (w/w)	>= 0.0 - <= 10.0 % (w/w)	Mixed oxides may also occur
Sodium hydroxide; EINECS 215-185-5	approx. 0,5% (w/w)	>= 0,0 — <= 0,5 % (w/w)	

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3.2 Mixtures

Hazardous ingredients

No hazardous ingredients contained.

Section 4 **First aid measures**

4.1 Description of first aid measures

General information

As non-powdered activated carbon has a low dusting behaviour, the risk of accidental exposure in the workplace is low. The following first aid information is based on contact with activated carbon in powder form.

After inhalation

Move to fresh air. If coughing or breathing difficulties occur, seek medical attention.

After skin contact

Remove contaminated clothing; wash skin with soap and water. If irritation occurs, seek medical attention.

After eye contact

Rinse immediately with plenty of water (remove contact lenses if easily possible). If irritation occurs, seek medical attention.

After ingestion

Rinse out mouth and give at least half a litre of water to drink. If gastrointestinal symptoms occur, consult a doctor.

Self-protection of first aiders

Ensure self-protection before entering a hazardous environment.

4.2 Most important symptoms and effects, both acute and delayed

Ingestion of large quantities may cause constipation.

Contact with eyes, skin or mucous membranes may cause irritation.

4.3 Indication of any immediate medical attention and special treatment needed

Not applicable.

Section 5 **Fire fighting measures**

5.1 Extinguishing media

Suitable extinguishing media

Water spray, water mist, powder extinguisher, carbon dioxide or foam.

Unsuitable extinguishing agents

None.

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5.2 Special hazards arising from the substance or mixture

Avoid dust formation.

Wet activated carbon can lead to oxygen depletion in closed rooms.

Hazardous decomposition products: Carbon monoxide. Used activated carbon may lead to other combustion products.

After a fire, smouldering hotspots may be present within the activated charcoal for a long time.

Activated carbon that has been allowed to smoulder for a long time in a confined space can accumulate carbon monoxide above the lower explosion limit.

5.3 Advice for firefighters

Personal protective equipment for firefighting

Standard personal protective equipment for firefighting including self-contained breathing apparatus for all indoor fires and large outdoor fires.

Further advice for firefighting

If possible, move smouldering activated charcoal to a safe area (preferably outside).

Section 6 **Accidental release measures**

6.1 Personal precautions, protective equipment and emergency procedures

No personal precautions are required for virgin activated charcoal (fresh charcoal). See section 8 for information on personal protective equipment.

6.2 Environmental precautions

Do not allow to enter drains or waterways.

6.3 Methods and material for containment and cleaning up

Soak up spilt product and rinse remaining product with plenty of water. Avoid dust formation.

6.4 Further information

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur. Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-deficient areas should be followed.

Used or spent activated carbon may contain contaminants that require the material to be handled in accordance with national laws or local permits and require the use of risk management measures when handling the materials.

Section 7 **Handling and storage**

7.1 Precautions for safe handling

Protective measures:

Wear suitable protective equipment (see section 8).

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Technical measures:

Measures to avoid dust formation: Use good working practices and engineering procedures during emptying.

Measures required to protect the environment:

Provide containment and adequate ventilation.

Specific requirements or regulations for handling:

Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially oxygen-deficient areas should be followed.

Fire and explosion protection instructions:

Avoid dust formation and dust deposits on exposed surfaces. Keep activated carbon away from sources of ignition.

Further information:

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions:

Do not store at high temperatures or in direct sunlight.

Packaging materials: Store in the original packaging.

Storage instructions: Keep away from strong oxidising agents (e.g. ozone, liquid oxygen, chlorine, permanganate etc.) and strong acids. Keep away from heat sources.

Requirements for storage rooms and containers: Store in a cool, well-ventilated area away from sources of contamination.

away from sources of contamination. Do not place Big Bags with activated carbon on a wet surface.

Storage class: not applicable

Further information on storage conditions:

The quantity of wet activated carbon stored should be limited. Oxygen content warning devices are recommended in closed storage rooms containing wet activated carbon.

7.3 Specific end uses

Not applicable

Section 8 **Exposure controls/personal protective equipment**

8.1 Parameters to be monitored

Components with occupational or biological limit values that require monitoring

Occupational exposure limits

Air limit values:

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Limit value type (country of origin)	Substance name	Workplace limit value		Recommended monitoring methods	Peak limitation	Source
		Long term (mg/m ³)	Short term			
Germany	Activated carbon alveolar fraction	1,5	-	Personal air sampling for the alveolar fraction	-	DFG Deutsche Forschungsgemeinschaft: MAK- und BAT-Werte-Liste 2010, Senate Commission for the Investigation of Health Hazards of Chemical Compounds, Communication 46; VCH
	Activated carbon respirable fraction	4	-	Personal air sampling for the respirable fraction	-	

Biological limit values: No biological limit value has been set.

Additional exposure limits under the conditions of use: None.

DNEL/DMEL and PNEC values

DNEL/DMEL		Route of exposure	Exposure frequency	Critical component	Remark
Worker	Consumer				
3 mg/m ³	0.5 mg/m ³	Inhalation	Short term (acute) Long-term (repeated)	Activated carbon	The preliminary long-term inhalation DNEL for local effects is based on the OEL (TWA, 8 h) established by the American Conference of Governmental Industrial Hygienists (ACGIH, 2001) for inhalable carbon black dust. The OEL is intended to minimise excessive pollution and effects on lung function.

No PNEC was derived as the substance is very poorly soluble and no ecotoxicity data are available.

8.2 Exposure controls and monitoring

Control of exposure in the workplace:

- Good basic industrial hygiene practice must be applied to any handling of activated carbon outside a container.

Safety controls:

- Work procedures for low oxygen levels should be in place - Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen levels can occur. Whenever workers enter a vessel containing activated carbon, the oxygen level in the vessel should be determined beforehand and work procedures for potentially low oxygen areas should be followed. Alternatively, the room can be fitted with oxygen content sensors with an alarm setting at 18 vol%.

Technical measures to prevent exposure:

- For industrial and commercial use of granular activated carbon and slurries of granular activated carbon, no engineering controls to prevent exposure are required.
- For industrial use of powdered activated carbons stored in high containment with only occasional possibility of exposure, no engineering controls are required.
- For commercial use of powdered activated carbons stored in high containment with up to no possibility of exposure, no engineering controls are required.

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- Provide local exhaust ventilation with a minimum efficiency of 90% for all activities.

Personal protective equipment:

- No personal protective equipment is required when handling non-pulverised or slurried activated carbon.
- Respiratory protection: Use a half-face mask equipped with a P2 filter (minimum efficiency of 90%) or better for handling powdered activated carbon (high skeleton density). Reduce dust exposure to a minimum.
- Hand protection: No uses requiring hand protection have been specifically identified, but the use of gloves is recommended as good working practice.
- Eye protection: Wear safety goggles with side shields if contact with powdered activated carbon may occur.
- Body protection: Standard protective clothing.

8.3 Environmental precautions

Product-related measures to prevent exposure:

- Local exhaust ventilation to remove material at source
- Storage in containers
- Regulated waste disposal

Training measures to prevent exposure:

- Incorporation of ISO 14001
- Appropriate documentation such as work instruction procedures

Organisational measures to prevent exposure:

- Education of the workforce
- Regular process review
- Environmental audits carried out by certified personnel

Technical measures to prevent exposure: none

8.4 Control of consumer exposure

Normal use of activated carbon (high skeletal density) in household products sold as filter products is safe under all foreseeable circumstances.

Section 9 **Physical and chemical properties**

9.1 Information on basic physical and chemical properties

Appearance

Form: Solid

Colour: Black

Odour: Odourless

Important health, safety and environmental information

Basic safety data

Endpoint	Value	Method	Remark
pH (20 °C):	8 - 9		
Melting point/melting range (°C)	> 1000		The melting point of activated carbon (high skeleton density) is estimated to be well above 1000 °C in an inert environment.

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Boiling point/boiling range (°C)	> 1000		The boiling point of activated carbon (high skeleton density) is estimated to be well above 1000 °C in an inert environment.
Flash point (°C)	-		
Ignition temperature (°C)	350 - 450		
Vapour pressure (°C)	-		
Skeleton density (g/cm ³)	2,10 - 2,20		
Bulk density (kg/m ³)	480 - 500		
Water solubility (20 °C in g/L)	0		The water solubility of activated carbon (high skeleton density) was determined according to OECD guideline 105 according to GLP using the column elution method. The substance was found to be insoluble in water at pH 6.8 and a temperature of 20 °C.
Partition coefficient n-octanol/water (log P _{ow})	-		The water solubility of activated carbon (high skeleton density) was determined according to OECD guideline 105 in accordance with GLP using the column elution method. It was found that the substance is insoluble in water at pH 6.8 and a temperature of 20 °C.
Viscosity, dynamic (mPa-s)	-		The substance is a solid.
Explosion limits for dust explosion hazard: - Lower - Upper	-		

9.2 Other information

The physical and chemical properties of the spent material may differ from those of the virgin activated carbon (fresh carbon).

Section 10 Stability and reactivity

10.1 Reactivity

This product shows no reactivity under the specified conditions of storage, transport and use.

10.2 Chemical stability

This product is stable under the specified conditions of storage, transport and use.

10.3 Possibility of hazardous reactions

Contact with strong oxidising agents e.g. chlorine, liquid oxygen, permanganate, ozone can lead to rapid combustion / possible explosion.

10.4 Conditions to avoid

Keep working temperatures below 70 °C. Do not store in direct sunlight.

10.5 Incompatible materials

Keep away from strong oxidising agents and strong acids.

10.6 Hazardous decomposition products

Carbon monoxide or carbon dioxide.

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Section 11 Toxicological information

11.1 Toxicokinetics, metabolism and distribution

Based on the physical and chemical properties of activated carbon, the lack of effects in toxicological studies and the therapeutic use of activated carbon as an adsorbent for the treatment of acute poisoning and acute diarrhoea, it can be expected that activated carbon (high skeletal density) is not absorbed by the oral, dermal and inhalation routes.

Toxicological data for humans

This information is not available and it is not a standard requirement under REACH.

11.2 Acute effects (toxicity tests)

	Active dose	Species	Method	Remark
Acute oral toxicity	LD50: > 2000 mg/kg bw (female) (No treatment-related effects were observed.)	Rat, female	OECD Guideline 423 (Acute oral toxicity - Acute toxic class method) EU method B.1 tris (Acute oral toxicity - Acute toxic class method)	reliable without restriction
Acute dermal toxicity	No data available	-	-	In accordance with column 2 REACH Annex VII: no acute dermal toxicity study (required in section 8.5) needs to be conducted as acute oral and inhalation toxicity studies are available.
Acute inhalation toxicity	LC0 (1 h): 64.4 mg/L air (nominal) or 8.5 mg/L air (analytical) (male/female) (No fatalities, but several effects were observed (fur contamination, general stress, lung rales, weight loss, lung discolouration)) LC100 (1 h): 235 mg/L air (nominal) (All animals died (initial test))	Rat	equivalent or similar to OECD Guideline 403 (Acute Inhalation Toxicity)	reliable with restrictions

Specific target organ toxicity, (STOT)

No information available on individual organ toxicities.

Specific symptoms in animal studies:

After ingestion: none

After skin contact: none

After inhalation: Weight loss, irritation of the respiratory mucosa and - at necropsy - lung discolouration were observed. The LC50 value for the inhalation route was determined to be > 8.5 mg/L.

After eye contact: none

Irritant/corrosive effect:

	Exposure time	Species	Evaluation	Method	Remark
Primary irritation to the skin:	4 hrs	rabbit	not irritating	OECD Guideline 404	reliable with restrictions
Irritation of the eyes		rabbit	not irritating	OECD Guideline 405 (Acute eye irritation/corrosion) (2002)	reliable without restriction

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	Exposure time	Species	Evaluation	Method	Remark
				EU Method B.5 (Acute toxicity: eye irritation/corrosion) (2008)	

Irritation of the respiratory tract: no data available

Sensitisation

In contact with skin: not sensitising

If inhaled: no data available

Repeated dose toxicity (subacute, subchronic, chronic)

	Active dose	Value	Exposure period	Species	Method	Evaluation	Remark
Chronic inhalative		no NOAEC identified	7 h/day for 5 days/week for 1 year.	Rat Guinea pig Mouse	Non-standardised method		Study not reliable.

CMR effects (carcinogenic, mutagenic and toxic for reproduction).

Carcinogenicity:	No data available.
In-vitro mutagenicity:	No data available.
Genotoxicity:	No data available.
In vivo mutagenicity:	No data available.
Germ cell mutagenicity:	Negative with and without metabolic activation
Reproductive toxicity:	No data available.

Summarised assessment of CMR properties:

All 3 in vitro key studies show that the substance has no genotoxic potential. Therefore, it can be concluded that the substance is not mutagenic and therefore does not need to be classified for mutagenicity according to the criteria in Annex I of Regulation 1272/2008/EC (CLP/EU-GHS) and Annex VI of Directive 67/548/EEC.

Three in vitro genotoxicity studies have shown that the substance has no genotoxic properties (non-mutagen cat. 3) and a supporting chronic toxicity study in three species has shown no systemic effects (hyperplasia and/or preneoplastic lesions).

11.3 Experience from practice

Observations relevant to classification: none

Further observations: none

11.4 General remarks

none

Section 12 **Environmental information**

12.1 Toxicity

No data available. As activated carbon is highly insoluble in water, no toxicity is expected.

12.2 Persistence and degradability

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Activated carbon (high skeletal density) is a solid inorganic material and is not amenable to degradation by natural chemical or enzymatic processes.

Activated carbon (high skeleton density) is only degraded under extreme conditions - such as heating under reflux with mixtures of concentrated sulphuric acid/nitric acid - when the carbon eventually oxidises to CO₂. Activated carbon (high skeletal density) cannot be converted into a soluble, absorbable form. Therefore, activated carbon (high skeletal density) cannot find its way to any cell site where it could conceivably be biodegraded. Furthermore, biodegradability testing is not feasible as the substance is insoluble in water.

The bioaccumulation study was omitted as the substance does not have a log K_{ow} (the substance is an inorganic substance or can be considered to behave like an inorganic substance). In addition, the size of the substance will prevent it from passing through the membranes, as the substance consists of particles > 0.5 µm in size. The particles are not soluble in water.

12.3 Bioaccumulative potential

The substance has a very low potential for bioaccumulation in aquatic organisms (e.g. fish), i.e. a BCF < 10.

12.4 Mobility in soil

Known or predicted distribution in the environmental compartments: -

Surface tension: No information available as the material is insoluble.

Adsorption/desorption:

Adsorption/desorption studies are not technically feasible as the substance is not soluble in water or organic solvents; and analysis is not possible as no distinction can be made between C of the activated carbon (high skeletal density) and C of the sediment/soil in the analysis. Furthermore, activated carbon (high skeleton density) consists largely of elemental carbon and is chemically inert. No further biodegradation will occur.

12.5 Result of the PBT and vPvB assessment

As activated carbon (high skeleton density) is considered to be an inorganic substance, a PBT assessment is not applicable.

12.6 Other adverse effects

A water slurry containing large amounts of activated carbon (high skeletal density) may have high pH values.

Section 13 **Disposal considerations**

13.1 Waste treatment methods

There are no specified disposal methods for virgin activated carbon (fresh carbon). Do not allow to enter the sewage system.

13.2 Waste codes / waste designations according to EWC / AVV

Waste code: EWC 15.02.03

13.3 Suitable packaging

Big bag with inlay

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13.4 Further information

Spent activated carbon may require special disposal/packaging instructions.

Section 14 Transport information

ADR/RID	The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a volume of 3 m ³ or less (3 m ³ maximum)
AND	The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m ³ (3 m ³ maximum)
IMDG/IMO	The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m ³ (3 m ³ maximum)
ICAO/IATA	The product is not dangerous in the sense of the transport regulations for packaging units packaging units with a maximum volume of 3 m ³ (3 m ³ maximum)

Environmental hazards

Not classified as dangerous for the environment for transport.

Special precautions for user

Wet activated carbon consumes oxygen from the air, therefore dangerously low oxygen concentrations may occur. Whenever workers enter a container of activated carbon, the oxygen level in the container should be determined beforehand and work procedures for potentially low oxygen areas should be followed. Do not place big bags with activated carbon on a wet surface.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

14.1	<u>UN number or ID number</u> ADR / RID / ADN, IMDG, IATA	not applicable
14.2	<u>UN proper shipping name</u> ADR / RID / ADN, IMDG, IATA	not applicable
14.3	<u>Transport hazard classes</u> ADR / RID / ADN, IMDG, IATA	not applicable
14.4	<u>Packaging group</u> ADR / RID / ADN, IMDG, IATA	not applicable
14.5	<u>Environmental hazards</u> ADR / RID / ADN, IMDG, IATA	not applicable

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14.6 Special precautions for user

not applicable

14.7 Transport in bulk by sea according to IMO instruments

not applicable

- Transport / further information: no dangerous goods according to the above regulations
- UN "Model Regulation": not applicable

Section 15 Legal provisions

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations:

Authorisations and/or restrictions on use

- Authorisations: none
- Restrictions on use: none
- Other EU regulations: none

National regulations:

none

15.2 Chemical safety assessment

Chemical safety assessment: A chemical safety assessment has been carried out in accordance with the rules prescribed in the REACH Regulation. The annexes contain an overview of the risk management measures based on this assessment.

Section 16 Other information

The information is based on our current knowledge, but does not constitute a guarantee of product properties and does not establish a contractual legal relationship.

This safety data sheet complies with Regulation (EC) No 1272/2008 [CLP], Article 31 as amended by Regulation (EU) 2020/878.

16.1 Changes in this version

Rev. 1.5; new creation: 15/08/2024

Inclusion of the UFI code.

Adaptation of the ingredients.

Adaptation of the form to the ECHA Guidance version 4.0/12/20.

16.2 Abbreviations and acronyms

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement on the Transport of Dangerous Goods by Road). Agreement on the International Carriage of Dangerous Goods by Road)

AwSV: Ordinance on Installations for the Handling of Substances Hazardous to Water

AVV: Waste Catalogue Ordinance

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CAS: Chemical Abstracts Service

CLP: Classification, Labelling and Packaging of substances and mixtures

DNEL: Derived No Effect Level

d: day(s)

EWC: European Waste Catalogue according to the draft Waste Catalogue Ordinance

EINECS: European INventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

ECHA: European Chemicals Agency

EWC: European Waste Catalogue

IARC: INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)

ICAO: International Civil Aviation Organisation

ICAO-TI: Technical Instructions by the "International Civil Aviation Organisation" (ICAO)

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

GefStoffV: Ordinance on Hazardous Substances (Germany)

h: hour

LOAEL: Lowest observed adverse effect level

LOAEC: Lowest observed adverse effect concentration

LC50: Lethal concentration, 50 per cent

LD50: Lethal dose, 50 per cent

NOAEL: No observed adverse effect level

NOAEC: No observed adverse effect concentration

NLP: No-Longer Polymers

N/A: not applicable

OECD: Organisation for Economic Co-operation and Development

PNEC: predicted no effect concentration

PBT: Persistent bioaccumulative toxic

(Regulations Concerning the International Transport of Dangerous Goods by Rail)

REACH: Registration, Evaluation, Authorisation of Chemicals

SVHC: substance of very high concern

TRGS: Technical Rules for Hazardous Substances

UN/NU: United Nations (United Nations)

VOC: Volatile Organic Compounds

VwVwS: Administrative regulation for substances hazardous to water

WGK: Water hazard class

Classification of mixtures and assessment method used in accordance with Regulation (EC) No. 1272/2008 [CLP]

Classification	Classification method
Resp. Sens. 1; H334	Calculation method
Skin Sens. 1; H317	Calculation method
Muta. 2; H341	Calculation method
Carc. 1A; H350i	Calculation method
Repr. 1B; H360D	Calculation method
STOT RE 1; H372	Calculation method
Aquatic Chronic 2; H411	Calculation method

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16.3 Important literature and data sources

Regulation (EC) No 1272/2008 [CLP]

Regulation (EU) 2020/878

ECHA Guidance version 4.0/12.20

Training advice

Basic training on the hazards of the substance and the use of risk management measures is required.

Recommended restrictions on use

Avoid contact with strong oxidising agents (and strong acids).

Exposure	Industrial use:	Commercial use:	Private use:
Human, oral, short-term:	0	0	0
Human, oral, long-term/repeated:	0	0	0
Human, dermal, short-term:	+	+	+
Human, dermal, long-term/repeated:	+	+	+
Human, inhalation short-term:	+	+	+
Human, inhalation, long-term/repeated:	+	+	+
Environment, water, short-term/one-time:	+	+	+
Environment, water, continuous:	+	+	+
Environment, air, short-term/once:	+	+	+
Environment, air, continuous:	+	+	+
Environment, soil, short-term/once:	+	+	+
Environment, soil, continuous:	+	+	+

Recommended use (+)

Use advised against (-)

Use not identified (0)

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----- END OF SAFETY DATA SHEET -----

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Sulphared

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Relevant uses

Binding of hydrogen sulfide from gases

1.2.2 Uses advised against

None known.

1.3 Details of the supplier of the safety data sheet

Company

HeGo Biotec International GmbH
Goerzallee 305b
14167 Berlin / GERMANY
Phone +49 30 – 847 185 50
Fax +49 30 – 847 185 60
Homepage www.hego-biotec.com
E-mail info@hego-biotec.com

Address enquiries to

Technical information

info@hego-biotec.com

Safety Data Sheet

sdb@chemiebuero.de (No dispatch of safety data sheets)

Safety data sheets are available from the supplier.

1.4 Emergency telephone number

Advisory body

Call NHS 111 or a doctor

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture [REGULATION (GB) CLP]

No classification.

2.2 Label elements

Hazard pictograms none

Signal word none

Hazard statements none

Precautionary statements none

2.3 Other hazards

Human health dangers Frequent persistent contact with the skin can cause skin irritation.
Contains no ingredients with endocrine-disrupting properties.

Environmental hazards Does not contain any PBT or vPvB substances.

Other hazards Further hazards were not determined with the current level of knowledge.

SECTION 3: Composition / Information on ingredients

3.1 Substances

not applicable

3.2 Mixtures

Comment on component parts

- Substance(s) exempted from the registration requirement (Title II) according to the REACH-Regulation 1907/2006/EC (e) (Art. 2 paragraph 7 sub-section d, or Art. 2 paragraph 7 sub-section b, as they accord with Appendix V Point 7 or Point 8).
No dangerous components.

SECTION 4: First aid measures

4.1 Description of first aid measures

General information

Change powdered clothing.

Inhalation

Ensure supply of fresh air.
In the event of symptoms seek medical treatment.

Skin contact

When in contact with the skin, clean with soap and water.
Consult a doctor if skin irritation persists.

Eye contact

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

Ingestion

Seek medical advice immediately.
Rinse out mouth and give plenty of water to drink.

4.2 Most important symptoms and effects, both acute and delayed

Irritant effects

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media

Product itself is non-combustible. Fire extinguishing method of surrounding areas must be considered.

Extinguishing media that must not be used

Full water jet.

5.2 Special hazards arising from the substance or mixture

Risk of formation of toxic pyrolysis products.

5.3 Advice for firefighters

Use self-contained breathing apparatus.

Fire residues and contaminated firefighting water must be disposed of in accordance within the local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.
Avoid dust formation.
Use personal protective equipment.

6.2 Environmental precautions

Do not discharge into the drains/surface waters/groundwater.

6.3 Methods and material for containment and cleaning up

Take up mechanically.
Avoid raising dust.
Dispose of absorbed material in accordance within the regulations.

6.4 Reference to other sections

See SECTION 8+13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Provide vacuuming if dust raised.
Avoid the formation and deposition of dust.

Do not eat, drink, smoke or take drugs at work.
Wash hands before breaks and after work.
Use barrier skin cream.
Take off contaminated clothing and wash before reuse.

7.2 Conditions for safe storage, including any incompatibilities

Keep only in original container.
Provide alkali-resistant floor.
Prevent penetration into the ground.
Do not store together with food and animal food/diet.
Keep container tightly closed.
Keep container in a well-ventilated place.
Store in a dry place.

7.3 Specific end use(s)

See product use, SECTION 1.2

SECTION 8: Exposure controls / personal protection

8.1 Control parameters

Ingredients with occupational exposure limits to be monitored (UK)

Substance
Calcium carbonate
CAS: 471-34-1, EINECS/ELINCS: 207-439-9
Long-term exposure: 10 mg/m ³ , Inhalable fraction
Silicon dioxide
CAS: 7631-86-9, EINECS/ELINCS: 231-545-4
Long-term exposure: 6 (total inhalable dust) 2,4 (Respirable fraction) mg/m ³

Ingredients with occupational exposure limits to be monitored EU (2004/37/EG)

not relevant

8.2 Exposure controls

Additional advice on system design	Ensure adequate ventilation on workstation. Measurement methods for taking workplace measurements must meet the performance requirements of DIN EN 482. For example, recommendations are given in the IFA's list of hazardous substances.
Eye protection	Safety glasses. (EN 166:2001)
Hand protection	0,4 mm Butyl rubber, >120 min (EN 374-1/-2/-3). The details concerned are recommendations. Please contact the glove supplier for further information.
Skin protection	Protective clothing (EN 340)
Other	Avoid contact with eyes and skin. Do not inhale dust. Personal protective equipment should be selected specifically for the working place, depending on concentration and quantity handled. The resistance of this equipment to chemicals should be ascertained with the respective supplier.
Respiratory protection	In the event of occupational exposure limits being exceeded or of inadequate ventilation: wear appropriate respiratory protection. Short term: filter apparatus, filter P2. (DIN EN 143)
Thermal hazards	no
Delimitation and monitoring of the environmental exposition	Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Form	pellets
Color	red-brown
Odor	odourless
Odour threshold	not applicable
pH-value	not applicable
pH-value [1%]	8 - 10
Boiling point or initial boiling point and boiling range [°C]	not determined
Flash point [°C]	not applicable
Flammability	not applicable
Lower explosion limit	not applicable
Upper explosion limit	not applicable
Oxidising properties	no
Vapour pressure/gas pressure [kPa]	not applicable
Density [g/cm³]	not determined
Relative density	not determined
Bulk density [kg/m³]	500 - 900
Solubility in water	virtually insoluble
Solubility other solvents	not relevant
Partition coefficient n-octanol/water (log value)	not applicable
Kinematic viscosity	not applicable
Relative vapour density	not applicable
Melting point [°C]	not determined
Auto-ignition temperature [°C]	not self-igniting
Decomposition temperature [°C]	not determined
Particle characteristics	not applicable

9.2 Other information

none

SECTION 10: Stability and reactivity

10.1 Reactivity

No dangerous reactions known if used as directed.

10.2 Chemical stability

The product is stable under standard conditions.

10.3 Possibility of hazardous reactions

Reactions with acids.

10.4 Conditions to avoid

See SECTION 7.2.

10.5 Incompatible materials

Acids

10.6 Hazardous decomposition products

No hazardous decomposition products known.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute oral toxicity Based on available data, the classification criteria are not met.

Product

ATE-mix, oral, > 2000 mg/kg

Acute dermal toxicity Based on available data, the classification criteria are not met.

Product

ATE-mix, dermal, > 2000 mg/kg

Acute inhalational toxicity Based on available data, the classification criteria are not met.

Product

ATE-mix, inhalativ (dust), > 5 mg/l 4h

Serious eye damage/irritation Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Skin corrosion/irritation Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Respiratory or skin sensitisation Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Specific target organ toxicity — single exposure Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Specific target organ toxicity — repeated exposure Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Mutagenicity Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Reproduction toxicity Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Carcinogenicity Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled. Toxicological data of complete product are not available.

Aspiration hazard Does not contain a relevant substance that meets the classification criteria. Based on the available information, the classification criteria are not fulfilled.

General remarks

none

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties Contains no ingredients with endocrine-disrupting properties.

11.2.2 Other information none

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability

Behaviour in environment compartments	not determined
Behaviour in sewage plant	not determined
Biological degradability	not applicable

12.3 Bioaccumulative potential

not applicable

12.4 Mobility in soil

not determined

12.5 Results of PBT and vPvB assessment

Based on all available information not to be classified as PBT or vPvB respectively.

12.6 Endocrine disrupting properties

Contains no ingredients with endocrine-disrupting properties.

12.7 Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Waste material must be disposed of in accordance with the Directive on waste 2008/98/EC as well as other national and local regulations. It is not possible to determine a waste code for this product in accordance with the European Waste Catalogue (EWC) since it is only possible to classify it according to how it is used by the customer. The waste code is to be determined within the EU in liaison with the waste-disposal operator.

Product

Coordinate disposal with the authorities if necessary.
Products are in plastic sacks; flexible intermediate bulk containers are always made of plastic.

Waste no. (recommended) 060603

Contaminated packaging

Uncontaminated packaging may be taken for recycling.

Waste no. (recommended) 150102

SECTION 14: Transport information

14.1 UN number or ID number

Transport by land according to ADR/RID not applicable

Inland navigation (ADN) not applicable

Marine transport in accordance with IMDG not applicable

Air transport in accordance with IATA not applicable

14.2 UN proper shipping name

Transport by land according to ADR/RID	NO DANGEROUS GOODS
Inland navigation (ADN)	NO DANGEROUS GOODS
Marine transport in accordance with IMDG	NOT CLASSIFIED AS "DANGEROUS GOODS"
Air transport in accordance with IATA	NOT CLASSIFIED AS "DANGEROUS GOODS"

14.3 Transport hazard class(es)

Transport by land according to ADR/RID	not applicable
Inland navigation (ADN)	not applicable
Marine transport in accordance with IMDG	not applicable
Air transport in accordance with IATA	not applicable

14.4 Packing group

Transport by land according to ADR/RID	not applicable
Inland navigation (ADN)	not applicable
Marine transport in accordance with IMDG	not applicable
Air transport in accordance with IATA	not applicable

14.5 Environmental hazards

Transport by land according to ADR/RID	no
Inland navigation (ADN)	no
Marine transport in accordance with IMDG	no
Air transport in accordance with IATA	no

14.6 Special precautions for user

Relevant information under SECTION 6 to 8.

14.7 Maritime transport in bulk according to IMO instruments

not relevant

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EEC-REGULATIONS

2008/98/EG (2000/532/EC); 2010/75/EU; 2004/42/EG; (EG) 648/2004; (EC) 1907/2006 (REACH); (EU) 1272/2008; 75/324/EEG ((EC) 2016/2037); (EU) 2020/878; (EU) 2016/131; (EU) 517/2014; (EU) 2019/1148; (EU) 2019/1021, (EU) 2023/707

- Comment on component parts

Substances of Very High Concern - SVHC: substances are not contained or are below 0.1%.

- Annex I (REACH)

The product is not subject to Annex I restrictions.

- Annex XIV (REACH)

According to Annex XIV of Regulation (EC) 1907/2006 (REACH) the product does not contain any substances $\geq 0.1\%$ that are subject to authorisation.

- Annex XVII (REACH)

According to Annex XVII of Regulation (EC) 1907/2006 (REACH) the product does not contain any substances $\geq 0.1\%$ that are restricted.

According to Annex XVII of Regulation (EC) 1907/2006 (REACH) the product is not subject to any restrictions.

TRANSPORT-REGULATIONS

ADR (2023); IMDG-Code (2023, 41. Amdt.); IATA-DGR (2024)

NATIONAL REGULATIONS (UK):

EH40/2005 Workplace exposure limits (Second edition, published December 2011); UK REACH; GB CLP.

- Observe employment restrictions for people

none

- VOC (2010/75/CE)

0%

15.2 Chemical safety assessment

not applicable

SECTION 16: Other information

16.1 Abbreviations and acronyms:

ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route
RID = Règlement concernant le transport international ferroviaire de marchandises dangereuses
ADN = Accord européen relatif au transport international des marchandises dangereuses par voie de navigation intérieure
ATE = acute toxicity estimate
CAS = Chemical Abstracts Service
CLP = Classification, Labelling and Packaging
DMEL = Derived Minimum Effect Level
DNEL = Derived No Effect Level
EC50 = Median effective concentration
ECB = European Chemicals Bureau
EEC = European Economic Community
EINECS = European Inventory of Existing Commercial Chemical Substances
EL50 = Median effective loading
ELINCS = European List of Notified Chemical Substances
EmS = Emergency Schedules
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC-Code = International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
IC50 = Inhibition concentration, 50%
IMDG = International Maritime Code for Dangerous Goods
IUCLID = International Uniform Chemical Information Database
IVIS = In vitro irritation score
LC50 = Lethal concentration, 50%
LD50 = Median lethal dose
LC0 = lethal concentration, 0%
LOAEL = lowest-observed-adverse-effect level
LL50 = Median lethal loading
LQ = Limited Quantities
MARPOL = International Convention for the Prevention of Marine Pollution from Ships
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
PBT = Persistent, Bioaccumulative and Toxic substance
PNEC = Predicted No-Effect Concentration
REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals
STP = Sewage Treatment Plant
TLV®/TWA = Threshold limit value – time-weighted average
TLV®STEL = Threshold limit value – short-time exposure limit
VOC = Volatile Organic Compounds
vPvB = very Persistent and very Bioaccumulative

16.2 Other information

Classification procedure

Modified position 8.2, 15.1

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Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH)

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifiers

Citric Acid

REACH registration No.: 02-2119773813-30-xxxx

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/ preparation: Product for Winetreatment.

1.3. Details of the supplier of the safety data sheet

Supplier (manufacturer/importer/
downstream user/distributor): Eaton Technologies GmbH

Begerow Product Line
An den Nahewiesen 24
55450 Langenlonsheim

Telephone: +49 6704 204-0

Telefax: +49 6704 204-121

E-mail (competent person): SDB@Eaton.com

Dept. responsible for information: Produktmanagement
Only available during office hours.

Information telephone: +49 6704 204-0

1.4. Emergency telephone number

Dept. responsible for information: Emergency medical information: Giftinformationszentrum Mainz
(German and English).

Emergency telephone: +49 (6131) 19240

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to EC regulation 1272/2008 (CLP):

Causes serious eye irritation.

Classification according to Directive 67/548/EEC or 1999/45/EC:

Irritating to eyes.

2.2. Label elements

Labelling (67/548/EEC or 1999/45/EC):

Hazard symbol(s) and hazard identifier(s) for dangerous materials and preparations:

Xi



R phrases:

R phrases	
R36	Irritating to eyes.

Citric Acid

Revision date: 06.12.2010 / 09.10.2012 Version: 2 Date of print: 08.10.2013

S-phrases:

S-phrases	
S24/25	Avoid contact with skin and eyes.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Labelling (CLP)

Hazard pictograms: GHS07



Signal word: Warning

Hazard statements:

Hazard statements:	
H319	Causes serious eye irritation.

Safety precautions:

Safety precautions:	
P264.1	Wash hands thoroughly after handling.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313	If eye irritation persists: Get medical advice/attention.

2.3. Other hazards**Possible harmful physico-chemical effects:**

The product in the delivered form is not dust explosion capable; the enrichment of fine dust however leads to the danger of dust explosion.

SECTION 3: Composition / Information on ingredients**Chemical characterization (preparation):**

2-hydroxy-1,2,3-propantricarbonsäure, Citric Acid

3.1. Substances**3.2. Mixtures****Hazardous ingredients:**

CAS No.	EC No	Chemical name:/ REACH registration No.	of (%)	up to (%)	Unit/ Content	Hazard symbol(s)	R phrases	INDEX no.
5949-29-1		Citronensäure-Monohydrat 02-2119773813-30-0000		100	%	Xi	36	

Full text of R-phrases: see section 16.

Labelling (CLP):

CAS No.	EC No	Chemical name:/ REACH registration No.	Hazard pictograms	Signal word	Hazard statements
5949-29-1		Citronensäure-Monohydrat 02-2119773813-30-0000	GHS07	Warning	319

Full text of H-phrases: see section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

After inhalation:

Provide fresh air. In case of respiratory tract irritation, consult a physician.

In case of skin contact:

After contact with skin, wash immediately with plenty of water and soap. In case of skin irritation, consult a physician.

Change contaminated, saturated clothing.

In case of eye contact:

In case of contact with eyes, rinse immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart. Subsequently consult an ophthalmologist.

After ingestion:

Rinse mouth immediately and drink plenty of water. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

4.2. Most important symptoms and effects, both acute and delayed

Symptoms: irritant.

Response: Irritating to eyes.

4.3. Indication of any immediate medical attention and special treatment needed

Information to physician:

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:

Water. Carbon dioxide (CO₂). Water mist. Foam. Extinguishing powder.

Extinguishing media which must not be used for safety reasons:

High power water jet.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards arising from the substance or preparation itself, its combustion products or from resulting gases:

In case of fire may be liberated: Carbon monoxide. Carbon dioxide (CO₂). Pyrolysis products, toxic.

In case of fire and/or explosion do not breathe fumes.

5.3. Advice for firefighters

Special protective equipment for firefighters:

In case of fire: Wear self-contained breathing apparatus.

Additional information:

Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Dispose of waste according to applicable legislation.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Personal precautions:

Provide for sufficient ventilation and punctiform suction at critical points.

Avoid generation of dust. Do not breathe dust. Avoid contact with skin, eyes and clothes.

6.1.2. For emergency responders

6.2. Environmental precautions

Do not allow to enter into soil/subsoil.

Knock down dust with water spray jet.

Do not allow to enter into surface water or drains.

6.3. Methods and material for containment and cleaning up**Methods for cleaning up:**

Take up mechanically.

Wash with plenty of water.

Treat the recovered material as prescribed in the section on waste disposal.

6.4. Reference to other sections

SECTION 7: Handling and storage

7.1. Precautions for safe handling**Advices on safe handling:**

Avoid generation of dust. Provide for sufficient ventilation and punctiform suction at critical points. Avoid contact with skin, eyes and clothes.

Precautions against fire and explosion:

Avoid generation of dust. Explosive dust-air mixtures may form.

Keep away from sources of ignition - No smoking.

7.2. Conditions for safe storage, including any incompatibilities**Requirements for storerooms and containers:**

Keep container tightly closed in a cool, well-ventilated place. Keep only in the original container. Keep container dry. Protect from moisture.

Storage temperature: 10-25 °C

Hints on joint storage:

Do not store together with: Alkalis (alkalis). Oxidizing agents, Solvents

Further information on storage conditions:

Suitable floor material: Acid-resistant.

Storage class: 11

7.3. Specific end use(s)

SECTION 8: Exposure controls/personal protection

8.1. Control parameters**8.2. Exposure controls****8.2.1. Appropriate engineering controls****Technical measures:**

Provide for sufficient ventilation and punctiform suction at critical points.

To follow: Occupational exposure limit values:

8.2.2. Personal protective equipment

Respiratory protection: Respiratory protection necessary at/for: Generation/formation of dust high concentrations

Suitable respiratory protection apparatus: Filtering device (DIN EN 147). P 1

Suitable material: The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

Wearing time with permanent contact: Butyl caoutchouc (butyl rubber).

Penetration time (maximum wearing period): > 120 min

Eye protection: Tightly sealed safety glasses.

Body protection: Take off immediately all contaminated clothing.

Avoid contact with skin and eyes.

Protect skin by using skin protective cream.

General protection and hygiene measures:

Keep away from food, drink and animal feeding stuffs. When using do not eat, drink, smoke, sniff. Wash hands before breaks and after work.

8.2.3. Environmental exposure controls:

Citric Acid

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SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Physical state: crystalline
Colour: transparent; whitish
Odour: odourless

Important health, safety and environmental information:

		Unit		Method
pH:	1,8		at °C 25	5 %
Melting point / melting range:	153	°C		
Flash point (°C):	345	°C		
Oxidizing characteristics:	Not oxidising.			
Density:	1,665	g/ml	at °C 20	
Bulk density:	850 - 950	kg/m³		

9.2. Other information**SECTION 10: Stability and reactivity****10.1. Reactivity**

This article doesn't contain dangerous substances or preparations intended to be released under normal or reasonably foreseeable conditions of use.

10.2. Chemical stability

Substance is, under normal conditions, chemically stable.

10.3. Possibility of hazardous reactions

Danger of dust explosion.

10.4. Conditions to avoid

Keep away from heat.

10.5. Incompatible materials

Response: Oxidising agent. Reducing agent. Base.
 Corrosive to metals.

10.6. Hazardous decomposition products

Carbon oxides

SECTION 11: Toxicological information**11.1. Information on toxicological effects****Acute toxicity:**

CAS No.	Chemical name	LD50: oral	Unit	Species	LD50: dermal	Unit	Species	LC50: inhalat iv	Unit	Species
5949-29-1	Citronensäure-Monohydrat	5400	mg/kg	Mouse.	>2000	mg/kg	Rat.			

CAS No.	Chemical name	Method: oral	Method: dermal	Method: inhalativ	h	Remark
5949-29-1	Citronensäure-Monohydrat					Data apply to the technically active substance.

Irritant and corrosive effects:

Rabbit.
 Irritant effect on the skin: mild irritant.
 Irritant effect on the eye: irritant.

Sensitisation:

not determined

Citric Acid

Revision date: 06.12.2010 / 09.10.2012 Version: 2 Date of print: 08.10.2013

Repeated dose toxicity:

not determined

CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction):

not determined

SECTION 12: Ecological information

12.1. Toxicity**Aquatic toxicity:**

Acute fish toxicity:

Leuciscus idus (golden orfe) LC50: 96 h: 440-760 mg/l, OECD 203

Acute Daphnia toxicity:

Daphnia magna LC50: 24h: 1535 mg/l

Daphnia magna EC50: 72 h: 120 mg/l

Effects in sewage plants:

Product is acid. Before discharge into sewage plants the product normally needs to be neutralised.

Further details:

Do not allow to enter into surface water or drains.

12.2. Persistence and degradability**Method:**

According to the present state of knowledge negative ecological effects are not expected.

Further details:

Readily biodegradable (according to OECD criteria)

12.3. Bioaccumulative potential**12.4. Mobility in soil****12.5. Results of PBT and vPvB assessment**

This substance does not meet the criteria for classification as PBT or vPvB.

12.6. Other adverse effects

Biochemical oxygen demand (BOD): 526 mg/g

SECTION 13: Disposal considerations

13.1. Waste treatment methods**Recommendation:**

The disposal of the product has to be carried out in accordance with the legal requirements. EWC waste codes are strictly industry-oriented, therefore waste classification has to be done by the waste producer.

Contaminated packaging:**Recommendation:**

Non-contaminated packages may be recycled.

SECTION 14: Transport information

14.1. Land transport (ADR/RID)**14.2. Inland waterway craft (ADN/ADNR)****14.3. Sea transport (IMDG)****14.4. Air transport (ICAO-TI / IATA-DGR)****14.5. Additional information:**

No dangerous good in sense of these transport regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Störfallverordnung:

Unterliegt nicht der StörfallV.

Water Hazard Class: 1 **Source:** Anh. 2, Nr.

Other regulations (EU):

For this substance a chemical safety assessment has been carried out.

15.2. Chemical Safety Assessment

SECTION 16: Other information

Further remarks:

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.

E-mail (competent person):

SDB@Eaton.com

Relevant R-and H-phrases (Number and full text):

R phrases	
R36	Irritating to eyes.

Hazard statements	
H319	Causes serious eye irritation.

Safety data sheet
in accordance with 1907/2006/EC,
Article 31

Print date: 03.01.2023

Version No. 6 (replaces version 5)

Revised on: 03.01.2023

SECTION 1: Identification of the substance or mixture and of the company

1.1 Product identifier

Trade name: Sulphuric acid t.r. 50%

Item number: H1000146203002

CAS number: 7664-93-9

EINECS number: 231-639-5

Index number: 016-020-00-8

REACH registration number 01-2119458838-20

UFI: 39U1-S04T-U004-17DX

1.2 Relevant identified uses of the substance or mixture and uses advised against

For details of the identified uses in accordance with Regulation (EC) No. 1907/2006, see the appendix to this safety data sheet.

Use of the substance/mixture Basic substance with no specifically defined use Industrial/commercial use

1.3 Details of the supplier providing the safety data sheet

Manufacturer/supplier:

Julius Hoesch GmbH & Co. KG

Birkesdorfer Straße 5

D-52353 Düren - Hoven Tel.:

+49 (0) 2421-807-0

Fax:

www.julius-hoesch.de

Email info@julius-hoesch.de

Information provided by: Product Safety Department

1.4 Emergency number:

Medical emergency information in case of poisoning:

Mainz Poison Information Centre – 24 hours – Tel.: +49 (0) 6131 19240 (advice in German or English)

SECTION 2: Possible hazards

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008

Met. Corr.1 H290 May be corrosive to metals.

Skin Corr. 1A H314 Causes severe skin burns and serious eye damage. Eye Dam. 1 H318

Causes serious eye damage.

2.2 Labelling elements

Labelling according to Regulation (EC) No. 1272/2008

The product is classified and labelled in accordance with the CLP Regulation.

(Continued on page 2)

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Hazard pictograms



GHS05

Signal word Danger

Hazardous components for labelling:

Sulphuric acid

Hazard statements

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

Safety advice

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothes immediately. Wash skin with water [or shower].

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 Immediately call a POISON CENTRE/doctor.

P406 Store in a corrosion-resistant container/container with corrosion-resistant inner lining.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards

Results of PBT and vPvB assessment PBT: Not applicable.

vPvB: Not applicable.

Identification of endocrine-disrupting properties

The substance/mixture does not contain any components in quantities of 0.1% or more that have endocrine-disrupting properties according to REACH Article 57(f) or Commission Delegated Regulation (EU) 2017/2100 or Commission Delegated Regulation (EU) 2018/605.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Description: Aqueous solution of the following substances

Hazardous ingredients:

CAS: 7664-93-9

EINECS: 231-639-5

Reg. No.: 01-2119458838-20

Sulphuric acid

Skin Corr. 1A, H314

Specific concentration limits:

Skin Corr. 1A; H314: $C \geq 15\%$ Skin

Irrit. 2; H315: $5\% \leq C < 15\%$ Eye

Irrit. 2; H319: $5\% \leq C < 15\%$

50

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Trade name: Sulphuric acid t.r. 50%

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SVHC

This product does not contain any substances of very high concern (REACH Regulation (EC) No. 1907/2006, Article 57).

Additional information:

The wording of the hazard statements listed can be found in Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General information:

Remove clothing contaminated with the product immediately. Self-protection of the first aider (body, eye and respiratory protection). **After inhalation:**

Fresh air, artificial respiration if necessary, warmth. Consult a doctor if symptoms persist. If unconscious, place in recovery position and transport.

After skin contact:

Wash off immediately with soap and water and rinse thoroughly. Immediate medical attention is necessary, as untreated chemical burns can lead to wounds that are difficult to heal.

After eye contact:

Rinse eyes with running water for several minutes, keeping eyelids open. Remove contact lenses.

Protect the uninjured eye.

Consult a doctor immediately.

After swallowing:

Rinse mouth and drink plenty of water. Do not induce vomiting; seek medical assistance immediately. **Information**

for the doctor:

If swallowed: do not use sodium hydrogen carbonate NaHCO_3 or calcium carbonate CaCO_3 for neutralisation, as the carbon dioxide CO_2 produced can lead to stomach perforation. Allow the patient to slowly drink magnesium oxide MgO suspended in water.

After inhaling vapours, inhale dexamethasone spray (Auxiloson).

4.2 Most important acute and delayed symptoms and effects

Burning and pain in the eyes, skin and mucous membranes. After ingestion, severe irritation of the mouth and throat and risk of perforation of the oesophagus.

4.3 Indications for immediate medical attention or special treatment

No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media:

Adapt firefighting measures to the environment.

CO_2 , extinguishing powder or water spray. Fight larger fires with water spray or alcohol-resistant foam.

5.2 Special hazards arising from the substance or mixture

In the event of a fire, the following may be released:

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Sulphur oxides (SO_x)

Reacts with base metals to form highly flammable hydrogen gas.

5.3 Firefighting information

Special protective equipment:

Wear full protective suit with self-contained breathing apparatus.

Further information

Cool endangered containers with water spray.

Collect contaminated extinguishing water separately. Do not allow to enter waterways/groundwater/soil.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away.

Avoid contact with skin, eyes and clothing. Do not breathe vapours. Ventilate affected areas thoroughly. Stop leaks without personal risk.

6.2 Environmental precautions:

Prevent penetration into drains, pits, cellars and waterways. Dilute with plenty of water.

In case of release of large quantities, inform the competent authorities.

6.3 Methods and material for containment and cleaning up:

Absorb with inert liquid-binding material (sand, diatomaceous earth, acid binder, universal binder). Do not use combustible/oxidising substances under any circumstances!

Apply neutralising agent.

For large quantities: pump out the product.

Transfer to suitable containers for recovery or disposal. Dispose of contaminated material as waste in accordance with section 13.

6.4 Reference to other sections

For information on safe handling, see Section 7. For information on personal protective equipment, see Section 8. For information on disposal, see Section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Open and handle containers with care.

When diluting, always add water first and stir in the product. Avoid contact with eyes and skin.

Fire and explosion protection information:

The product is non-flammable.

Compliance with general rules for preventive fire protection in the workplace.

7.2 Conditions for safe storage, taking into account incompatibilities

Storage: Store in well-sealed containers in a cool, dry place.

Requirements for storage rooms and containers:

Observe laws and regulations on the storage and use of water-polluting substances. Only use containers that are specifically approved for the substance/product.

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Trade name: Sulphuric acid t.r. 50%

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Storage information:

Store separately from food.

Keep away from alkalis, metals and organic compounds.

Further information on storage conditions: Keep container tightly closed.

Storage class:

8 B Non-flammable corrosive hazardous substances (TRGS 510, Storage of hazardous substances in portable containers)

Classification according to the Industrial Safety Regulation (BetrSichV):

Substances or mixtures that have a corrosive effect on metals

7.3 Specific end uses No further relevant information available.

SECTION 8: Exposure controls/personal protective equipment

Components with workplace-related limit values to be monitored:
8.1 Parameters to be monitored
CAS: 7664-93-9 Sulphuric acid (≥50-<75%)

AGW (Germany)

Long-term value: 0.1 E mg/m³
1(l);DFG, EU, Y

IOELV (European Union)

Long-term value: 0.05 mg/m³
DNEL values
CAS: 7664-93-9 Sulphuric acid

Inhalation DNEL (worker)

0.1 mg/m³ (acute – local effect)
0.05 mg/m³ (chronic – local effects)

PNEC values
CAS: 7664-93-9 Sulphuric acid

PNEC aqua

0.003 mg/l (freshwater)

0.003 mg/l (seawater)

PNEC

8.8 mg/l (wastewater treatment plant)

PNEC sediment

0.002 mg/kg (freshwater)

0.002 mg/kg (seawater)

Additional information: The lists valid at the time of compilation served as a basis.

8.2 Exposure controls and monitoring
Suitable technical control measures No further information, see Section 7.

Individual protection measures, e.g. personal protective equipment General protective and hygiene measures:

Keep away from drinks, food and animal feed. Remove contaminated, soaked clothing immediately.

Wash hands before breaks and at the end of work. Avoid contact with eyes and skin.

Do not inhale vapours or spray mist.

Respiratory protection Respiratory protection only if aerosols or mists are formed. **Recommended filter device for short-term use:** combination filter E-P2

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Observe wearing time limits and rules for the use of respiratory protective equipment (BGR 190).

Hand protection

Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use.

Glove material

Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

Chloroprene rubber (CR), recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 480 min. Nitrile rubber (NBR), recommended material thickness: ≥ 0.35 mm, breakthrough time: ≥ 480 min.

Polyvinyl chloride (PVC), recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 480 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer. Since the product is a preparation of several substances, the resistance of glove materials cannot be predicted and must therefore be checked before use.

Penetration time of the glove material

Observe the protective glove manufacturer's information on permeability and breakthrough times as well as the specific conditions at the workplace (mechanical stress, contact duration).

Protective gloves should be replaced at the first signs of wear. Our recommendation applies to one-time, short-term use as protection against liquid splashes. For other applications, please consult a glove manufacturer.

Gloves made from the following materials are suitable for prolonged contact:

Fluorinated rubber (Viton) with a layer thickness of 0.7 mm (recommended: protection index 6, corresponding to a permeation time of over 480 minutes according to EN 374).

Please note: the daily usage time of chemical protective gloves may be significantly shorter than the permeation time determined in accordance with EN 374 due to specific conditions in the workplace (mechanical stress, temperature).

Gloves made of the following materials are not suitable: natural rubber (latex) Eye/face

protection Tight-fitting safety goggles.

Body protection:

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this solution.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General information

Colour	Colourless
Odour	Odourless
Odour threshold:	Not determined.
Melting point/freezing point:	< -40 °C
Boiling point or initial boiling point and boiling range	approx. 124 °C
Flammability	Not applicable.
Lower and upper explosion limits	
Lower:	Not determined.
Upper:	Not determined.

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Flash point:	Not applicable; product is not flammable or explosive.
Ignition temperature:	(lowest value of the individual components)
Decomposition temperature:	340 °C
pH value at 20 °C:	< 1
pH value:	
Viscosity:	
Kinematic:	Not determined.
Dynamic:	Not determined.
Solubility	
Water:	Completely miscible
Distribution coefficient n-octanol/water (log-Value)	Not determined.
Vapour pressure:	Not determined.
Density and/or relative density	
Density at 20 °C:	approx. 1.40 g/cm ³
Relative density	Not determined.
Vapour density	Not determined.

9.2 Other information

Appearance:	
Form:	Liquid
Important health, safety and environmental information	
Ignition temperature	The product is not self-igniting.
Explosive properties:	The product is not explosive.
Change in state Softening point or range	
Oxidising properties:	The product is not a fire accelerant.
Evaporation rate	Not determined.

Information about physical hazard classes

Explosive substances/mixtures and products with explosive substances	Not applicable
Flammable gases	Not applicable
Aerosols	Not applicable
Oxidising gases	Not applicable
Gases under pressure	Not applicable
Flammable liquids	Not applicable
Flammable solids	Not applicable
Self-decomposing substances and mixtures	Not applicable
Pyrophoric liquids	Not applicable
Pyrophoric solids	Not applicable
Self-heating substances and mixtures	Not applicable
Substances and mixtures which, in contact with	
Water develops flammable gases	Not applicable
Oxidising liquids	Not applicable
Oxidising solids	Not applicable

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Organic peroxides Substances and mixtures that are corrosive to metals May be corrosive to metals. Desensitised substances/mixtures and products containing explosives	Not applicable Not applicable

SECTION 10: Stability and reactivity

10.1 Reactivity No further relevant information available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:

To avoid thermal decomposition, do not overheat.

10.3 Possibility of hazardous reactions

Violent reactions with strong alkalis and oxidising agents. Corrosive to metals.

When diluting, add acid to water, never vice versa. Reactions with metals to form hydrogen.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials:

base metals alkalis

(lyes)

10.6 Hazardous decomposition products:

Hydrogen Sulphur

oxides (SOx)

SECTION 11: Toxicological information

11.1 Information on hazard classes within the meaning of Regulation (EC) No. 1272/2008

Acute toxicity Based on the available data, the classification criteria are not met.

Classification-relevant LD/LC50 values:

CAS: 7664-93-9 Sulphuric acid

Oral	LD	2,140 mg/kg (rat) (OECD TG 401)

Corrosive/irritant effect on the skin

Causes severe skin burns and serious eye damage.

Serious eye damage/irritation

Causes serious eye damage.

Respiratory/skin sensitisation

Based on the available data, the classification criteria are not met.

Germ cell mutagenicity Based on the available data, the classification criteria are not met.

Carcinogenicity Based on the available data, the classification criteria are not met. **Reproductive toxicity**
Based on the available data, the classification criteria are not met. **Specific target organ toxicity after single exposure**

Based on the available data, the classification criteria are not met.

Specific target organ toxicity after repeated exposure

Based on the available data, the classification criteria are not met.

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Aspiration hazard Based on the available data, the classification criteria are not met.

11.2 Information on other hazards

Endocrine-disrupting properties

None of the ingredients are included.

SECTION 12: Environmental information

12.1 Toxicity

Aquatic toxicity:

CAS: 7664-93-9 Sulphuric acid

LC 50 / 96 h	16-28 mg/l (Lepomis macrochirus)
EC 50 / 48 h	>100 mg/l (Daphnia magna) (OECD 202)
IC 50 / 72 h	>100 mg/l (Desmodesmus subspicatus) (ECD 201)

12.2 Persistence and degradability As an inorganic product, not biodegradable.

12.3 Bioaccumulation potential No bioaccumulation

12.4 Mobility in soil No further relevant information available.

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

12.6 Endocrine-disrupting properties

The product does not contain any substances with endocrine-disrupting properties.

12.7 Other harmful effects

Ecotoxic effects:

Harmful effects on fish, plankton and sessile organisms possible due to pH shift.

Other information:

When discharged in low concentrations into adapted biological sewage treatment plants, no disruption to the degradation activity of activated sludge is to be expected.

Further ecological information:

The product does not cause biological oxygen consumption.

After neutralisation, only the relatively low harmful effect of the salts produced remains. If not neutralised, the pH value must be observed. The toxic effect on fish and bacteria begins below a pH value of 6 and above a pH value of 9.

AOX note: Product does not contain any organically bound halogens that lead to AOX values.

General information:

Must not be allowed to enter groundwater, waterways or the sewage system. Water hazard class 1 (self-assessment): slightly hazardous to water according to AwSV.

SECTION 13: Disposal considerations

13.1 Waste treatment procedures

The following information refers to the product in its original form and not to products that have been further processed. When mixed with other products, different disposal methods may be required; if in doubt, consult the product supplier or local authority.

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Recommendation:

Must not be disposed of with household waste. Do not allow to enter the sewage system. Recycle used product or reuse it where possible. Otherwise, dispose of it at an approved disposal facility, e.g. by neutralisation.

Waste code number:

Since 1 January 1999, waste code numbers have been based not only on the product but also, to a large extent, on its application. The waste code number applicable to the application can be found in the European Waste Catalogue.

Uncleaned packaging: Dispose of in accordance with official regulations.

Recommendation:

Recycling: After emptying completely, seal tightly and return to the supplier without cleaning. Care must be taken to ensure that no foreign substances get into the packaging!

Other containers: Empty completely and clean before reconditioning or recycling.

Recommended cleaning agent: Water, with the addition of cleaning agents if necessary.

SECTION 14: Transport information

14.1 UN number or ID number

ADR, IMDG, IATA

UN2796

14.2 Proper UN shipping name

ADR

2796 SULPHURIC ACID

IMDG, IATA

SULPHURIC ACID

14.3 Transport hazard classes

ADR

Class

8 (C1) Corrosive substances

Hazard label

8

IMDG, IATA

Class

8 Corrosive substances

label

8

14.4 Packaging group

ADR, IMDG, IATA

II

14.5 Environmental hazards:

Not applicable. No

Marine pollutant:
14.6 Special precautions
for the user

Caution: Corrosive substances

Number for labelling
of the hazard (Kemler number):

80

EMS number:

F-A,S-B

Segregation groups

Acids

Stowage category

B

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Segregation code	SG36 Stow "separated from" SGG18-alkalis. SG49 Stow "separated from" SGG6-cyanides

14.7 Transport in bulk by sea according to IMO instruments	Not applicable.

Transport/further information:
ADR

Exempted quantities (EQ):	E2
Limited quantity (LQ)	1L
Exempt quantities (EQ)	Code: E2
	Maximum net quantity per inner packaging: 30 ml
	Maximum net quantity per outer packaging: 500 ml

Transport category

2

Tunnel restriction code

E

IMDG

Limited quantities (LQ)	1L
Excepted quantities (EQ)	Code: E2
	Maximum net quantity per inner packaging: 30 ml
	Maximum net quantity per outer packaging: 500 ml

UN Model Regulation:

UN 2796 SULPHURIC ACID, 8, II

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/specific legislation for the substance or mixture

TSCA (Toxic Substances Control Act)

All ingredients are included.

Canadian Domestic Substances List (DSL)

All ingredients are included.

Philippines Inventory of Chemicals and Chemical Substances (PICCS)

All ingredients are included.

Chinese Chemical Inventory of Existing Chemical Substances (IECSC)

All ingredients are included.

Australian Inventory of Industrial Chemicals (AIIC)

All ingredients are included.

Korean Existing Chemical Inventory (KECI)

All ingredients are included.

New Zealand Inventory of Chemicals (NZIoC)

All ingredients are included.

Taiwan Chemical Substance Inventory (TCSI)

All ingredients are included.

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Japan - Existing Chemical Substances (ENCS)

All ingredients are included.

Directive 2012/18/EU
Specified hazardous substances – ANNEX I (12th BImSchV)

None of the ingredients are included.

REGULATION (EC) No. 1907/2006 ANNEX XVII Restriction conditions: 3

Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment – Annex II

None of the ingredients are included.

REGULATION (EU) 2019/1148
Annex I - RESTRICTED EXPLOSIVE PRECURSORS (Upper concentration limit for authorisation under Article 5(3))

CAS: 7664-93-9 Sulphuric acid

Limit value: >15–≤40%

≥50–<75%

Annex II – SUBSTANCES SUBJECT TO REPORTING REQUIREMENTS FOR EXPLOSIVES

None of the ingredients are included.

Regulation (EC) No. 273/2004 on drug precursors

CAS: 7664-93-9 Sulphuric acid

3

Regulation (EC) No 111/2005 laying down rules for the monitoring of trade between the Community and third countries in drug precursors

CAS: 7664-93-9 Sulphuric acid

3

National regulations:
Notes on employment restrictions:

Observe restrictions on employment for children and young people in accordance with Directive 94/33/EC and the relevant national regulations.

Major Accidents Regulation: Major Accidents Regulation, Annex: not mentioned.

Water hazard class:

WGK 1 (self-classification): slightly hazardous to water according to AwsV.

UBA identification number(s): 182

15.2 Chemical safety assessment: A chemical safety assessment has been carried out.

SECTION 16: Other information

The information is based on our current knowledge, but does not constitute a guarantee of product properties and does not establish a contractual legal relationship.

In accordance with Annex II of EC No. 1907/2006 in the version valid on the date of this safety data sheet.

Registration number:
Relevant phrases

Full text of the hazard statements (H and R phrases) indicated in section 3. These phrases refer only to the ingredients. The labelling of the product is given in section 2.

H314 Causes severe skin burns and eye damage.

Department issuing the data sheet: See department providing information

Date of previous version: 27 November 2020

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Abbreviations and acronyms:

RID: International Regulations Concerning the Transport of Dangerous Goods by Rail

ICAO: International Civil Aviation Organisation

LEV: Local Exhaust Ventilation

RPE: Respiratory Protective Equipment

RCR: Risk Characterisation Ratio (RCR= PEC/PNEC and RCR= Exposure Level/DNEL)

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

IMDG: International Maritime Dangerous Goods Code IATA:

International Air Transport Association

GHS: Globally Harmonised System of Classification and Labelling of Chemicals CLP:

Classification, Labelling and Packaging (Regulation (EC) No. 1272/2008) EINECS:

European Inventory of Existing Commercial Chemical Substances ELINCS: European

List of Notified Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

TRGS: Technical Rules for Dangerous Substances (Technical Rules for Dangerous Substances, BAuA, Germany)

DNEL: Derived No-Effect Level (REACH)

PNEC: Predicted No-Effect Concentration (REACH)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

SVHC: Substance of Very High Concern SVHC:

Substances of Very High Concern

vPvB: Very persistent and very bioaccumulative

Met. Corr.1: Corrosive to metals – Category 1

Skin Corr. 1A: Skin irritant/corrosive effect – Category 1A

Eye Dam. 1: Serious eye damage/eye irritation – Category 1

*** Data changed from previous version ANNEX**

Exposure scenarios:

Use as an intermediate product in the manufacture of inorganic and organic chemicals, including fertilisers (industry)

Use as a processing aid (industrial)

Use in the extraction and processing of minerals and ores (industry) Use in surface treatment (industry)

Use in electrolysis processes (industry) Use in gas purification (industry)

Use in the manufacture of lead-acid batteries (industry) Maintenance of lead-acid batteries (professional users) Recycling of lead-acid batteries (industry)

Use in laboratories (industry) Use in laboratories (commercial)

Use in formulations (industry) Use of lead-acid batteries (consumers)

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Appendix: Exposure scenario 1

Short name of the exposure scenario

Use as an intermediate in the manufacture of inorganic and organic chemicals, including fertilisers (industry)

Use sector

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU4 Manufacture of food and feed

SU6b Manufacture of pulp, paper and paper products

SU8 Manufacture of bulk chemicals (including petroleum products) SU9 Manufacture of fine chemicals

SU14 Metal production and processing, including alloys **Product category PC19**

Chemical intermediates **Process category**

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for only one product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

Environmental release category ERC6a Use as an intermediate

Description of the activities/processes considered in the exposure scenario

See Section 1 in the appendix to the safety data sheet.

SECTION 2: Conditions of use and risk management measures to control exposure

Duration and frequency 5 working days/week.

Employees

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 300,000

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Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Emissions to air: 94.9 kg/day (measured data)

Other conditions of use affecting worker exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC01, PROC02, PROC03, PROC04) The process is completely enclosed. (PROC01, PROC03, PROC8b, PROC09)

Outdoors, not near buildings (PROC01, PROC02, PROC8a, PROC8b) Outdoors, near buildings. (PROC03, PROC04)

Indoors with good natural ventilation. (PROC09) Avoid

contact with eyes

Avoid contact with skin.

Other conditions of use affecting consumer exposure

Keep out of reach of children.

Other conditions of use affecting consumer exposure during the product's lifetime

Not applicable

Risk management measures

Employee protection Organisational

protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Vapour recovery system (PROC02, PROC04, PROC09)

Use exhaust gas recirculation and local extraction (PROC01, PROC03, PROC8b) Complete separation. (PROC01, PROC02)

Ensure suitable extraction at the processing machines.

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, check breathing air with DRÄGER sulphuric acid 1/a test tubes.

Chemical-resistant protective gloves (EN 374)

The gloves must be checked for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this solution.

Tightly fitting safety goggles. **Consumer**

protection measures Ensure adequate labelling.

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Keep locked up and out of the reach of children.

Environmental protection measures

Air An exhaust air purification system, e.g. an air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging waste water into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m³/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

Disposal procedure

Must not be disposed of with household waste. Do not allow to enter the sewage system.

Type of waste Partially emptied and uncleaned containers

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC (RCRs < 1).

Consumer Not relevant for this exposure scenario.

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Appendix: Exposure scenario 2

Short name of the exposure scenario Use as a

processing aid (industry) **Sector of use**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU4 Manufacture of food and feed

SU6b Manufacture of pulp, paper and paper products

SU8 Manufacture of bulk chemicals (including petroleum products) SU9 Manufacture of fine chemicals

SU11 Manufacture of rubber products

SU23 Electricity, steam, gas, water supply and sewage treatment

Product category

PC20 Processing aids such as pH regulators, flocculants, precipitants, neutralising agents

Process category

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for only one product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

PROC13 Treatment of products by dipping and pouring

Environmental release category

ERC6b Use as a reactive processing aid at an industrial site (not incorporated into or onto an article)

SECTION 2: Conditions of use and risk management measures to control exposure

Employees

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

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Amount used per time or activity

Annual tonnage per site (tonnes per year): 100,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Process is completely enclosed. (PROC01, PROC03, PROC08b, PROC09)

Outdoors, not near buildings (PROC01, PROC02, PROC08a, PROC08b) Outdoors, near buildings. (PROC03, PROC04)

Indoors with good natural ventilation. (PROC09, PROC13)

Risk management measures

Employee protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Vapour recovery system (PROC02, PROC04, PROC09)

Use exhaust gas recirculation and local extraction (PROC01, PROC03, PROC08b) Complete separation. (PROC01, PROC02)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, check breathing air with DRÄGER sulphuric acid 1/a test tubes.

Chemical-resistant protective gloves (EN 374)

The glove must be checked for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated waste water should be neutralised before discharge into surface water or a waste water treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

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SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC (RCRs < 1).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1.

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Appendix: Exposure scenario 3

Short name of the exposure scenario

Use for the extraction and processing of minerals and ores (industry)

Use sector

SU2a Mining (except offshore industries)

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU14 Metal production and processing, including alloys

Product category

PC20 Processing aids such as pH regulators, flocculants, precipitants, neutralising agents

PC40 Extraction agents

Process category

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure

Environmental release category

ERC4 Use as a non-reactive processing aid at an industrial site (not incorporated into or onto a product)

ERC6b Use as a reactive processing aid at an industrial site (not incorporated into or onto an article)

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 438

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC03)

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Process is completely enclosed. (PROC03)
Outdoors, not near buildings (PROC02, PROC03, PROC04)

Risk management measures

Employee protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Vapour recovery system (PROC02, PROC04) Use exhaust gas recirculation and local extraction (PROC02) Complete separation. (PROC02)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.
At concentrations above 20% acid, breathing air can be monitored using DRÄGER sulphuric acid 1/a test tubes.
Chemical-resistant protective gloves (EN 374)
Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.
The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.
Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.
Avoid contact with eyes.
Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Environmental protection measures

Air Exhaust air should be cleaned using an exhaust air cleaner, e.g. an air scrubber or filter.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.
All contaminated waste water should be neutralised before discharge into surface water or a waste water treatment plant.
Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:
Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.
The exposure assessment was carried out according to the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.
Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1 .

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Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 4

Short name of exposure scenario Use for surface treatment (industry) **Sector of use**

SU2a Mining (except offshore industries)

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU14 Metal production and processing, including alloys

SU15 Manufacture of fabricated metal products, except machinery and equipment

SU16 Manufacture of computers, electronic and optical products, electrical equipment

Product category

PC14 Products for the treatment of metal surfaces PC15 Products

for the treatment of non-metal surfaces **Process category**

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for only one product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

PROC13 Treatment of products by dipping and pouring

Environmental release category

ERC6b Use as a reactive processing aid at an industrial site (not incorporated into or onto an article)

SECTION 2: Conditions of use and risk management measures to control exposure

Employees

8 hours (full shift). 5
working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

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Amount used per time or activity

Annual tonnage per site (tonnes per year): 10,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC01, PROC02, PROC03, PROC04) The process is completely enclosed. (PROC01, PROC03, PROC8b, PROC09)

Outdoors, not near buildings (PROC01, PROC02, PROC08a, PROC08b) Outdoors, near buildings (PROC03, PROC13)

Risk management measures

Employee protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Ensure suitable extraction at the processing machines. Vapour recovery system (PROC02, PROC04, PROC09)

Use exhaust gas recirculation and local extraction (PROC01, PROC03, PROC08b) Complete separation. (PROC01, PROC02)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes. Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this solution.

Tightly fitting safety goggles.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface waters or a wastewater treatment plant.

Size of the wastewater treatment plant (m³/day): 2000 Sewage sludge treatment: Incineration or landfill

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Trade name: Sulphuric acid t.r. 50%

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Soil The soil should be impermeable and liquid-resistant.

Disposal measures Dispose of in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC (RCRs < 1).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1.

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Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 5

Short name of exposure scenario Use in electrolysis

processes (industry) **Use sector**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU14 Metal production and processing, including alloys

SU15 Manufacture of fabricated metal products, except machinery and equipment

SU17 General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment

Product category

PC14 Products for treating metal surfaces

PC20 Processing aids such as pH regulators, flocculants, precipitants, neutralising agents

Process category

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for a single product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

PROC13 Treatment of products by dipping and pouring

Environmental release category

ERC5 Use at an industrial site resulting in inclusion in or on an article ERC6b Use as a reactive processing aid at an industrial site (no inclusion in or on an article)

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 2,306,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

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Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC01, PROC02) The process is completely enclosed. (PROC01, PROC8b, PROC09)

Outdoors, not near buildings (PROC01, PROC02, PROC8a, PROC08b) Indoors with good natural ventilation. (PROC09, PROC13)

Risk management measures

Employee protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. Handling procedures must be well documented.

Technical protective measures

Ensure adequate extraction at the processing machines. Use vapour recovery system (PROC02, PROC09)

Use exhaust gas recirculation and local extraction (PROC01, PROC08b) Complete separation. (PROC01, PROC02)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, check breathing air with DRÄGER sulphuric acid 1/a test tubes.

Chemical-resistant protective gloves (EN 374)

The glove must be checked for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer. Since the product is a mixture of several substances, the resistance of glove materials cannot be predicted and must therefore be checked before use.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this solution.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated waste water should be neutralised before discharge into surface water or a waste water treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

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The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC (RCRs < 1).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1.

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Appendix: Exposure scenario 6

Short name of the exposure scenario Use in gas purification (industry) **Sector of use**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU8 Manufacture of bulk chemicals (including petroleum products)

Product category

PC20 Processing aids such as pH regulators, flocculants, precipitants, neutralising agents

Process category

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for a single product

Environmental release category

ERC7 Use as a functional fluid at an industrial site

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 30,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC01, PROC08b)

Outdoors, not near buildings (PROC01, PROC02, PROC08a, PROC08b) Outdoors, near buildings. (PROC01, PROC02, PROC08b)

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Risk management measures

Employee protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Ensure suitable extraction at the processing machines. Vapour recovery system (PROC02)

Use exhaust gas recirculation and local extraction (PROC01, PROC08b) Complete separation. (PROC01, PROC02)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes. Chemical-resistant protective gloves (EN 374)

The gloves must be checked for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated waste water should be neutralised before discharge into surface water or a waste water treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out according to the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1 .

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Appendix: Exposure scenario 7

Short name of exposure scenario Use in the manufacture of lead-acid batteries (industry) **Sector of use**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

Product category PC0 Other

Process category

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

Environmental release category

ERC2 Formulation into a mixture

ERC5 Use at an industrial site resulting in inclusion in or on an article

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 2,500

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

Process is completely enclosed. (PROC02) Indoors with

good natural ventilation. (-)

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Trade name: Sulphuric acid t.r. 50%

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**Risk management measures Worker
protection Organisational protective
measures**

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Ensure suitable extraction on the processing machines.

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes. Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this solution.

Tightly fitting safety goggles.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m³/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC (RCRs < 1).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1.

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Appendix: Exposure scenario 8

Short name of the exposure scenario Maintenance of lead-acid batteries (professional users) **Sector of use** SU22 Commercial uses: Public sector (administration, education, entertainment, services, crafts)
Product category PC0 Other
Process category PROC19 Manual activities with hand contact
Environmental release category ERC8b Wide use as a reactive processing aid (not included in or on a product, internal use)
ERC9b Wide use of a functional fluid (external use)

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5
working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the

mixture The substance is a minor component.

or in the product: 25-50%

Amount used per time or activity

Annual tonnage per site (tonnes per year): 2,500

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Open windows during use to ensure natural ventilation.

Due to the properties of the substance, the process should be carried out as closed as possible.

Risk management measures

Employee protection Organisational

protective measures

Only allow qualified or authorised personnel to carry out the activities. The handling procedures must be well documented.

Technical protective measures

Ensure suitable extraction at the processing machines.

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

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For concentrations above 20% acid, breathing air can be monitored using DRÄGER sulphuric acid 1/a test tubes.

Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure prediction

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1 .

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Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 9

Short title of the exposure scenario Recycling of

lead-acid batteries (industry) **Sector of use**

SU3 Industrial uses: Uses of substances on their own or in preparations at industrial sites

Product category PC0 Other

Process category

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC4 Chemical production with the possibility of exposure PROC5

Batch mixing

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

Environmental release category ERC1 Manufacture of the substance

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture The substance is a minor component.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 2,500

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

Only enter enclosed spaces if there is adequate ventilation.

Risk management measures Worker

protection Organisational protective measures

Only allow qualified or authorised personnel to carry out the activities. The handling procedures must be well documented.

Technical protective measures

Ensure suitable extraction at the processing machines.

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Trade name: Sulphuric acid t.r. 50%

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Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Environmental protection measures

Air An exhaust air purification system, e.g. air scrubber or filter, should be used for the exhaust air.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure prediction

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1 .

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Article 31

Print date: 03.01.2023

Version No. 6 (replaces version 5)

Revised on: 03.01.2023

Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 10

Short name of the exposure scenario Use in laboratories (industry) **Sector of use**
SU22 Commercial uses: Public sector (administration, education, entertainment, services, crafts)
Product category PC21 Laboratory chemicals **Process category**
PROC15 Use as laboratory reagent **Environmental release**
category
ERC8a Wide use as a non-reactive processing aid (no inclusion in or on a product, internal use)
ERC8b Wide use as a reactive processing aid (no inclusion in or on a product, internal use)

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5
working days/week.

Environment < 330 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture The substance is the main component.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 5,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the material, the process should be carried out as closed as possible.

Indoors with good natural ventilation. (-)

Risk management measures Worker

protection Organisational protective measures

Only allow qualified or authorised personnel to carry out the activities. The handling procedures must be well documented.

Technical protective measures Extraction at the object is required.

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

At concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes.

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Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use.

Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Consumer protection measures *Ensure adequate labelling.*

Environmental protection measures

Air *Exhaust air should be cleaned using, for example, air scrubbers or filters.*

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m³/day): 2000 Sewage sludge treatment:

*Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.*

Disposal measures *Disposal in accordance with official regulations.*

SECTION 3: Exposure prediction

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs (RCR < 1).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC (RCRs < 1).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1.

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Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 11

Short name of the exposure scenario Use in laboratories (commercial) **Sector of use**

SU3 Industrial uses: Uses of substances on their own or in preparations at industrial sites

Product category

PC35 Washing and cleaning products (including solvent-based products)

Process category

PROC2 Chemical production or refining in a closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

PROC5 Batch mixing

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for only one product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

PROC10 Application by rolling or brushing

PROC13 Treatment of products by dipping and pouring

Environmental release category

ERC8a Wide use as a non-reactive processing aid (no inclusion in or on an article, internal use)

ERC8b Wide use as reactive processing aid (no inclusion in or on an article, internal use)

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture 10%

Amount used per time or activity

Annual tonnage per site (tonnes per year): 5,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

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Trade name: Sulphuric acid t.r. 50%

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Indoors with good natural ventilation. (-)

Risk management measures Worker protection Organisational protective measures

Only allow qualified or authorised personnel to carry out the activities. The handling procedures must be well documented.

Technical protective measures

Extraction at the object is required.
(PROC02, PROC05)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes. Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Consumer protection measures Ensure adequate labelling.

Environmental protection measures

Air Exhaust air should be cleaned using, for example, air scrubbers or filters.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before being discharged into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure prediction

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out using the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure assessment was carried out using EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations prove that the RCR is < 1 .

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Appendix: Exposure scenario 12

Short name of the exposure scenario Use in formulations (industry) **Sector of use**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU10 Formulation [mixing] of preparations and/or repackaging (except alloys)

Process category

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC5 Batch mixing

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for only one product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

Environmental release category ERC2 Formulation to a mixture

SECTION 2: Conditions of use and risk management measures to control exposure

Employees

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the mixture Pure substance.

Amount used per time or activity

Annual tonnage per site (tonnes per year): 300,000

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the substance, the process should be carried out as closed as possible.

High temperatures may occur during the process. (PROC01, PROC03) Process is completely enclosed. (PROC01, PROC03, PROC08b, PROC09) Outdoors, not near buildings (PROC01, PROC08a, PROC08b) Outdoors, near buildings. (PROC03)

Indoors with good natural ventilation. (PROC05, PROC09)

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D

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in accordance with 1907/2006/EC,
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Print date: 03.01.2023

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Trade name: Sulphuric acid t.r. 50%

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Risk management measures Worker protection Organisational protective measures

Only allow qualified or authorised personnel to carry out activities. The handling procedures must be well documented.

Technical protective measures

Vapour recovery system (PROC02, PROC09)

Use exhaust gas recirculation and local extraction (PROC01, PROC03, PROC08b) Complete separation. (PROC01)

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, check breathing air with DRÄGER sulphuric acid 1/a test tubes.

Chemical-resistant protective gloves (EN 374)

The gloves must be checked for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Consumer protection measures Ensure adequate labelling.

Environmental protection measures

Air Exhaust air should be cleaned using, for example, air scrubbers or filters.

Water

Neutralisation is usually required before discharging wastewater into sewage treatment plants.

All contaminated wastewater should be neutralised before discharge into surface water or a wastewater treatment plant.

Size of wastewater treatment plant (m^3/day): 2000 Sewage sludge treatment:

Incineration or landfill **Soil** The soil should be impermeable and liquid-resistant.

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out according to the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($RCR < 1$).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC ($RCRs < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1 .

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Trade name: Sulphuric acid t.r. 50%

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Appendix: Exposure scenario 13

Short title of the exposure scenario Use of lead-acid

batteries (consumer) **Sector of use**

SU3 Industrial uses: uses of substances on their own or in preparations at industrial sites

SU10 Formulation [mixing] of preparations and/or repackaging (except alloys)

Process category

PROC1 Chemical production or refining in a closed process with no likelihood of exposure or processes with equivalent containment conditions

PROC5 Batch mixing

PROC8a Transfer of substances or mixtures (filling and emptying) in installations not specifically designed for a single product

PROC8b Transfer of substances or mixtures (filling and emptying) in facilities specifically designed for a single product

PROC9 Transfer of a substance or mixture into small containers (special filling plant, including weighing)

Environmental release category ERC2 Formulation into a mixture

SECTION 2: Conditions of use and risk management measures to control exposure

Workers

8 hours (full shift). 5

working days/week.

Environment < 365 days/year

Physical parameters

The information on the physical and chemical properties in the exposure scenario is based on the properties of the pure substance.

Physical state

Liquid

Vapour pressure: < 0.1 hPa (20°C)

Concentration of the substance in the

mixture Pure substance.

25-40

Amount used per time or activity

Annual tonnage per site (tonnes per year): 2,500

Other conditions of use

Other conditions of use affecting environmental exposure

Due to the properties of the substance, the process should be carried out as closed as possible.

Other conditions of use affecting worker exposure

Avoid contact with skin and eyes.

Due to the properties of the material, the process should be carried out as closed as possible.

Indoors with good natural ventilation. (-)

Avoid contact with eyes, skin and clothing. Batteries should only be opened in a well-ventilated area.

Batteries should not be opened unnecessarily.

Batteries should be placed on a solid surface to prevent leakage.

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Other conditions of use affecting consumer exposure during the product's service life

Wear suitable overalls to avoid contact with the skin. Acid-resistant gloves must be worn.

Wear safety goggles to protect against splashes.

Risk management measures Worker protection Organisational protective measures

Only allow qualified or authorised personnel to carry out the activities. The handling procedures must be well documented.

Personal protective measures

For short-term or low exposure, use a breathing filter device; for intensive or prolonged exposure, use a self-contained breathing apparatus.

For concentrations above 20% acid, breathing air can be checked using DRÄGER sulphuric acid 1/a test tubes. Chemical-resistant protective gloves (EN 374)

Check the gloves for leaks before each use. Fluorinated rubber (Viton), recommended material thickness: ≥ 0.4 mm, breakthrough time: ≥ 480 min. Butyl rubber, recommended material thickness: ≥ 0.5 mm, breakthrough time: ≥ 120 min.

The selection of a suitable glove depends not only on the material, but also on other quality characteristics and varies from manufacturer to manufacturer.

Tight-fitting safety goggles. Do not inhale gases/vapours/aerosols. Avoid contact with skin.

Avoid contact with eyes.

Standard protective work clothing. Chemical-resistant safety shoes or boots. If skin contact is possible, wear protective clothing that is impervious to this substance.

Consumer protective measures Ensure adequate labelling.

Environmental protection measures Water

Neutralisation is usually required before the wastewater is discharged into sewage treatment plants. Size of wastewater treatment plant (m^3/day): 2000

Sewage sludge treatment: incineration or landfill

Disposal measures Disposal in accordance with official regulations.

SECTION 3: Exposure forecast

Human

The exposure assessment was carried out in accordance with ECETOC TRA.

The exposure assessment was carried out according to the Advanced REACH Tool (Tier 2). The calculated individual exposure figures are below the DNELs ($\text{RCR} < 1$).

Environment

The environmental exposure was estimated according to EUSES. The calculated value is lower than the PNEC ($\text{RCRs} < 1$).

SECTION 4: Guidance for downstream users

Under the conditions listed above, the process is considered safe.

Other conditions should only be considered if measurements or appropriate calculations demonstrate that the RCR is < 1 .

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: **0754**

Version: **2.2 en**

Replaces version of: 2024-03-04

Version: (2)

date of compilation: 2018-02-09

Revision: 2024-09-17

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Identification of the substance	Rapeseed Oil extra pure, refined
Article number	0754
EC number	232-299-0
CAS number	8002-13-9
Alternative name(s)	Oleum Rapae

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses:	Laboratory chemical Laboratory and analytical use
Uses advised against:	Do not use for private purposes (household). Food, drink and animal feedingstuffs.

1.3 Details of the supplier of the safety data sheet

Carl Roth GmbH + Co. KG
Schoemperlenstr. 3-5
D-76185 Karlsruhe
Germany

Telephone: +49 (0) 721 - 56 06 0

Telefax: +49 (0) 721 - 56 06 149

e-mail: sicherheit@carlroth.de

Website: www.carlroth.de

Competent person responsible for the safety data sheet: Department Health, Safety and Environment

e-mail (competent person): sicherheit@carlroth.de

1.4 Emergency telephone number

Name	Street	Postal code/city	Telephone	Website
National Poisons Information Service City Hospital	Dudley Rd	B187QH Birmingham	844 892 0111	

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification acc. to GHS

This substance does not meet the criteria for classification.

2.2 Label elements

Labelling

not required

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: 0754

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Rapeseed Oil
CAS No	8002-13-9
EC No	232-299-0

SECTION 4: First aid measures

4.1 Description of first aid measures



General notes

No special measures are necessary.

Following inhalation

Provide fresh air.

Following skin contact

Wash with plenty of soap and water.

Following eye contact

Rinse cautiously with water for several minutes.

Following ingestion

Rinse mouth. Call a doctor if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media



Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings
dry extinguishing powder, BC-powder, carbon dioxide (CO₂), dry sand

Unsuitable extinguishing media

water

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: 0754

5.2 Special hazards arising from the substance or mixture

Combustible.

Hazardous combustion products

Carbon monoxide (CO), Carbon dioxide (CO₂), May produce toxic fumes of carbon monoxide if burning.

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures



For non-emergency personnel

No special measures are necessary.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

No special measures are necessary.

Advice on general occupational hygiene

Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed.

Incompatible substances or mixtures

Observe hints for combined storage. Incompatible materials: see section 10.

Consideration of other advice:

Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

7.3 Specific end use(s)

No information available.

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: **0754**

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)

This information is not available.

8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection



Use safety goggle with side protection.

Skin protection



- **hand protection**

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374.

- **type of material**

NBR (Nitrile rubber)

- **material thickness**

>0,11 mm

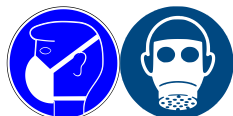
- **breakthrough times of the glove material**

>480 minutes (permeation: level 6)

- **other protection measures**

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

Respiratory protection



Respiratory protection necessary at: Aerosol or mist formation. P1 (filters at least 80 % of airborne particles, colour code: White). Type: A (against organic gases and vapours with a boiling point of > 65 °C, colour code: Brown). Usually no personal respirative protection necessary.

Environmental exposure controls

Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	liquid
Colour	light yellow
Odour	faintly perceptible

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: **0754**

Melting point/freezing point	-2 – -10 °C
Boiling point or initial boiling point and boiling range	not determined
Flammability	this material is combustible, but will not ignite readily
Lower and upper explosion limit	not determined
Flash point	>100 °C
Auto-ignition temperature	not determined
Decomposition temperature	not relevant
pH (value)	not determined
Kinematic viscosity	72 mm ² /s at 20 °C
Dynamic viscosity	66,24 cP at 20 °C

Solubility(ies)

Water solubility	not determined

Partition coefficient

Partition coefficient n-octanol/water (log value):	this information is not available

Vapour pressure	not determined

Density and/or relative density

Density	0,91 – 0,92 g/cm ³ at 20 °C
Relative vapour density	Information on this property is not available.

Particle characteristics	not relevant (liquid)

Other safety parameters

Oxidising properties	none

9.2 Other information

Information with regard to physical hazard classes:	hazard classes acc. to GHS (physical hazards): not relevant
Other safety characteristics:	There is no additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity

This material is not reactive under normal ambient conditions.

If heated

Vapours may form explosive mixtures with air.

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: 0754

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Violent reaction with: strong oxidiser

10.4 Conditions to avoid

There are no specific conditions known which have to be avoided.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Classification acc. to GHS

This substance does not meet the criteria for classification.

Acute toxicity

Shall not be classified as acutely toxic.

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Symptoms related to the physical, chemical and toxicological characteristics

• If swallowed

Data are not available.

• If in eyes

Data are not available.

• If inhaled

Data are not available.

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: 0754

- **If on skin**

Data are not available.

- **Other information**

Health effects are not known.

11.2 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

11.3 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods



Consult the appropriate local waste disposal expert about waste disposal.

Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packagings

Handle contaminated packages in the same way as the substance itself. Completely emptied packages can be recycled.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions. Non-contaminated packages may be recycled.

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: **0754**

SECTION 14: Transport information

- 14.1 UN number or ID number** not subject to transport regulations
- 14.2 UN proper shipping name** not assigned
- 14.3 Transport hazard class(es)** none
- 14.4 Packing group** not assigned
- 14.5 Environmental hazards** non-environmentally hazardous acc. to the dangerous goods regulations
- 14.6 Special precautions for user**
There is no additional information.
- 14.7 Maritime transport in bulk according to IMO instruments**
The cargo is not intended to be carried in bulk.
- 14.8 Information for each of the UN Model Regulations**
- International Maritime Dangerous Goods Code (IMDG) - Additional information**
Not subject to IMDG.
- International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information**
Not subject to ICAO-IATA.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Deco-Paint Directive

VOC content	100 %
VOC content	920 g/l

Industrial Emissions Directive (IED)

VOC content	100 %
VOC content	920 g/l

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

not listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

not listed

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Water Framework Directive (WFD)

not listed

Regulation on the marketing and use of explosives precursors

not listed

Regulation on drug precursors

not listed

Regulation on substances that deplete the ozone layer (ODS)

not listed

Regulation concerning the export and import of hazardous chemicals (PIC)

not listed

Regulation on persistent organic pollutants (POP)

not listed

National regulations(GB)

List of substances subject to authorisation (GB REACH, Annex 14) / SVHC - candidate list

not listed

Restrictions according to GB REACH, Annex 17

not listed

Other information

Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

National inventories

Country	Inventory	Status
AU	AIIC	substance is listed
CA	DSL	substance is listed
CN	IECSC	substance is listed
EU	ECSI	substance is listed
KR	KECI	substance is listed
NZ	NZIoC	substance is listed
PH	PICCS	substance is listed
TR	CICR	substance is listed
TW	TCSI	substance is listed
US	TSCA	substance is listed (ACTIVE)
VN	NCI	substance is listed

Legend

AIIC	Australian Inventory of Industrial Chemicals
CICR	Chemical Inventory and Control Regulation
DSL	Domestic Substances List (DSL)
ECSI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
KECI	Korea Existing Chemicals Inventory
NCI	National Chemical Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance.

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SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
1.1		EC number: 232-299-0	yes
1.1	EC number: 232-299-0	CAS number: 8002-13-9	yes
2.1	Classification according to Regulation (EC) No 1272/2008 (CLP): This substance does not meet the criteria for classification in accordance with Regulation No 1272/2008/EC.	Classification acc. to GHS: This substance does not meet the criteria for classification.	yes
2.2	Signal word: not required		yes
2.3	Other hazards: There is no additional information.	Other hazards	yes
2.3		Results of PBT and vPvB assessment: According to the results of its assessment, this substance is not a PBT or a vPvB.	yes
2.3		Endocrine disrupting properties: Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.	yes
11.1		Acute toxicity: change in the listing (table)	yes
14.2	UN proper shipping name: not relevant	UN proper shipping name: not assigned	yes
14.3	Transport hazard class(es): not relevant	Transport hazard class(es): none	yes
14.3	Class: -		yes
14.4	Packing group: not relevant	Packing group: not assigned	yes
14.5	Environmental hazards: none (non-environmentally hazardous acc. to the dangerous goods regulations)	Environmental hazards: non-environmentally hazardous acc. to the dangerous goods regulations	yes
14.8	• Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN): Not subject to ADR, RID and ADN.		yes
15.1	• Regulation 649/2012/EU concerning the export and import of hazardous chemicals (PIC): Not listed.		yes
15.1	• Regulation 1005/2009/EC on substances that deplete the ozone layer (ODS): Not listed.		yes
15.1	• Regulation 850/2004/EC on persistent organic pollutants (POP): Not listed.		yes
15.1	• Restrictions according to REACH, Annex XVII: not listed		yes
15.1	• List of substances subject to authorisation (REACH, Annex XIV): not listed		yes

Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Rapeseed Oil extra pure, refined

article number: **0754**

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
15.1		2012/18/EU (Seveso III): change in the listing (table)	yes
15.1	VOC content: 100 %		yes
15.1		VOC content: 100 %	yes
15.1		VOC content: 920 g/l	yes
15.1	VOC content: 100 %		yes
15.1		VOC content: 100 %	yes
15.1		VOC content: 920 g/l	yes
15.1	National inventories: Substance is listed in the following national inventories:		yes
15.1		National inventories: change in the listing (table)	yes
15.1		Regulation on the marketing and use of explosives precursors: not listed	yes
15.1		Regulation on drug precursors: not listed	yes
15.1		Regulation on substances that deplete the ozone layer (ODS): not listed	yes
15.1		Regulation concerning the export and import of hazardous chemicals (PIC): not listed	yes
15.1		Regulation on persistent organic pollutants (POP): not listed	yes
15.1		National regulations(GB)	yes
15.1		List of substances subject to authorisation (GB REACH, Annex 14) / SVHC - candidate list: not listed	yes
15.1		Restrictions according to GB REACH, Annex 17: not listed	yes
15.1		Other information: Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.	yes
15.1		National inventories	yes
15.1		National inventories: change in the listing (table)	yes

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Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
DGR	Dangerous Goods Regulations (see IATA/DGR)
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
ED	Endocrine disruptor
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GB REACH	The REACH etc. (Amendment etc.) (EU Exit) Regulations 2019, SI 2019/758 (as amended)
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: **5634**

Version: **1.1 en**

Replaces version of: 10.03.2025

Version: (1)

date of compilation: 10.03.2025

Revision: 12.06.2025

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Identification of the substance

Iron(III) oxide ROTI®METIC 99,98 % (3N8)

Article number

5634

Registration number (REACH)

It is not required to list the identified uses because the substance is not subject to registration according to REACH (< 1 t/a).

EC number

215-168-2

CAS number

1309-37-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses:

Laboratory chemical
Laboratory and analytical use

Uses advised against:

Do not use for private purposes (household).
Food, drink and animal feedingstuffs.

1.3 Details of the supplier of the safety data sheet

Carl Roth GmbH + Co. KG
Schoemperlenstr. 3-5
D-76185 Karlsruhe
Germany

Telephone: +49 (0) 721 - 56 06 0

Telefax: +49 (0) 721 - 56 06 149

e-mail: sicherheit@carlroth.de

Website: www.carlroth.de

Competent person responsible for the safety data sheet: Department Health, Safety and Environment

e-mail (competent person):

sicherheit@carlroth.de

1.4 Emergency telephone number

Name	Street	Postal code/city	Telephone	Website
Giftzentrale München	Ismaninger Str. 22	81675 München	+49/(0)89 19240	www.toxikologie.mri.tum.de

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

This substance does not meet the criteria for classification in accordance with Regulation No 1272/2008/EC.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

not required

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Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: **5634**

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Iron(III) oxide
Molecular formula	Fe_2O_3
Molar mass	159,7 g/mol
CAS No	1309-37-1
EC No	215-168-2

SECTION 4: First aid measures

4.1 Description of first aid measures



General notes

Take off contaminated clothing.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Rinse skin with water/shower.

Following eye contact

Rinse cautiously with water for several minutes. In all cases of doubt, or when symptoms persist, seek medical advice.

Following ingestion

Rinse mouth. Call a doctor if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media



Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings!

Safety data sheet

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water, foam, dry extinguishing powder, ABC-powder

Unsuitable extinguishing media

water jet

5.2 Special hazards arising from the substance or mixture

Non-combustible.

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures



For non-emergency personnel

Control of dust.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains. Take up mechanically.

Advice on how to clean up a spill

Take up mechanically.

Other information relating to spills and releases

Place in appropriate containers for disposal.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

No special measures are necessary.

Advice on general occupational hygiene

Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Store in a dry place.

Incompatible substances or mixtures

Observe hints for combined storage. See also TRGS 510 (Germany). Incompatible materials: see section 10.

Consideration of other advice:

Ventilation requirements

Use local and general ventilation.

Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

Storage of hazardous substances in non-stationary containers (TRGS 510) (Germany)

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Storage class (LGK): 13 (non-combustible solids)

7.3 Specific end use(s)

No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)

Country	Name of agent	CAS No	Identifier	TWA [mg/m ³]	STEL [mg/m ³]	Ceiling-C [mg/m ³]	Notation	Source
DE	dust		AGW	10	20		Y, i	TRGS 900
DE	dust		AGW	1,25	2,5		Y, r	TRGS 900

Notation

Ceiling-C	Ceiling value is a limit value above which exposure should not occur
i	Inhalable fraction
r	Respirable fraction
STEL	Short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)
TWA	Time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)
Y	A risk of developmental toxicity does not need to be expected if the occupational exposure limit value and the biological limit value (BGW) are adhered to

Human health values

Relevant DNELs and other threshold levels				
Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
DNEL	10 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects

8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection



Use safety goggle with side protection.

Skin protection



• hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374.

• type of material

NBR (Nitrile rubber)

• material thickness

>0,11 mm

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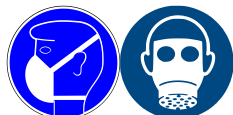
- **breakthrough times of the glove material**

>480 minutes (permeation: level 6)

- **other protection measures**

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

Respiratory protection



Respiratory protection necessary at: Dust formation. Particulate filter device (EN 143). P1 (filters at least 80 % of airborne particles, colour code: White).

Environmental exposure controls

Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Form	powder
Colour	red
Odour	odourless
Melting point/freezing point	1.565 °C at 1.013 hPa (ECHA)
Boiling point or initial boiling point and boiling range	not determined
Flammability	non-combustible
Lower and upper explosion limit	not relevant (solid)
Flash point	not applicable
Auto-ignition temperature	not determined
Decomposition temperature	not relevant
pH (value)	not applicable
Kinematic viscosity	not relevant

Solubility(ies)

Water solubility	(insoluble (< 1 mg/l))

Partition coefficient

Partition coefficient n-octanol/water (log value):	not relevant (inorganic)

Vapour pressure	not determined

Density and/or relative density

Density	5,25 g/cm ³ at 25 °C (ECHA)

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Relative vapour density not relevant (solid)

Particle characteristics No data available.

Other safety parameters

Oxidising properties none

9.2 Other information

Information with regard to physical hazard classes: hazard classes acc. to GHS (physical hazards): not relevant

Other safety characteristics: There is no additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity

This material is not reactive under normal ambient conditions.

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Violent reaction with: Carbide, Hydrogen sulphide (H₂S), Hydrogen peroxide, Explosive properties, Ethylene oxide, Magnesium

10.4 Conditions to avoid

There are no specific conditions known which have to be avoided.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Classification according to GHS (1272/2008/EC, CLP)

This substance does not meet the criteria for classification in accordance with Regulation No 1272/2008/EC.

Acute toxicity

Shall not be classified as acutely toxic.

Acute toxicity					
Exposure route	Endpoint	Value	Species	Method	Source
oral	LD50	>5.000 mg/kg	rat		ECHA

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

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Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Endocrine disruptor for human health

Shall not be classified as an endocrine disruptor for human health.

Symptoms related to the physical, chemical and toxicological characteristics

• If swallowed

Data are not available.

• If in eyes

Data are not available.

• If inhaled

Inhalation of dust may cause irritation of the respiratory system

• If on skin

Data are not available.

• Other information

none

11.2 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Acc. to 1272/2008/EC: Shall not be classified as hazardous to the aquatic environment.

Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (Ordinance on facilities for handling substances hazardous to water) (AwSV):

nwg, non-hazardous to water (Germany)

Aquatic toxicity (acute)				
Endpoint	Value	Species	Source	Exposure time
EC50	>100 mg/l	aquatic invertebrates	ECHA	48 h

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Iron(III) oxide ROTI®METIC 99,98 % (3N8)

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Aquatic toxicity (chronic)

Endpoint	Value	Species	Source	Exposure time
EC50	>10.000 mg/l	microorganisms	ECHA	3 h

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods



Consult the appropriate local waste disposal expert about waste disposal.

Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packagings

Handle contaminated packages in the same way as the substance itself. Completely emptied packages can be recycled.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process. Waste catalogue ordinance (Germany).

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions. Non-contaminated packages may be recycled.

SECTION 14: Transport information

14.1 UN number or ID number	not subject to transport regulations
14.2 UN proper shipping name	not assigned
14.3 Transport hazard class(es)	none
14.4 Packing group	not assigned
14.5 Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations
14.6 Special precautions for user	

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according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



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There is no additional information.

14.7 Maritime transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

14.8 Information for each of the UN Model Regulations

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN) - Additional information

Not subject to ADR, RID and ADN.

International Maritime Dangerous Goods Code (IMDG) - Additional information

Not subject to IMDG.

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Not subject to ICAO-IATA.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Restrictions according to REACH, Annex XVII

Dangerous substances with restrictions (REACH, Annex XVII)				
Name of substance	Name acc. to inventory	CAS No	Restriction	No
Iron(III) oxide	substances in tattoo inks and permanent make-up		R75	75

Legend

- R75 1. Shall not be placed on the market in mixtures for use for tattooing purposes, and mixtures containing any such substances shall not be used for tattooing purposes, after 4 January 2022 if the substance or substances in question is or are present in the following circumstances:
- (a) in the case of a substance classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 as carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, the substance is present in the mixture in a concentration equal to or greater than 0,00005 % by weight;
 - (b) in the case of a substance classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 as reproductive toxicant category 1A, 1B or 2, the substance is present in the mixture in a concentration equal to or greater than 0,001 % by weight;
 - (c) in the case of a substance classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 as skin sensitiser category 1, 1A or 1B, the substance is present in the mixture in a concentration equal to or greater than 0,001 % by weight;
 - (d) in the case of a substance classified in Part 3 of Annex VI to Regulation (EC) No 1272/2008 as skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2, or as serious eye damage category 1 or eye irritant category 2, the substance is present in the mixture in a concentration equal to or greater than:
 - (i) 0,1 % by weight, if the substance is used solely as a pH regulator;
 - (ii) 0,01 % by weight, in all other cases;
 - (e) in the case of a substance listed in Annex II to Regulation (EC) No 1223/2009 (*1), the substance is present in the mixture in a concentration equal to or greater than 0,00005 % by weight;
 - (f) in the case of a substance for which a condition of one or more of the following kinds is specified in column g (Product type, Body parts) of the table in Annex IV to Regulation (EC) No 1223/2009, the substance is present in the mixture in a concentration equal to or greater than 0,00005 % by weight:
 - (i) "Rinse-off products";
 - (ii) "Not to be used in products applied on mucous membranes";
 - (iii) "Not to be used in eye products";
 - (g) in the case of a substance for which a condition is specified in column h (Maximum concentration in ready for use preparation) or column i (Other) of the table in Annex IV to Regulation (EC) No 1223/2009, the substance is present in the mixture in a concentration, or in some other way, that does not accord with the condition specified in that column;
 - (h) in the case of a substance listed in Appendix 13 to this Annex, the substance is present in the mixture in a concentration equal to or greater than the concentration limit specified for that substance in that Appendix.
2. For the purposes of this entry use of a mixture "for tattooing purposes" means injection or introduction of the mixture into a person's skin, mucous membrane or eyeball, by any process or procedure (including procedures commonly referred to as permanent make-up, cosmetic tattooing, micro-blading and micro-pigmentation), with the aim of making a mark or design on his or her body.
3. If a substance not listed in Appendix 13 falls within more than one of points (a) to (g) of paragraph 1, the strictest concentration limit laid down in the points in question shall apply to that substance. If a substance listed in Appendix 13 also falls within one or more of points (a) to (g) of paragraph 1, the concentration limit laid down in point (h) of paragraph 1 shall apply to that substance.
4. By way of derogation, paragraph 1 shall not apply to the following substances until 4 January 2023:
- (a) Pigment Blue 15:3 (CI 74160, EC No 205-685-1, CAS No 147-14-8);
 - (b) Pigment Green 7 (CI 74260, EC No 215-524-7, CAS No 1328-53-6).

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: 5634

Legend

5. If Part 3 of Annex VI to Regulation (EC) No 1272/2008 is amended after 4 January 2021 to classify or re-classify a substance such that the substance then becomes caught by point (a), (b), (c) or (d) of paragraph 1 of this entry, or such that it then falls within a different one of those points from the one within which it fell previously, and the date of application of that new or revised classification is after the date referred to in paragraph 1 or, as the case may be, paragraph 4 of this entry, that amendment shall, for the purposes of applying this entry to that substance, be treated as taking effect on the date of application of that new or revised classification.
6. If Annex II or Annex IV to Regulation (EC) No 1223/2009 is amended after 4 January 2021 to list or change the listing of a substance such that the substance then becomes caught by point (e), (f) or (g) of paragraph 1 of this entry, or such that it then falls within a different one of those points from the one within which it fell previously, and the amendment takes effect after the date referred to in paragraph 1 or, as the case may be, paragraph 4 of this entry, that amendment shall, for the purposes of applying this entry to that substance, be treated as taking effect from the date falling 18 months after entry into force of the act by which that amendment was made.
7. Suppliers placing a mixture on the market for use for tattooing purposes shall ensure that, after 4 January 2022, the mixture is marked with the following information:
- (a) the statement "Mixture for use in tattoos or permanent make-up";
 - (b) a reference number to uniquely identify the batch;
 - (c) the list of ingredients in accordance with the nomenclature established in the glossary of common ingredient names pursuant to Article 33 of Regulation (EC) No 1223/2009, or in the absence of a common ingredient name, the IUPAC name. In the absence of a common ingredient name or IUPAC name, the CAS and EC number. Ingredients shall be listed in descending order by weight or volume of the ingredients at the time of formulation. "Ingredient" means any substance added during the process of formulation and present in the mixture for use for tattooing purposes. Impurities shall not be regarded as ingredients. If the name of a substance, used as ingredient within the meaning of this entry, is already required to be stated on the label in accordance with Regulation (EC) No 1272/2008, that ingredient does not need to be marked in accordance with this Regulation;
 - (d) the additional statement "pH regulator" for substances falling under point (d)(i) of paragraph 1;
 - (e) the statement "Contains nickel. Can cause allergic reactions." if the mixture contains nickel below the concentration limit specified in Appendix 13;
 - (f) the statement "Contains chromium (VI). Can cause allergic reactions." if the mixture contains chromium (VI) below the concentration limit specified in Appendix 13;
 - (g) safety instructions for use insofar as they are not already required to be stated on the label by Regulation (EC) No 1272/2008.
- The information shall be clearly visible, easily legible and marked in a way that is indelible.
- The information shall be written in the official language(s) of the Member State(s) where the mixture is placed on the market, unless the Member State(s) concerned provide(s) otherwise.
- Where necessary because of the size of the package, the information listed in the first subparagraph, except for point (a), shall be included instead in the instructions for use.
- Before using a mixture for tattooing purposes, the person using the mixture shall provide the person undergoing the procedure with the information marked on the package or included in the instructions for use pursuant to this paragraph.
8. Mixtures that do not contain the statement "Mixture for use in tattoos or permanent make-up" shall not be used for tattooing purposes.
9. This entry does not apply to substances that are gases at temperature of 20 °C and pressure of 101,3 kPa, or generate a vapour pressure of more than 300 kPa at temperature of 50 °C, with the exception of formaldehyde (CAS No 50-00-0, EC No 200-001-8).
10. This entry does not apply to the placing on the market of a mixture for use for tattooing purposes, or to the use of a mixture for tattooing purposes, when placed on the market exclusively as a medical device or an accessory to a medical device, within the meaning of Regulation (EU) 2017/745, or when used exclusively as a medical device or an accessory to a medical device, within the same meaning. Where the placing on the market or use may not be exclusively as a medical device or an accessory to a medical device, the requirements of Regulation (EU) 2017/745 and of this Regulation shall apply cumulatively.

List of substances subject to authorisation (REACH, Annex XIV)/SVHC - candidate list not listed

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Deco-Paint Directive

VOC content	0 %
VOC content	0 g/l

Industrial Emissions Directive (IED)

VOC content	0 %

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: 5634

VOC content	0 g/l

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

not listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

not listed

Water Framework Directive (WFD)

List of pollutants (WFD)				
Name of substance	Name acc. to inventory	CAS No	Listed in	Remarks
Iron(III) oxide	Metals and their compounds		a)	

Legend

a) Indicative list of the main pollutants

Regulation on the marketing and use of explosives precursors

not listed

Regulation on drug precursors

not listed

Regulation on substances that deplete the ozone layer (ODS)

not listed

Regulation concerning the export and import of hazardous chemicals (PIC)

not listed

Regulation on persistent organic pollutants (POP)

not listed

National regulations (Germany)

Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (Ordinance on facilities for handling substances hazardous to water) (AwSV)

Wassergefährdungsklasse, WGK nwg (non-hazardous to water)
(water hazard class):

Index number: 800

Technical instructions on air quality control (Germany)

Number	Group of substances	Class	Conc.	Mass flow	Mass concentration	Notation
5.2.1	total dust, including micro-dust		≥ 25 wt%	0,2 kg/h	20 mg/m ³	2)

Notation

2) Even with a mass flow smaller than or equal to 0.20 kg/h, a mass concentration of 0.15 g/m³ in waste gas may not be exceeded

Storage of hazardous substances in non-stationary containers (TRGS 510) (Germany)

Storage class (LGK): 13 (non-combustible solids)

Other information

Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

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according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: 5634

National inventories

Country	Inventory	Status
AU	AIIC	substance is listed
CA	DSL	substance is listed
CN	IECSC	substance is listed
EU	ECSI	substance is listed
EU	REACH Reg.	substance is listed
JP	CSCL-ENCS	substance is listed
KR	KECI	substance is listed
MX	INSQ	substance is listed
NZ	NZIoC	substance is listed
PH	PICCS	substance is listed
TR	CICR	substance is listed
TW	TCSI	substance is listed
US	TSCA	substance is listed (ACTIVE)

Legend

AIIC	Australian Inventory of Industrial Chemicals
CICR	Chemical Inventory and Control Regulation
CSCL-ENCS	List of Existing and New Chemical Substances (CSCL-ENCS)
DSL	Domestic Substances List (DSL)
ECSI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
INSQ	National Inventory of Chemical Substances
KECI	Korea Existing Chemicals Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADN	Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
AGW	Workplace exposure limit
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC50	Effective Concentration 50 %. The EC50 corresponds to the concentration of a tested substance causing 50 % changes in response (e.g. on growth) during a specified time interval

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according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Iron(III) oxide ROTI®METIC 99,98 % (3N8)

article number: 5634

Abbr.	Descriptions of used abbreviations
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
ED	Endocrine disruptor
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
LGK	Lagerklasse (storage class according to TRGS 510, Germany)
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
STEL	Short-term exposure limit
SVHC	Substance of Very High Concern
TRGS	Technische Regeln für Gefahrstoffe (technical rules for hazardous substances, Germany)
TRGS 900	Arbeitsplatzgrenzwerte (TRGS 900)
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.
Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU.

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid $\geq 30\%$, technical

article number: **9280**

Version: **6.0 en**

Replaces version of: 2023-11-07

Version: (5)

date of compilation: 2015-11-25

Revision: 2024-09-21

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Identification of the substance	Hydrochloric acid $\geq 30\%$, technical
Article number	9280
Index No (GB CLP)	[017-002-01-X]
EC number	[231-595-7]
CAS number	[7647-01-0]

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses:	Laboratory chemical Laboratory and analytical use
Uses advised against:	Do not use for squirting or spraying. Do not use for products which come into direct contact with the skin. Do not use for private purposes (household). Food, drink and animal feedingstuffs.

1.3 Details of the supplier of the safety data sheet

Carl Roth GmbH + Co. KG
Schoemperlenstr. 3-5
D-76185 Karlsruhe
Germany

Telephone: +49 (0) 721 - 56 06 0

Telefax: +49 (0) 721 - 56 06 149

e-mail: sicherheit@carlroth.de

Website: www.carlroth.de

Competent person responsible for the safety data sheet: Department Health, Safety and Environment

e-mail (competent person): sicherheit@carlroth.de

1.4 Emergency telephone number

Name	Street	Postal code/city	Telephone	Website
National Poisons Information Service City Hospital	Dudley Rd	B187QH Birmingham	844 892 0111	

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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acc. to Regulation (EC) No. 1907/2006 (REACH)



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Classification acc. to GHS

Section	Hazard class	Cat-egory	Hazard class and category	Hazard statement
2.16	Substance or mixture corrosive to metals	1	Met. Corr. 1	H290
3.2	Skin corrosion/irritation	1B	Skin Corr. 1B	H314
3.3	Serious eye damage/eye irritation	1	Eye Dam. 1	H318
3.8R	Specific target organ toxicity - single exposure (respiratory tract irritation)	3	STOT SE 3	H335

For full text of abbreviations: see SECTION 16

The most important adverse physicochemical, human health and environmental effects

Skin corrosion produces an irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis.

2.2 Label elements

Labelling

Signal word

Danger

Pictograms

GHS05, GHS07



Hazard statements

H290 May be corrosive to metals
H314 Causes severe skin burns and eye damage
H335 May cause respiratory irritation

Precautionary statements

Precautionary statements - prevention

P280 Wear protective gloves/protective clothing/eye protection/face protection

Precautionary statements - response

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER/doctor

Hazardous ingredients for labelling:

Hydrochloric acid ...%

2.3 Other hazards

Results of PBT and vPvB assessment

Does not contain a PBT-/vPvB-substance at a concentration of $\geq 0,1\%$.

Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

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SECTION 3: Composition/information on ingredients

3.1 Substances

not relevant (mixture)

Molecular formula

HCl

Molar mass

36,46 g/mol

3.2 Mixtures

Description of the mixture

Name of substance	Identifier	Wt%	Classification acc. to GHS	Pictograms	Notes
Hydrochloric acid ...%	CAS No 7647-01-0 EC No 231-595-7 Index No 017-002-01-X	> 27 – 32	Met. Corr. 1 / H290 Skin Corr. 1B / H314 Eye Dam. 1 / H318 STOT SE 3 / H335	 	B GHS-HC IOELV

Notes

B: Some substances (acids, bases, etc.) are placed on the market in aqueous solutions at various concentrations and, therefore, these solutions require different classification and labelling since the hazards vary at different concentrations. In Part 3 entries with Note B have a general designation of the following type: 'nitric acid ... %'. In this case the supplier must state the percentage concentration of the solution on the label. Unless otherwise stated, it is assumed that the percentage concentration is calculated on a weight/weight basis.

GHS-HC: Harmonised classification (the classification of the substance corresponds to the entry in the list according to 1272/2008/EC, Annex VI)

IOELV: Substance with a community indicative occupational exposure limit value

Name of substance	Identifier	Specific Conc. Limits	M-Factors	ATE	Exposure route
Hydrochloric acid ...%	CAS No 7647-01-0 EC No 231-595-7	Met. Corr. 1; H290: $C \geq 0,1\%$ Skin Corr. 1B; H314: $C \geq 25\%$ Skin Irrit. 2; H315: $10\% \leq C < 25\%$ Eye Dam. 1; H318: $C \geq 25\%$ Eye Irrit. 2; H319: $10\% \leq C < 25\%$ STOT SE 3; H335: $C \geq 10\%$	-	-	

Remarks

For full text of abbreviations: see SECTION 16

SECTION 4: First aid measures

4.1 Description of first aid measures



General notes

Take off immediately all contaminated clothing. Self-protection of the first aider.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

After contact with skin, wash immediately with plenty of water. Immediate medical treatment required because corrosive injuries that are not treated are hard to cure.

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Following eye contact

In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist. Protect uninjured eye.

Following ingestion

Rinse mouth immediately and drink plenty of water. Call a physician immediately. If swallowed danger of perforation of the esophagus and the stomach (strong corrosive effects).

4.2 Most important symptoms and effects, both acute and delayed

Corrosion, Risk of blindness, Gastric perforation, Risk of serious damage to eyes, Irritation, Cough, Dyspnoea

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media



Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings!

water spray, alcohol resistant foam, dry extinguishing powder, BC-powder, carbon dioxide (CO₂)

Unsuitable extinguishing media

water jet

5.2 Special hazards arising from the substance or mixture

Non-combustible.

Hazardous combustion products

In case of fire may be liberated: Hydrogen chloride (HCl)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus. Wear full chemical protective clothing.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures



For non-emergency personnel

Use personal protective equipment as required. Avoid contact with skin, eyes and clothes. Do not breathe vapour/spray.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it. The product is an acid. Before discharge into sewage plants the product normally needs to be neutralised.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains.

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Advice on how to clean up a spill

Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents).

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Use extractor hood (laboratory). When diluting/dissolving, always have the water ready first, then slowly stir in the product. Handle and open container with care. Provision of sufficient ventilation. Clear contaminated areas thoroughly.

Advice on general occupational hygiene

Wash hands before breaks and after work. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed. Keep only in original container.

Incompatible substances or mixtures

Observe hints for combined storage. Incompatible materials: see section 10.

Consideration of other advice:

Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

7.3 Specific end use(s)

No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)

Cou ntr y	Name of agent	CAS No	Identi- fier	TW A [pp m]	TWA [mg/ m ³]	STE L [pp m]	STEL [mg/ m ³]	Ceil ing- C [pp m]	Ceil- ing-C [mg/ m ³]	Nota- tion	Source
EU	hydrogen chloride	7647-01-0	IOELV	5	8	10	15				2000/39/ EC
GB	hydrogen chloride	7647-01-0	WEL	1	2	5	8			ga	EH40/20 05

Notation

Ceiling-C	Ceiling value is a limit value above which exposure should not occur
ga	As gases and aerosols
STEL	Short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)
TWA	Time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

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Relevant DNELs of components						
Name of substance	CAS No	End-point	Threshold level	Protection goal, route of exposure	Used in	Exposure time
Hydrochloric acid ...%	7647-01-0	DNEL	8 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects
Hydrochloric acid ...%	7647-01-0	DNEL	15 mg/m ³	human, inhalatory	worker (industry)	acute - local effects

8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection



Use safety goggle with side protection. Wear face protection.

Skin protection



• hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. Check leak-tightness/impermeability prior to use. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. The times are approximate values from measurements at 22 ° C and permanent contact. Increased temperatures due to heated substances, body heat etc. and a reduction of the effective layer thickness by stretching can lead to a considerable reduction of the breakthrough time. If in doubt, contact manufacturer. At an approx. 1.5 times larger / smaller layer thickness, the respective breakthrough time is doubled / halved. The data apply only to the pure substance. When transferred to substance mixtures, they may only be considered as a guide.

• type of material

NBR (Nitrile rubber)

• material thickness

>0,3 mm

• breakthrough times of the glove material

>480 minutes (permeation: level 6)

• other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

Respiratory protection



Respiratory protection necessary at: Aerosol or mist formation. Type: E (against acidic gases like sulphur dioxide or hydrogen chloride, colour code: Yellow).

Environmental exposure controls

Keep away from drains, surface and ground water.



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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	liquid
Colour	colourless - light yellow
Odour	stinging
Melting point/freezing point	-50 °C
Boiling point or initial boiling point and boiling range	>80 °C
Flammability	non-combustible
Lower and upper explosion limit	not determined
Flash point	not determined
Auto-ignition temperature	not determined
Decomposition temperature	not relevant
pH (value)	<1 (20 °C)
Kinematic viscosity	not determined
Dynamic viscosity	1,9 mPa s at 15 °C

Solubility(ies)

Water solubility	miscible in any proportion

Partition coefficient

Partition coefficient n-octanol/water (log value):	not relevant (inorganic)

Vapour pressure	21 hPa at 20 °C

Density and/or relative density

Density	1,16 g/cm ³ at 20 °C
Relative vapour density	Information on this property is not available.

Particle characteristics	not relevant (liquid)

Other safety parameters

Oxidising properties	none

9.2 Other information

Information with regard to physical hazard classes:

Corrosive to metals	category 1: corrosive to metals

Other safety characteristics:



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Miscibility

completely miscible with water

SECTION 10: Stability and reactivity

10.1 Reactivity

Substance or mixture corrosive to metals.

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Dangerous/dangerous reactions with: strong oxidiser, Aldehydes, Aluminium, Amines, Carbide, Fluorine, Metals, Permanganates, Strong alkali,

Danger of explosion: Alkali metals, Sulphuric acid, concentrated

10.4 Conditions to avoid

Keep away from heat.

10.5 Incompatible materials

different metals

Release of flammable materials with

Metals, Light metals (due to the release of hydrogen in an acid/alkaline medium)

10.6 Hazardous decomposition products

Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Test data are not available for the complete mixture.

Classification procedure

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Classification acc. to GHS

Acute toxicity

Shall not be classified as acutely toxic.

Skin corrosion/irritation

Causes severe skin burns and eye damage.

Serious eye damage/eye irritation

Causes serious eye damage.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

May cause respiratory irritation.

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Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Symptoms related to the physical, chemical and toxicological characteristics

• If swallowed

If swallowed danger of perforation of the esophagus and the stomach (strong corrosive effects)

• If in eyes

causes burns, Causes serious eye damage, risk of blindness

• If inhaled

Irritation to respiratory tract, cough, Dyspnoea, pulmonary oedema

• If on skin

causes severe burns, causes poorly healing wounds

• Other information

Other adverse effects: Circulatory collapse, Cardiac arrhythmias, Symptoms can occur only after several hours

11.2 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

11.3 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Does not contain a PBT-/vPvB-substance at a concentration of $\geq 0,1\%$.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods



This material and its container must be disposed of as hazardous waste. Dispose of contents/container in accordance with local/regional/national/international regulations.

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Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packageings

It is a dangerous waste; only packageings which are approved (e.g. acc. to ADR) may be used. Handle contaminated packages in the same way as the substance itself. Completely emptied packages can be recycled.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

Properties of waste which render it hazardous

HP 4 irritant - skin irritation and eye damage
HP 5 specific target organ toxicity (STOT)/aspiration toxicity
HP 8 corrosive

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions. Non-contaminated packages may be recycled.

SECTION 14: Transport information

14.1 UN number or ID number

ADRRID	UN 1789
IMDG-Code	UN 1789
ICAO-TI	UN 1789

14.2 UN proper shipping name

ADRRID	HYDROCHLORIC ACID
IMDG-Code	HYDROCHLORIC ACID
ICAO-TI	Hydrochloric acid

14.3 Transport hazard class(es)

ADRRID	8
IMDG-Code	8
ICAO-TI	8

14.4 Packing group

ADRRID	II
IMDG-Code	II
ICAO-TI	II

14.5 Environmental hazards

non-environmentally hazardous acc. to the dangerous goods regulations

14.6 Special precautions for user

Provisions for dangerous goods (ADR) should be complied within the premises.

14.7 Maritime transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid $\geq 30\%$, technical

article number: 9280

14.8 Information for each of the UN Model Regulations

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) Additional information

Proper shipping name	HYDROCHLORIC ACID
Particulars in the transport document	UN1789, HYDROCHLORIC ACID, 8, II, (E)
Classification code	C1
Danger label(s)	8



Special provisions (SP)	520
Excepted quantities (EQ)	E2
Limited quantities (LQ)	1 L
Transport category (TC)	2
Tunnel restriction code (TRC)	E
Hazard identification No	80
Emergency Action Code	2R

Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) Additional information

Classification code	C1
Danger label(s)	8



Special provisions (SP)	520
Excepted quantities (EQ)	E2
Limited quantities (LQ)	1 L
Transport category (TC)	2
Hazard identification No	80

International Maritime Dangerous Goods Code (IMDG) - Additional information

Proper shipping name	HYDROCHLORIC ACID
Particulars in the shipper's declaration	UN1789, HYDROCHLORIC ACID, 8, II
Marine pollutant	-
Danger label(s)	8



Excepted quantities (EQ)	E2
Limited quantities (LQ)	1 L

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid $\geq 30\%$, technical

article number: 9280

EmS	F-A, S-B
Stowage category	C
Segregation group	1 - Acids

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Proper shipping name	Hydrochloric acid
Particulars in the shipper's declaration	UN1789, Hydrochloric acid, 8, II
Danger label(s)	8



Special provisions (SP)	A3
Excepted quantities (EQ)	E2
Limited quantities (LQ)	0,5 L

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Deco-Paint Directive

VOC content	0 %
VOC content (Water content was discounted)	0 g/l

Industrial Emissions Directive (IED)

VOC content	0 %
VOC content (Water content was discounted)	0 g/l

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

none of the ingredients are listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

none of the ingredients are listed

Water Framework Directive (WFD)

none of the ingredients are listed

Regulation on the marketing and use of explosives precursors

none of the ingredients are listed

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid ≥ 30 %, technical

article number: 9280

Regulation on drug precursors

Name of substance	CAS No	Wt%	Classification	CN Code	Threshold level
Hydrochloric acid ...%	7647-01-0	32	Category 3	2806 10 00	

Regulation on substances that deplete the ozone layer (ODS)

none of the ingredients are listed

Regulation concerning the export and import of hazardous chemicals (PIC)

none of the ingredients are listed

Regulation on persistent organic pollutants (POP)

none of the ingredients are listed

National regulations(GB)

List of substances subject to authorisation (GB REACH, Annex 14) / SVHC - candidate list

none of the ingredients are listed

Restrictions according to GB REACH, Annex 17

Dangerous substances with restrictions (GB REACH, Annex 17)			
Name of substance	Name acc. to inventory	CAS No	No
Hydrochloric acid	this product meets the criteria for classification in accordance with Regulation No 1272/2008/EC		3

Other information

Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances

Name of substance	CAS No	Listed in	HS code
Hydrochloric acid ...%	7647-01-0	Table II	2806.10

National inventories

Country	Inventory	Status
AU	AIIC	all ingredients are listed
CA	DSL	all ingredients are listed
CN	IECSC	all ingredients are listed
EU	ECSI	all ingredients are listed
EU	REACH Reg.	all ingredients are listed
JP	CSCL-ENCS	all ingredients are listed
JP	ISHA-ENCS	not all ingredients are listed
KR	KECI	all ingredients are listed
MX	INSQ	all ingredients are listed
NZ	NZIoC	all ingredients are listed
PH	PICCS	all ingredients are listed
TR	CICR	not all ingredients are listed

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid $\geq 30\%$, technical

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Country	Inventory	Status
TW	TCSI	all ingredients are listed
US	TSCA	all ingredients are listed (ACTIVE)
VN	NCI	all ingredients are listed

Legend

AIIC	Australian Inventory of Industrial Chemicals
CICR	Chemical Inventory and Control Regulation
CSCL-ENCS	List of Existing and New Chemical Substances (CSCL-ENCS)
DSL	Domestic Substances List (DSL)
EC SI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
INSQ	National Inventory of Chemical Substances
ISHA-ENCS	Inventory of Existing and New Chemical Substances (ISHA-ENCS)
KECI	Korea Existing Chemicals Inventory
NCI	National Chemical Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical safety assessment

Chemical safety assessments for substances in this mixture were not carried out.

SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
2.3	Results of PBT and vPvB assessment: Does not contain a PBT-/vPvB-substance in a concentration of $\geq 0,1\%$.	Results of PBT and vPvB assessment: Does not contain a PBT-/vPvB-substance at a concentration of $\geq 0,1\%$.	yes
2.3	Endocrine disrupting properties: Does not contain an endocrine disruptor (ED) in a concentration of $\geq 0,1\%$.	Endocrine disrupting properties: Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.	yes
15.1	Restrictions according to GB REACH, Annex 17: none of the ingredients are listed	Restrictions according to GB REACH, Annex 17	yes
15.1		Dangerous substances with restrictions (GB REACH, Annex 17): change in the listing (table)	yes
15.1		National inventories: change in the listing (table)	yes

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
2000/39/EC	Commission Directive establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
ATE	Acute Toxicity Estimate
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CN Code	Combined Nomenclature
DGR	Dangerous Goods Regulations (see IATA/DGR)

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Abbr.	Descriptions of used abbreviations
DNEL	Derived No-Effect Level
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
ED	Endocrine disruptor
EH40/2005	EH40/2005 Workplace exposure limits (http://www.nationalarchives.gov.uk/doc/open-government-licence/)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EmS	Emergency Schedule
Eye Dam.	Seriously damaging to the eye
Eye Irrit.	Irritant to the eye
GB CLP	The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use) (Amendment etc.) (EU Exit) Regulations 2019, SI 2019/720 (as amended)
GB REACH	The REACH etc. (Amendment etc.) (EU Exit) Regulations 2019, SI 2019/758 (as amended)
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
HS	Harmonized Commodity Description and Coding System (Harmonized System, drawn up by the World Customs Organisation)
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
ICAO-TI	Technical instructions for the safe transport of dangerous goods by air
IMDG	International Maritime Dangerous Goods Code
IMDG-Code	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
IOELV	Indicative occupational exposure limit value
Met. Corr.	Substance or mixture corrosive to metals
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
Skin Corr.	Corrosive to skin
Skin Irrit.	Irritant to skin
STEL	Short-term exposure limit
STOT SE	Specific target organ toxicity - single exposure
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative
WEL	Workplace exposure limit

Safety data sheet Safety data sheet

acc. to Regulation (EC) No. 1907/2006 (REACH)



Hydrochloric acid $\geq 30\%$, technical

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Key literature references and sources for data

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties. The classification is based on tested mixture.

Health hazards. Environmental hazards. The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

List of relevant phrases (code and full text as stated in section 2 and 3)

Code	Text
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

Warning



SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : R744
SDS no : EIGA018A-R744
Other means of identification : Carbon dioxide
CAS-No. : 124-38-9
EC-No. : 204-696-9
EC Index-No. : ---

REACH registration No : Listed in Annex IV / V REACH, exempted from registration.

Chemical formula : CO₂

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Extinguishing agent.
Industrial and professional uses. Perform risk assessment prior to use.
Test gas/Calibration gas.
Purge gas, diluting gas, inerting gas.
Shield gas for welding processes.
Use for manufacture of electronic/photovoltaic components.
Consumer use.
Treatment of water intended for human consumption.
It is the responsibility of the end user to ensure that the product as supplied is suitable for its intended use.

Uses advised against : None.

1.3. Details of the supplier of the safety data sheet

THE NETHERLANDS:

AIR LIQUIDE BV
De Witbogt 1
5652 AG Eindhoven
the Netherlands-Nederland
Tel: +31 (0)40 250 35 03

BELGIUM:

L'AIR LIQUIDE BELGE S.A./N.V.
Hermeslaan 11
1932 Zaventem
Belgium-Belgique-België
Tel: +32 (0)2 540 86 60

LUXEMBURG:

L'AIR LIQUIDE LUXEMBOURG S.A.
ZONE P.E.D.-B.P.20
L-4801 RODANGE Luxembourg
Tel: +352 26 30 29 03

1.4. Emergency telephone number

Country/Area	Organisation/Company	Address	Emergency number	Comment
Belgium	Centre Anti-Poisons/Antigifcentrum c/o Hôpital Militaire Reine Astrid	Rue Bruyn 1 1120 Bruxelles/Brussel	+32 70 245 245	Please dial: 070 245 245 for any urgent questions about intoxication (free of charge 24/7), if not accessible, dial: 02 264 96 30 (standard fee)
Luxembourg	Centre Anti-Poisons/Antigifcentrum c/o Hôpital Militaire Reine Astrid	Rue Bruyn 1 1120 Bruxelles/Brussel	+352 8002 5500	Free telephone number with a 24/7 access. Experts answer all urgency questions on dangerous products in French, Dutch and English
Netherlands	Nationaal Vergiftigingen Informatie Centrum	Huispostnummer Q03.2.315 Postbus 85500 3508 GA Utrecht	+31 88 755 80 00	Only for the purpose of informing medical personnel in cases of acute intoxications (24 hours a day, 7 days a week)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards Gases under pressure : Liquefied gas H280

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)

:



GHS04

Signal word (CLP)

: Warning

Hazard statements (CLP)

: H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP)

- Storage

: P403 - Store in a well-ventilated place.

Supplemental information

: Asphyxiant in high concentrations.
Contains fluorinated greenhouse gases.

2.3. Other hazards

Contact with liquid may cause cold burns/frostbite.
In high concentrations CO₂ causes rapid circulatory insufficiency even at normal levels of oxygen concentration. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness and death.
Not classified as PBT or vPvB.
The substance/mixture has no endocrine disrupting properties.
Not classified as PMT or vPvM.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
Carbon dioxide	CAS-No.: 124-38-9 EC-No.: 204-696-9 EC Index-No.: --- REACH registration No: *1	100	Press. Gas (Liq.), H280

Full text of H- and EUH-statements: see section 16

Contains no other components or impurities which will influence the classification of the product.

*1: Listed in Annex IV / V REACH, exempted from registration.

*3: Registration not required: Substance manufactured or imported < 1t/y.

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
- Skin contact : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
Low concentrations of CO₂ cause increased respiration and headache.
See section 11.

4.3. Indication of any immediate medical attention and special treatment needed

None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
Product does not burn, use fire control measures appropriate for the surrounding fire.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products : None.

5.3. Advice for firefighters

- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus.
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel : Act in accordance with local emergency plan.
Try to stop release.
Evacuate area.
Ensure adequate air ventilation.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Stay upwind.
See section 8 of the SDS for more information on personal protective equipment.
- For emergency responders : Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Oxygen detectors should be used when asphyxiating gases may be released.
See section 5.3 of the SDS for more information.

6.2. Environmental precautions

- Try to stop release.

6.3. Methods and material for containment and cleaning up

- Ventilate area.

6.4. Reference to other sections

- See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product

: Containers, which contain or have contained flammable or explosive substances, must not be inerted with liquid carbon dioxide. Potential production of solid CO₂ particles must be ruled out. In order to rule out potential electrostatic discharge production, the system must be adequately grounded.

Do not breathe gas.

Avoid release of product into atmosphere.

The product must be handled in accordance with good industrial hygiene and safety procedures.

Only experienced and properly instructed persons should handle gases under pressure.

Consider pressure relief device(s) in gas installations.

Ensure the complete gas system was (or is regularly) checked for leaks before use.

Do not smoke while handling product.

Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.

Avoid suck back of water, acid and alkalis.

Be aware of the risk of formation of static electricity with the use of CO₂ extinguishers. Do not use them in places where a flammable atmosphere may be present.

Safe handling of the gas receptacle

: Do not allow backfeed into the container.

Protect containers from physical damage; do not drag, roll, slide or drop.

When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.

Leave valve protection caps, when provided, in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.

If user experiences any difficulty operating valve discontinue use and contact supplier.

Never attempt to repair or modify container valves or safety relief devices.

Damaged valves should be reported immediately to the supplier.

Keep container valve outlets clean and free from contaminants particularly oil and water.

Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.

Close container valve after each use and when empty, even if still connected to equipment.

Never attempt to transfer gases from one cylinder/container to another.

Never use direct flame or electrical heating devices to raise the pressure of a container.

Do not remove or deface labels provided by the supplier for the identification of the content of the container.

Suck back of water into the container must be prevented.

Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Observe all regulations and local requirements regarding storage of containers.

Containers should not be stored in conditions likely to encourage corrosion.

Container valve guards or caps, when provided, should be in place.

Containers should be stored in the vertical position and properly secured to prevent them from falling over.

Stored containers should be periodically checked for general condition and leakage.

Keep container below 50°C in a well ventilated place.

Store containers in location free from fire risk and away from sources of heat and ignition.

Keep away from combustible materials.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

R744 (124-38-9)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Carbon dioxide
IOEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Belgium - Occupational Exposure Limits	
Local name	Carbone (dioxyde de) # Koolstofdioxide
OEL TWA	9131 mg/m ³
	5000 ppm
OEL STEL	54784 mg/m ³
	30000 ppm
Remark	A: la mention "A" signifie que l'agent libère un gaz ou une vapeur qui n'ont en eux-mêmes aucun effet physiologique mais peuvent diminuer le taux d'oxygène dans l'air. Lorsque le taux d'oxygène descend en dessous de 17-18 % (vol/vol) le manque d'oxygène provoque des suffocations qu'aucun symptôme préalable n'annonce. # A: de vermelding "A" betekent dat dit agens gas of damp vrijgeeft dat of die op zich geen fysiologische werking heeft, maar het zuurstofgehalte in de lucht verlaagt. Wanneer het zuurstofgehalte daalt onder de 17-18 % (vol/vol), veroorzaakt het zuurstoftekort verstikking, die zich manifesteert zonder dat er een waarschuwing aan voorafgaat.
Regulatory reference	Koninklijk besluit/Arrêté royal 16/11/2023
Luxembourg - Occupational Exposure Limits	
Local name	Dioxyde de carbone
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Netherlands - Occupational Exposure Limits	
Local name	Kooldioxide
TGG-8u (OEL TWA)	9000 mg/m ³
	5000 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2024

DNEL (Derived-No Effect Level) : None available.

PNEC (Predicted No-Effect Concentration) : None available.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Provide adequate general and local exhaust ventilation.
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Oxygen detectors should be used when asphyxiating gases may be released.
Consider the use of a work permit system e.g. for maintenance activities.
CO2 detectors should be used when CO2 may be released.

8.2.2. Individual protection measures, e.g. personal protective equipment

- Eye/face protection : Wear goggles when transfilling or breaking transfer connections.
Standard EN 166 - Personal eye-protection - specifications.
- Skin protection : Wear working gloves when handling gas containers.
Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher. Recommended types include wrist gloves from leather or synthetic material with equivalent performance, fabric gloves, fabric gloves with leather palms.
Wear cold insulating gloves when transfilling or breaking transfer connections.
Standard EN 511 - Cold insulating gloves, performance level 1 or higher. Recommended types include insulated gauntlets or gloves specifically selected to prevent liquid penetration and ingress of cryogenic liquids and to provide mechanical resistance.
- Hand protection : Wear safety shoes while handling containers.
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
- Other : Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
Consult respiratory device supplier's product information for the selection of the appropriate device.
Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
- Respiratory protection : None in addition to the above sections.
- Thermal hazards

8.2.3. Environmental exposure controls

None necessary.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
- Physical state at 20°C / 101.3kPa	: Gas.
- Colour	: Colourless.
Odour	: Odourless.
Melting point / Freezing point	: -78,5 °C Melting point at normal conditions does not exist. At atmospheric pressure solid carbon dioxide sublimates into gaseous carbon dioxide at -78.5°C
Boiling point	: -56,6 °C
Flammability	: Non flammable.
Lower explosion limit	: Not applicable.
Upper explosion limit	: Not applicable.
Flash point	: Not applicable for gases and gas mixtures.
Auto-ignition temperature	: Non flammable.
Decomposition temperature	: Not applicable.
pH	: Not applicable for gases and gas mixtures.
Viscosity, kinematic	: Not applicable for gases and gas mixtures.
Water solubility [20°C]	: 2000 mg/l

Partition coefficient n-octanol/water (Log Kow)	: 0,83
Vapour pressure [20°C]	: 57,3 bar(a)
Vapour pressure [50°C]	: No reliable data available.
Density and/or relative density	: Not applicable for gases and gas mixtures.
Relative vapour density (air=1)	: 1,52
Particle characteristics	: Not applicable for gases and gas mixtures. Nanoforms are not relevant for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Oxidising properties	: No oxidising properties.
Critical temperature [°C]	: 31 °C

9.2.2. Other safety characteristics

Molar mass	: 44 g/mol
Other data	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

None.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity	: Toxicological effects not expected by inhalation from this product if occupational exposure limit values are not exceeded.
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/irritation	: No known effects from this product.
Respiratory or skin sensitisation	: No known effects from this product.
Germ cell mutagenicity	: No known effects from this product.
Carcinogenicity	: No known effects from this product.
Toxic for reproduction : Fertility	: No known effects from this product.
Toxic for reproduction : unborn child	: No known effects from this product.
STOT-single exposure	: No known effects from this product.
STOT-repeated exposure	: No known effects from this product.

Aspiration hazard

: Not applicable for gases and gas mixtures.

11.2. Information on other hazards

Other information

: Unlike simple asphyxiants, carbon dioxide has the ability to cause death even when normal oxygen levels (20-21%) are maintained. 5% CO₂ has been found to act synergistically to increase the toxicity of certain other gases (CO, NO₂). CO₂ has been shown to enhance the production of carboxy- or met-hemoglobin by these gases possibly due to carbon dioxide's stimulatory effects on the respiratory and circulatory systems.
For more information, see 'EIGA Safety Info 24: Carbon Dioxide, Physiological Hazards' at www.eiga.eu.
The substance/mixture has no endocrine disrupting properties.

SECTION 12: Ecological information

12.1. Toxicity

Assessment

: No ecological damage caused by this product.

EC50 48h - Daphnia magna [mg/l]

: No data available.

EC50 72h - Algae [mg/l]

: No data available.

LC50 96 h - Fish [mg/l]

: No data available.

12.2. Persistence and degradability

Assessment

: No ecological damage caused by this product.

12.3. Bioaccumulative potential

Assessment

: No ecological damage caused by this product.
Not expected to bioaccumulate due to the low log Kow (log Kow < 4).
See section 9.

12.4. Mobility in soil

Assessment

: No ecological damage caused by this product.

12.5. Results of PBT and vPvB assessment

Assessment

: Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

Assessment

: The substance/mixture has no endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects

: Not classified as PMT or vPvM.

Effect on the ozone layer

: No effect on the ozone layer.

Global warming potential [CO₂=1]

: 1

Effect on global warming

: When discharged in large quantities may contribute to the greenhouse effect.
Contains greenhouse gas(es).

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Discharge to atmosphere in large quantities should be avoided.
Do not discharge into any place where its accumulation could be dangerous.
Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended)

: 16 05 05 : Gases in pressure containers other than those mentioned in 16 05 04.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN number or ID number

In accordance with ADR / RID / IMDG / IATA / ADN

UN-No. : 1013

14.2. UN proper shipping name

Transport by road/rail/inland waterways (ADR/RID/ADN) : CARBON DIOXIDE

Transport by air (ICAO-TI / IATA-DGR) : Carbon dioxide

Transport by sea (IMDG) : CARBON DIOXIDE

14.3. Transport hazard class(es)

Labelling :



2.2 : Non-flammable, non-toxic gases.

Transport by road/rail/inland waterways (ADR/RID/ADN)

Class : 2

Classification code : 2A

Hazard identification number : 20

Tunnel Restriction : C/E - Tank carriage: Passage forbidden through tunnels of category C, D and E. Other carriage: Passage forbidden through tunnels of category E

Transport by air (ICAO-TI / IATA-DGR)

Class / Div. (Sub. risk(s)) : 2.2

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.2

Emergency Schedule (EmS) - Fire : F-C

Emergency Schedule (EmS) - Spillage : S-V

14.4. Packing group

Transport by road/rail/inland waterways (ADR/RID/ADN) : Not applicable.

Transport by air (ICAO-TI / IATA-DGR) : Not applicable.

Transport by sea (IMDG) : Not applicable.

14.5. Environmental hazards

Transport by road/rail/inland waterways (ADR/RID/ADN) : None.

Transport by air (ICAO-TI / IATA-DGR) : None.

Transport by sea (IMDG) : None.

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail/inland waterways (ADR/RID/ADN) : P200.

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : 200.

Cargo Aircraft only : 200.

Transport by sea (IMDG) : P200.

- Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment.
Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

14.7. Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU-Regulations

- Restrictions on use : None.
Other information, restriction and prohibition regulations : Not listed on the PIC list (Regulation EU 649/2012).
Not listed on the POP list (Regulation EU 2019/1021).
Seveso Directive : 2012/18/EU (Seveso III) : Covered.

National regulations

- Regulatory reference : Ensure all national/local regulations are observed.

15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

SECTION 16: Other information

- Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.

Section	Changed item	Comments
	Supersedes version of	Modified
	Revision date	Modified
	Endocrine disrupting properties	Added
1	Relevant identified uses	Modified
2	Supplemental information	Added
2.3	Other hazards which do not result in classification	Modified
7	Safe handling of the gas receptacle	Modified
8	Regulatory reference	Added
8	Regulatory reference	Added
8	TGG-8u (OEL TWA) [ppm]	Added
8	Regulatory reference	Added
8	Local name	Added
8	Local name	Added
8	Local name	Added

8	OEL TWA	Added
8	OEL TWA	Added
8	TGG-8u (OEL TWA)	Added
8	OEL STEL	Added
8	OEL STEL	Added
8	OEL TWA	Added
8	OEL TWA	Added
8	Remark	Added
8	Regulatory reference	Added
8	Local name	Added
8	IOEL TWA [ppm]	Added
8	IOEL TWA	Added
8.2	Appropriate engineering controls	Modified
8.2	Respiratory protection	Modified
9	Particle characteristics	Added
9	Partition coefficient n-octanol/water (Log Pow)	Modified
9	Density	Added
9	Partition coefficient n-octanol/water (Log Kow)	Added
9	Lower explosive limit (LEL)	Added
9	Upper explosive limit (UEL)	Added
9	Melting point	Modified
9	Odour	Modified
9	Vapour pressure at 50°C	Modified
9	Viscosity, kinematic	Modified
9.1	Explosive limits (vol %)	Removed
9.1	Critical temperature	Modified
9.1	Decomposition temperature	Modified
12.7	Other adverse effects	Modified
13.1	Waste treatment methods	Modified
14	Number of blue cones/lights (ADN)	Added
14	Classification code (ADN)	Added
14	Equipment required (ADN)	Added
14	Excepted quantities (ADN)	Added
14	Danger labels (ADN)	Added
14	Limited quantities (ADN)	Added
14	Classification code (RID)	Added
14	Colis express (express parcels) (RID)	Added
14	Excepted quantities (RID)	Added
14	Hazard identification number (RID)	Added

14	Limited quantities (RID)	Added
14	Mixed packing provisions (RID)	Added
14	Packing instructions (RID)	Added
14	Special provisions for carriage - Loading, unloading and handling (RID)	Added
14	Proper Shipping Name (RID)	Added
14	Portable tank and bulk container instructions (RID)	Added
14	Special provisions (RID)	Added
14	Tank codes for RID tanks (RID)	Added
14	Special provisions for RID tanks (RID)	Added
14	Transport category (RID)	Added
14	UN-No. (RID)	Modified
14.1	UN-No. (ADN)	Added
14.2	Proper Shipping Name (ADN)	Added
14.3	Danger labels (RID)	Added
14.6	Special provisions (ADN)	Added
14.6	Special provisions (ADR)	Modified
15	Seveso Directive : 2012/18/EU (Seveso III)	Modified
16	Abbreviations and acronyms	Modified

Abbreviations and acronyms

: ATE - Acute Toxicity Estimate.
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008.
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006.
EINECS - European Inventory of Existing Commercial Chemical Substances.
CAS# - Chemical Abstract Service number.
PPE - Personal Protection Equipment.
LC50 - Lethal Concentration to 50 % of a test population.
RMM - Risk Management Measures.
PBT - Persistent, Bioaccumulative and Toxic.
vPvB - Very Persistent and Very Bioaccumulative.
STOT- SE : Specific Target Organ Toxicity - Single Exposure.
CSA - Chemical Safety Assessment.
EN - European Standard.
UN - United Nations.
ADR - Agreement concerning the International Carriage of Dangerous Goods by Road.
IATA - International Air Transport Association.
IMDG code - International Maritime Dangerous Goods.
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail.
WGK - Water Hazard Class.
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure.
UFI : Unique Formula Identifier.
ADN -International Carriage of Dangerous Goods by Inland Waterways.
PROC -Process category
.
ERC – Environmental release category.
PMT - Persistent, Mobile and Toxic.
vPvM – very Persistent and very Mobile.

Safety Data Sheet

R744

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
SDS Reference Number: EIGA018A-R744

- Training advice : The hazard of asphyxiation is often overlooked and must be stressed during operator training.
For more guidance, refer to EIGA SL 01 "Dangers of Asphyxiation", downloadable at <http://www.eiga.eu>.
- Further information : Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).
Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at <http://www.Eiga.eu>.

Full text of H- and EUH-statements	
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
H280	Contains gas under pressure; may explode if heated.

- DISCLAIMER OF LIABILITY : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

End of document

SAFETY DATA SHEET

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SECTION 1. IDENTIFICATION

Product name : NGSH-100

Article-No. : 340515

Other means of identification : No data available

Manufacturer or supplier's details

Company name of supplier : Klüber Lubrication NA LP
9010 County Road 2120
Tyler, Texas 75707
USA
Phone: +1 903 534 8021
Fax: +1 903 581 4376
info@us.kluber.com

Klüber Lubrication NA LP
32 Industrial Drive
Londonderry, NH 03053
USA
Phone: +1 603 647 4104
Fax: +1 603 647 4106
info@us.kluber.com

E-mail address of person responsible for the SDS : mcm@us.kluber.com

Emergency telephone number : +1 517 545 7070 NCEC

Recommended use of the chemical and restrictions on use

Recommended use : Lubricating oil

Restrictions on use : Restricted to professional users.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the Hazardous Products Regulations

Reproductive toxicity : Category 2

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GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Suspected of damaging fertility.

Precautionary statements :

Prevention:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
IF exposed or concerned: Get medical advice/ attention.

Storage:
Store locked up.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Chemical nature : ester oil
Synthetic hydrocarbon oil

Components

Chemical name	Common Name/Synonym	CAS-No.	Concentration (% w/w)
White mineral oil (petroleum)	White mineral oil (petroleum)	8042-47-5	Trade secret** ($\geq 1 - < 5$ %)
Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based	Lubricating oils (petroleum), C15-30, hydrotreated	72623-86-0	Trade secret** ($\geq 1 - < 5$ %)

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	neutral oil-based; Baseoil — unspecified		
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	68411-46-1	Trade secret** ($\geq 1 - < 5$ *)
2,5-bis(octyldithio)-1,3,4-thiadiazole	2,5-bis(octyldithio)-1,3,4-thiadiazole	13539-13-4	Trade secret** ($\geq 0.1 - < 1$ *)
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	68411-46-1	Trade secret** ($\geq 1 - < 5$ *)

* Actual concentration or concentration range is withheld as a trade secret

* Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

- If inhaled : Obtain medical attention.
Remove person to fresh air. If signs/symptoms continue, get medical attention.
Keep patient warm and at rest.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
If breathing is irregular or stopped, administer artificial respiration.
- Obtain medical attention.
Remove person to fresh air. If signs/symptoms continue, get medical attention.
Keep patient warm and at rest.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
If breathing is irregular or stopped, administer artificial respiration.
- In case of skin contact : Take off all contaminated clothing immediately.
Get medical attention immediately if irritation develops and

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persists.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.
Wash off immediately with plenty of water.

Take off all contaminated clothing immediately.
Get medical attention immediately if irritation develops and persists.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.
Wash off immediately with plenty of water.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 10 minutes.
If eye irritation persists, consult a specialist.

Rinse immediately with plenty of water, also under the eyelids, for at least 10 minutes.
If eye irritation persists, consult a specialist.

If swallowed : Move the victim to fresh air.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
Do NOT induce vomiting.
Obtain medical attention.
Rinse mouth with water.
Never give anything by mouth to an unconscious person.

Move the victim to fresh air.
If unconscious, place in recovery position and seek medical advice.
Keep respiratory tract clear.
Do NOT induce vomiting.
Obtain medical attention.
Rinse mouth with water.
Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed : May cause an allergic skin reaction.
Allergic appearance
No symptoms known or expected.
Suspected of damaging fertility.

Notes to physician : The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.
Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

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Suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media : High volume water jet

High volume water jet

Hazardous combustion products : Carbon oxides
Nitrogen oxides (NOx)

Carbon oxides
Nitrogen oxides (NOx)

Further information : Standard procedure for chemical fires.

Standard procedure for chemical fires.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.
Exposure to decomposition products may be a hazard to health.

In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.
Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Evacuate personnel to safe areas.
Use personal protective equipment.
Ensure adequate ventilation.
Do not breathe vapours or spray mist.

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Refer to protective measures listed in sections 7 and 8.
Evacuate personnel to safe areas.
Use personal protective equipment.
Ensure adequate ventilation.
Do not breathe vapours or spray mist.
Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Try to prevent the material from entering drains or water courses.
Prevent further leakage or spillage if safe to do so.
Local authorities should be advised if significant spillages cannot be contained.

Do not allow contact with soil, surface or ground water.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Do not breathe vapours or spray mist.
Avoid contact with skin and eyes.
For personal protection see section 8.
Persons with a history of skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Smoking, eating and drinking should be prohibited in the application area.
Wash hands and face before breaks and immediately after handling the product.
Do not get in eyes or mouth or on skin.
Do not get on skin or clothing.
Do not ingest.
Do not repack.
Do not re-use empty containers.

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These safety instructions also apply to empty packaging which may still contain product residues.
Keep container closed when not in use.

Do not breathe vapours or spray mist.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Wash hands and face before breaks and immediately after handling the product.
Do not get in eyes or mouth or on skin.
Do not get on skin or clothing.
Do not ingest.
Do not repack.
Do not re-use empty containers.
These safety instructions also apply to empty packaging which may still contain product residues.
Keep container closed when not in use.

Conditions for safe storage : Store in original container.
Keep container closed when not in use.
Keep in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store in accordance with the particular national regulations.
Keep in properly labelled containers.

Store in original container.
Keep container closed when not in use.
Keep in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Store in accordance with the particular national regulations.
Keep in properly labelled containers.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
White mineral oil (petroleum)	8042-47-5	TWA (Mist)	5 mg/m3	CA AB OEL (2009-04-30)
		STEL (Mist)	10 mg/m3	CA AB OEL (2009-04-30)

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		TWAEV (Mist - Inhalable dust)	5 mg/m3	CA QC OEL (2022-04-13)
		TWA (Mist)	1 mg/m3	CA BC OEL (2021-01-04)
		TWA (Inhalable particulate matter)	5 mg/m3	ACGIH (2013-03-01)
Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based	72623-86-0	TWA (Mist)	5 mg/m3	CA AB OEL (2009-04-30)
		STEL (Mist)	10 mg/m3	CA AB OEL (2009-04-30)
		TWAEV (Mist - Inhalable dust)	5 mg/m3	CA QC OEL (2022-04-13)
		TWA (Mist)	1 mg/m3	CA BC OEL (2021-01-04)
		TWA (Inhalable particulate matter)	5 mg/m3	ACGIH (2013-03-01)

Contains no substances with occupational exposure limit values.

Engineering measures : Handle only in a place equipped with local exhaust (or other appropriate exhaust).

Handle only in a place equipped with local exhaust (or other appropriate exhaust).

Personal protective equipment

Respiratory protection : Not required; except in case of aerosol formation.

Filter type : Filter type A-P

Hand protection

Material : Nitrile rubber

Break through time : > 10 min

Protective index : Class 1

Remarks : Wear protective gloves. The break through time depends amongst other things on the material, the thickness and the type of glove and therefore has to be measured for each case.

Eye protection : Safety glasses with side-shields

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- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.
- Protective measures : The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
- Hygiene measures : Wash face, hands and any exposed skin thoroughly after handling.
Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

- Physical state : liquid
- Colour : yellow
- Odour : characteristic
- Odour Threshold : No data available
- Melting point/ range : No data available
- Boiling point/boiling range : No data available
- Flammability : Flammability (solid, gas):
Not applicable
- Upper explosion limit / Upper flammability limit : No data available
- Lower explosion limit / Lower flammability limit : No data available
- Flash point : 246 °C

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Method: ISO 2592, open cup

Auto-ignition temperature	:	400 °C
Self-ignition	:	No data available
Decomposition temperature	:	No data available
pH	:	Not applicable
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	98.6 mm ² /s (40 °C)
Solubility(ies)		
Water solubility	:	insoluble
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Vapour pressure	:	< 0.001 hPa (20 °C)
Density	:	0.87 g/cm ³ (20 °C)
Relative density	:	0.862 (20 °C) Reference substance: Water The value is calculated
Relative vapour density	:	No data available
Bulk density	:	No data available
Particle characteristics		
Other information		
Evaporation rate	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	No data available
Sublimation point	:	No data available

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SECTION 10. STABILITY AND REACTIVITY

Reactivity	: No hazards to be specially mentioned.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: No dangerous reaction known under conditions of normal use.
Conditions to avoid	: No conditions to be specially mentioned.
Incompatible materials	: No materials to be especially mentioned.
Hazardous decomposition products	: No decomposition if stored and applied as directed.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Based on available data, the classification criteria are not met.

Product:

Acute oral toxicity	: Remarks: This information is not available.
Acute inhalation toxicity	: Remarks: This information is not available.
Acute dermal toxicity	: Symptoms: Redness, Local irritation

Components:

White mineral oil (petroleum):

Acute oral toxicity	: LD50 (Rat): > 5,000 mg/kg Method: OECD Test Guideline 401
Acute inhalation toxicity	: LC50 (Rat): > 5 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: OECD Test Guideline 403 Assessment: The substance or mixture has no acute inhalation toxicity
Acute dermal toxicity	: LD50 (Rabbit): > 2,000 mg/kg Method: OECD Test Guideline 402 Assessment: The substance or mixture has no acute dermal toxicity

Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based:

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Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401
GLP: yes

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg
Method: OECD Test Guideline 402
GLP: yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg

Acute inhalation toxicity : Assessment: The component/mixture is moderately toxic after short term inhalation.

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg
Method: OECD Test Guideline 401

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Based on available data, the classification criteria are not met.

Product:

Remarks : This information is not available.

Components:

White mineral oil (petroleum):

Species : Rabbit
Assessment : No skin irritation
Method : OECD Test Guideline 404

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Result : No skin irritation
GLP : yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species : Rabbit
Assessment : No skin irritation
Method : OECD Test Guideline 404
Result : No skin irritation

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Species : Rabbit
Assessment : Irritating to skin.
Result : Irritating to skin.

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species : Rabbit
Assessment : No skin irritation
Method : OECD Test Guideline 404
Result : No skin irritation

Serious eye damage/eye irritation

Based on available data, the classification criteria are not met.

Product:

Remarks : This information is not available.

Components:

White mineral oil (petroleum):

Species : Rabbit
Result : No eye irritation
Assessment : No eye irritation
Method : OECD Test Guideline 405
GLP : yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species : Rabbit
Result : No eye irritation
Assessment : No eye irritation
Method : OECD Test Guideline 405

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Species : Rabbit
Result : No eye irritation
Assessment : No eye irritation

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Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species	:	Rabbit
Result	:	No eye irritation
Assessment	:	No eye irritation
Method	:	OECD Test Guideline 405

Respiratory or skin sensitisation

Skin sensitisation

Based on available data, the classification criteria are not met.

Respiratory sensitisation

Based on available data, the classification criteria are not met.

Product:

Remarks : This information is not available.

Components:

White mineral oil (petroleum):

Test Type	:	Buehler Test
Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Method	:	OECD Test Guideline 406
Result	:	Does not cause skin sensitisation.
GLP	:	yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species	:	Guinea pig
Assessment	:	Did not cause sensitisation on laboratory animals.
Method	:	OECD Test Guideline 406
Result	:	Did not cause sensitisation on laboratory animals.

2,5-bis(octyldithio)-1,3,4-thiadiazole:

Species	:	Guinea pig
Assessment	:	May cause sensitisation by skin contact.
Result	:	May cause sensitisation by skin contact.

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Species	:	Guinea pig
Assessment	:	Did not cause sensitisation on laboratory animals.
Method	:	OECD Test Guideline 406
Result	:	Did not cause sensitisation on laboratory animals.

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Germ cell mutagenicity

Based on available data, the classification criteria are not met.

Product:

Genotoxicity in vitro : Remarks: No data available

Genotoxicity in vivo : Remarks: No data available

Components:

White mineral oil (petroleum):

Germ cell mutagenicity - Assessment : Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Carcinogenicity

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

Components:

White mineral oil (petroleum):

Carcinogenicity - Assessment : No evidence of carcinogenicity in animal studies.

Reproductive toxicity

Suspected of damaging fertility.

Product:

Effects on fertility : Remarks: No data available

Effects on foetal development : Remarks: No data available

Components:

White mineral oil (petroleum):

Reproductive toxicity - Assessment : - Fertility -
No toxicity to reproduction
- Teratogenicity -
No effects on or via lactation

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Reproductive toxicity - : - Fertility -

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Assessment Some evidence of adverse effects on sexual function and fertility, based on animal experiments.

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Reproductive toxicity - : - Fertility -
Assessment Some evidence of adverse effects on sexual function and fertility, based on animal experiments.

STOT - single exposure

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

Components:

White mineral oil (petroleum):

Assessment : The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Based on available data, the classification criteria are not met.

Product:

Remarks : No data available

Components:

White mineral oil (petroleum):

Assessment : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Repeated dose toxicity

Product:

Remarks : This information is not available.

Aspiration toxicity

Based on available data, the classification criteria are not met.

Product:

This information is not available.

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Components:

White mineral oil (petroleum):

May be fatal if swallowed and enters airways.

Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based:

May be fatal if swallowed and enters airways.

Further information

Product:

Remarks : Information given is based on data on the components and the toxicology of similar products.

Remarks : Information given is based on data on the components and the toxicology of similar products.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish : Remarks: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Toxicity to daphnia and other aquatic invertebrates : Remarks: No data available

Toxicity to algae/aquatic plants : Remarks: No data available

Toxicity to microorganisms : Remarks: No data available

Components:

White mineral oil (petroleum):

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
Exposure time: 96 h
Test Type: semi-static test
Method: OECD Test Guideline 203

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Toxicity to daphnia and other aquatic invertebrates : LC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : NOEC (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to fish (Chronic toxicity) : NOEC (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
Exposure time: 28 d
Remarks: The value is given based on a SAR/AAR approach using OECD Toolbox, DEREK, VEGA QSAR models (CAESAR models), etc.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): >= 1,000 mg/l
Exposure time: 21 d
Remarks: The value is given based on a SAR/AAR approach using OECD Toolbox, DEREK, VEGA QSAR models (CAESAR models), etc.

Toxicity to microorganisms : LC50 (Bacteria): > 1,000 mg/l
Exposure time: 40 h
Test Type: Growth inhibition

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Toxicity to fish : LC50 (Danio rerio (zebra fish)): > 100 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 51 mg/l
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : EC50 (Desmodesmus subspicatus (green algae)): > 100 mg/l
Exposure time: 72 h
Test Type: static test
Method: OECD Test Guideline 201

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2,5-bis(octyldithio)-1,3,4-thiadiazole:

Ecotoxicology Assessment

Chronic aquatic toxicity : May cause long lasting harmful effects to aquatic life.

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Toxicity to fish : LC50 (Danio rerio (zebra fish)): > 100 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203

Toxicity to daphnia and other : EC50 (Daphnia magna (Water flea)): 51 mg/l
aquatic invertebrates
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202

Toxicity to algae/aquatic : EC50 (Desmodesmus subspicatus (green algae)): > 100 mg/l
plants
Exposure time: 72 h
Test Type: static test
Method: OECD Test Guideline 201

Persistence and degradability

Product:

Biodegradability : Remarks: No data available

Physico-chemical : Remarks: No data available
removability

Components:

White mineral oil (petroleum):

Biodegradability : Biodegradation: 31 %
Exposure time: 28 d

Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based:

Biodegradability : aerobic
Inoculum: activated sludge
Result: Not readily biodegradable.
Biodegradation: 31 %

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Exposure time: 28 d
GLP: yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Biodegradability : aerobic
Inoculum: activated sludge
Result: Not rapidly biodegradable
Biodegradation: 1 %
Exposure time: 28 d
Method: OECD Test Guideline 301B
GLP: yes

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Biodegradability : aerobic
Inoculum: activated sludge
Result: Not rapidly biodegradable
Biodegradation: 1 %
Exposure time: 28 d
Method: OECD Test Guideline 301B
GLP: yes

Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Product does not contain substances which are persistent, bioaccumulative, and toxic (PBT) at levels of 0.1% or higher.
Product does not contain substances which are very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Components:

White mineral oil (petroleum):

Partition coefficient: n- : log Pow: > 6
octanol/water

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

Partition coefficient: n- : log Pow: 5.2 - 10.82
octanol/water

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene:

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Partition coefficient: n-octanol/water : log Pow: 5.2 - 10.82

Mobility in soil

Product:

Mobility : Remarks: No data available

Distribution among environmental compartments : Remarks: No data available

Other adverse effects

Product:

Additional ecological information : Harmful to aquatic life with long lasting effects.

Components:

White mineral oil (petroleum):

Results of PBT and vPvB assessment : Substance is not persistent, bioaccumulative, and toxic (PBT).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
Do not dispose of with domestic refuse.
Dispose of as hazardous waste in compliance with local and national regulations.

The product should not be allowed to enter drains, water courses or the soil.
Do not dispose of with domestic refuse.
Dispose of as hazardous waste in compliance with local and national regulations.

Contaminated packaging : Packaging that is not properly emptied must be disposed of as the unused product.
Dispose of waste product or used containers according to local regulations.

Packaging that is not properly emptied must be disposed of as the unused product.

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Dispose of waste product or used containers according to local regulations.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations

TDG

Not regulated as a dangerous good

Special precautions for user

Not applicable

SECTION 15. REGULATORY INFORMATION

Canadian lists

No substances are subject to a Significant New Activity Notification.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
CA AB OEL	:	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
CA BC OEL	:	Canada. British Columbia OEL
CA QC OEL	:	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
ACGIH / TWA	:	8-hour, time-weighted average
CA AB OEL / TWA	:	8-hour Occupational exposure limit

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CA AB OEL / STEL : 15-minute occupational exposure limit
CA BC OEL / TWA : 8-hour time weighted average
CA QC OEL / TWAEV : Time-weighted average exposure value

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Revision Date : 2025-06-05
Date format : yyyy/mm/dd

|| Relevant changes compared to the last edition are highlighted at the left margin. This version replaces all previous editions.

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the Internet) is not permitted without our express written consent. We provide our customers with amended safety data sheets as prescribed by law. The customer is responsible for passing on safety data sheets and any amendments contained therein to its own customers, employees and other users of the product. We provide no guarantee that safety data sheets received by users from third parties are up-to-date. All information and instructions in this safety data sheet have been compiled to the best of our knowledge and are based on the information available to us on the day of publication. The information provided is intended to describe the product in relation to the required safety measures; it is neither an assurance of characteristics nor a guarantee of the product's suitability for particular applications and does not justify any contractual legal relationship. The existence of a safety data sheet for a particular jurisdiction does not necessarily mean that import or use within that jurisdiction is legally permitted. If you have any questions, please contact your responsible sales contact or authorized trading partner.

Section 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier****Product name:** REFRIGERANT R290**Product code:** R290**Synonyms:** REFRIGERANT GRADE PROPANE**1.2. Relevant identified uses of the substance or mixture and uses advised against****1.3. Details of the supplier of the safety data sheet****Company name:** National Refrigerants Ltd

4 Watling Close

Sketchley Meadows Business Park

Hinckley

Leicestershire

LE10 3EZ

United Kingdom

Tel: 01455 630790**Fax:** 01455 630791**Email:** sds@nationalref.com**1.4. Emergency telephone number****Emergency tel:** Carechem24 +44 (0)1865 407333**Section 2: Hazards identification****2.1. Classification of the substance or mixture****Classification under CLP:** Flam. Gas 1: H220; Press. Gas: H280**Most important adverse effects:** Extremely flammable gas. Contains gas under pressure; may explode if heated.**2.2. Label elements****Label elements:****Hazard statements:** H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Hazard pictograms: GHS02: Flame

GHS04: Gas cylinder

**Signal words:** Danger**Precautionary statements:** P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.

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No smoking.

P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381: Eliminate all ignition sources if safe to do so.

P403: Store in a well-ventilated place.

P410: Protect from sunlight.

2.3. Other hazards

Other hazards: In use, may form flammable / explosive vapour-air mixture.

PBT: This product is not identified as a PBT/vPvB substance.

Section 3: Composition/information on ingredients

3.2. Mixtures

Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Do not use hot water. If frostbite has occurred call a physician.

Eye contact: Bathe the eye with running water for 15 minutes. Consult a doctor.

Ingestion: Not applicable.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so. If unconscious, check for breathing and apply artificial respiration if necessary. Consult a doctor.

4.2. Most important symptoms and effects, both acute and delayed

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

Ingestion: Not applicable.

Inhalation: There may be drowsiness, slurred speech, muscular weakness, muscle twitching, tremor, blurred vision, dilated pupils and shock.

4.3. Indication of any immediate medical attention and special treatment needed

Immediate / special treatment: Not applicable.

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: Alcohol resistant foam. Water spray. Carbon dioxide. Dry chemical powder. Suitable extinguishing media for the surrounding fire should be used. Use water spray to cool containers.

5.2. Special hazards arising from the substance or mixture

Exposure hazards: Flammable. In combustion emits toxic fumes. Forms explosive air-vapour mixture.

[cont...]

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5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Refer to section 8 of SDS for personal protection details. Notify the police and fire brigade immediately. Eliminate all sources of ignition. If outside keep bystanders upwind and away from danger point.

6.2. Environmental precautions

Environmental precautions: Stop release if safe to do so. Prevent from entering sewers, basements and work pits, or any place where the accumulation can be dangerous.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Do not use equipment in clean-up procedure which may produce sparks. Material evaporates. Ventilate the area, especially low or enclosed places where heavy vapours might collect.

6.4. Reference to other sections

Reference to other sections: Refer to section 8 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Smoking is forbidden. Use non-sparking tools. Ensure there is sufficient ventilation of the area. Avoid the formation or spread of mists in the air.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a cool, well ventilated area. Keep container tightly closed. Keep away from sources of ignition. Prevent the build up of electrostatic charge in the immediate area. Ensure lighting and electrical equipment are not a source of ignition.

Suitable packaging: Must only be kept in original packaging.

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Workplace exposure limits: No data available.

DNEL/PNEC Values

DNEL / PNEC No data available.

[cont...]

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8.2. Exposure controls

Engineering measures: Ensure there is sufficient ventilation of the area. Ensure lighting and electrical equipment are not a source of ignition.

Respiratory protection: Respiratory protection not required.

Hand protection: Protective gloves.

Eye protection: Safety glasses with side-shields. Safety goggles. Face-shield. Ensure eye bath is to hand.

Skin protection: Protective clothing.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Liquified gas

Colour: Colourless

Odour: Characteristic odour

Boiling point/range°C: -42.1

Flammability limits %: lower: 2.2

upper: 9.5

Autoflammability°C: 470

Vapour pressure: 8.3 Bar @ 20oC

Relative density: 1.5 (Air=1)

9.2. Other information

Other information: No data available.

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions. Stable at room temperature.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions.

Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat. Hot surfaces. Sources of ignition. Flames.

10.5. Incompatible materials

Materials to avoid: Strong oxidising agents. Strong acids.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes.

Section 11: Toxicological information

[cont...]

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11.1. Information on toxicological effects

Toxicity values: No data available.

Symptoms / routes of exposure

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

Ingestion: Not applicable.

Inhalation: There may be drowsiness, slurred speech, muscular weakness, muscle twitching, tremor, blurred vision, dilated pupils and shock.

Section 12: Ecological information

12.1. Toxicity

Ecotoxicity values: No data available.

12.2. Persistence and degradability

Persistence and degradability: Biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential: No bioaccumulation potential.

12.4. Mobility in soil

Mobility: Readily absorbed into soil.

12.5. Results of PBT and vPvB assessment

PBT identification: This product is not identified as a PBT/vPvB substance.

12.6. Other adverse effects

Other adverse effects: Negligible ecotoxicity.

Section 13: Disposal considerations

13.1. Waste treatment methods

Disposal operations: Product evaporates.

Recovery operations: Consult manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licenced instalation.

Disposal of packaging: Return to supplier.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

14.1. UN number

UN number: UN1978

[cont...]

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14.2. UN proper shipping name

Shipping name: PROPANE

14.3. Transport hazard class(es)

Transport class: 2

14.4. Packing group

14.5. Environmental hazards

Environmentally hazardous: No

Marine pollutant: No

14.6. Special precautions for user

Special precautions: No special precautions.

Tunnel code: B/D

Transport category: 2

Section 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Specific regulations: Not applicable.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out for the substance or the mixture by the supplier.

Section 16: Other information

Other information

Other information: This safety data sheet is prepared in accordance with Commission Regulation (EU) No 2015/830.

* indicates text in the SDS which has changed since the last revision.

Phrases used in s.2 and s.3: H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Legal disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any damage resulting from handling or from contact with the above product.

Section 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier****Product name:** REFRIGERANT R1270**CAS number:** 115-07-1**EINECS number:** 204-062-1**Product code:** R1270**Synonyms:** PROPYLENE**1.2. Relevant identified uses of the substance or mixture and uses advised against****Use of substance / mixture:** PC16: Heat transfer fluids.**1.3. Details of the supplier of the safety data sheet****Company name:** National Refrigerants Ltd

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Tel: 01455 630790**Fax:** 01455 630791**Email:** sds@nationalref.com**1.4. Emergency telephone number****Emergency tel:** Carechem24 +44 (0)1865 407333**Section 2: Hazards identification****2.1. Classification of the substance or mixture****Classification under CLP:** Flam. Gas 1: H220; Press. Gas: H280**Most important adverse effects:** Extremely flammable gas. Contains gas under pressure; may explode if heated.**2.2. Label elements****Label elements:****Hazard statements:** H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Hazard pictograms: GHS02: Flame

GHS04: Gas cylinder



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Signal words: Danger

Precautionary statements: P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.
No smoking.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381: Eliminate all ignition sources if safe to do so.
P403: Store in a well-ventilated place.

2.3. Other hazards

Other hazards: In use, may form flammable / explosive vapour-air mixture.

PBT: This product is not identified as a PBT/vPvB substance.

Section 3: Composition/information on ingredients

3.1. Substances

Chemical identity: REFRIGERANT R1270

CAS number: 115-07-1

EINECS number: 204-062-1

Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Do not use hot water. If frostbite has occurred call a physician.

Eye contact: Bathe the eye with running water for 15 minutes. Consult a doctor.

Ingestion: Not applicable.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so. If unconscious, check for breathing and apply artificial respiration if necessary. Consult a doctor.

4.2. Most important symptoms and effects, both acute and delayed

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

Ingestion: Not applicable.

Inhalation: Causes asphyxiation in high concentrations. Gas reduces oxygen available for breathing.

4.3. Indication of any immediate medical attention and special treatment needed

Immediate / special treatment: Not applicable.

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: Alcohol resistant foam. Water spray. Carbon dioxide. Dry chemical powder. Suitable extinguishing media for the surrounding fire should be used. Use water spray to cool containers.

[cont...]

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5.2. Special hazards arising from the substance or mixture

Exposure hazards: Flammable. In combustion emits toxic fumes. Forms explosive air-vapour mixture.

5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Refer to section 8 of SDS for personal protection details. Notify the police and fire brigade immediately. Eliminate all sources of ignition. If outside keep bystanders upwind and away from danger point.

6.2. Environmental precautions

Environmental precautions: Stop release if safe to do so. Prevent from entering sewers, basements and work pits, or any place where the accumulation can be dangerous.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Do not use equipment in clean-up procedure which may produce sparks. Material evaporates. Ventilate the area, especially low or enclosed places where heavy vapours might collect.

6.4. Reference to other sections

Reference to other sections: Refer to section 8 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Smoking is forbidden. Use non-sparking tools. Ensure there is sufficient ventilation of the area. Avoid the formation or spread of mists in the air.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a cool, well ventilated area. Keep container tightly closed. Keep away from sources of ignition. Prevent the build up of electrostatic charge in the immediate area. Ensure lighting and electrical equipment are not a source of ignition.

Suitable packaging: Must only be kept in original packaging.

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Workplace exposure limits: No data available.

[cont...]

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DNEL/PNEC Values

DNEL / PNEC No data available.

8.2. Exposure controls

Engineering measures: Ensure there is sufficient ventilation of the area. Ensure lighting and electrical equipment are not a source of ignition.

Respiratory protection: Respiratory protection not required.

Hand protection: Protective gloves.

Eye protection: Safety glasses with side-shields. Safety goggles. Face-shield. Ensure eye bath is to hand.

Skin protection: Protective clothing.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Liquified gas

Colour: Colourless

Odour: Characteristic odour

Boiling point/range°C: -47.7

Melting point/range°C: -185

Flammability limits %: lower: 1.8

upper: 11

Flash point°C: -108

Autoflammability°C: 455

Vapour pressure: Not applicable.

9.2. Other information

Other information: No data available.

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions. Stable at room temperature.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions.
Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat. Hot surfaces. Sources of ignition. Flames.

10.5. Incompatible materials

Materials to avoid: Strong oxidising agents. Strong acids.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes.

[cont...]

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Section 11: Toxicological information

11.1. Information on toxicological effects

Toxicity values: No data available.

Symptoms / routes of exposure

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

Ingestion: Not applicable.

Inhalation: Causes asphyxiation in high concentrations. Gas reduces oxygen available for breathing.

Section 12: Ecological information

12.1. Toxicity

Ecotoxicity values: No data available.

12.2. Persistence and degradability

Persistence and degradability: Biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential: No bioaccumulation potential.

12.4. Mobility in soil

Mobility: Readily absorbed into soil.

12.5. Results of PBT and vPvB assessment

PBT identification: This product is not identified as a PBT/vPvB substance.

12.6. Other adverse effects

Other adverse effects: R1270: Global Warming Potential (GWP): 2 (CO₂=1)

Section 13: Disposal considerations

13.1. Waste treatment methods

Disposal operations: Product evaporates.

Recovery operations: Consult manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licenced instalation.

Disposal of packaging: Return to supplier.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

14.1. UN number

UN number: UN1077

[cont...]

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14.2. UN proper shipping name

Shipping name: PROPYLENE

14.3. Transport hazard class(es)

Transport class: 2

14.4. Packing group

14.5. Environmental hazards

Environmentally hazardous: No

Marine pollutant: No

14.6. Special precautions for user

Special precautions: No special precautions.

Tunnel code: B/D

Transport category: 2

Section 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Specific regulations: Not applicable.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out for the substance or the mixture by the supplier.

Section 16: Other information

Other information

Other information: This safety data sheet is prepared in accordance with Commission Regulation (EU) No 2015/830.

* indicates text in the SDS which has changed since the last revision.

Phrases used in s.2 and s.3: H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

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SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT: PROPYLENE GLYCOL (Inhibited Solution)

PRODUCT CODES: 55PG30, 5PG96, 5PG40, 55PG40, 55PG45, 275PG35D, 55PG35D, 55PG35, 1PG70, 5PG70, 55PG70, PROPYL55G

CHEMICAL NAME/FAMILY: Glycols

OTHER NAME: Coolant

MANUFACTURER: NATIONAL REFRIGERANTS, INC.

ADDRESS: 11401 Roosevelt Boulevard Phila., Pa. 19154

INFORMATION: 800-262-0012

EMERGENCY: 800-424-9300

DATE: 1/2021

PREPARER: Matt Callahan

2. HAZARD IDENTIFICATION

CLASSIFICATION: Not classified as hazardous according to 29 CFR 1910.1200 (2012)

OTHER HAZARDS: SKIN AND EYE CONTACT: Prolonged contact may cause minor skin irritation.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Propylene Glycol	(CAS#57-55-6)	35-96 %
Demineralized Water	(CAS#7732-18-5)	< 65 %
Dipotassium Hydrogen Phosphate	(CAS#7758-11-4)	< 5 %

COMMON NAME and SYNONYM:

Coolant

There are no stabilizers or impurities that contribute to the classification of the material identified in section 2

4. FIRST AID MEASURES

INHALATION:	Move person to fresh air; if effects occur, consult a physician.
EYE CONTACT:	Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.
SKIN CONTACT:	Wash skin with plenty of water.
INGESTION:	No emergency medical treatment necessary.



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ADVICE TO PHYSICIANS: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Water fog of fine spray. Dry chemical & carbon dioxide fire extinguishers. Foam. Do not use direct water stream, may spread fire. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Liquid mist of the product can burn. Flammable concentrations of vapor can accumulate at temperatures above flash point.

FIRE FIGHTING PROCEDURES: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of re-ignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream, may spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

SPECIAL PROTECTIVE

EQUIPMENT FOR FIREFIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide, Carbon dioxide.



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6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:

Small spills: Absorb with materials such as—cat litter, sawdust, vermiculite. Collect in suitable and properly labeled container.

Large spills: Dike area to contain spill. Recover spilled material if possible. See Disposal Considerations section for additional information.

PERSONAL PRECAUTIONS: Use appropriate safety equipment. For additional information, refer to Exposure Controls and Personal Protection section.

ENVIRONMENTAL PRECAUTIONS: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Ecological Information section.

7. HANDLING AND STORAGE

HANDLING: (Always wear recommended personal protective equipment)

Ventilation: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

Other Precautions: Spills of these organic materials on hot fibrous insulations may lead to lowering of the auto- ignition temperatures possibly resulting in spontaneous combustion.

STORAGE: Store below: 121 deg. C (250 deg. F). Do not store in: galvanized steel.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Propylene glycol	NA	NA	10 mg/m3 TWA 8 AIHA WEEL

PERSONAL PROTECTION

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. In dusty or misty atmospheres, use and approved particulate respirator.

Ventilation: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

Eye Protection: Use safety glasses.



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Other Protective Equipment: No precautions other than clean body-covering clothing should be needed. Use gloves chemically resistant to this material.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Light Blue Liquid
ODOR:	Mild
ODOR THRESHOLD:	Not Determined
PH:	9-11
FREEZING POINT:	≤ -51 deg. C / ≤ -60 deg. F
BOILING POINT:	(760 mmHg) 162 deg. C / 323 deg. F
FLASH POINT:	102 deg. C / 216 deg. F Closed Cup
EVAPORATION RATE:	0.07 (Butyl Acetate = 1)
FLAMMABILITY LEL/UEL:	LEL=2.6%(V)100 deg.C UEL=12.5%(V)130 deg.C
VAPOR PRESSURE:	0.7 mmHg 20 deg. C
VAPOR DENSITY:	2.6 (Air=1)
RELATIVE DENSITY:	1.05 (Water=1) 20 deg. C
SOLUBILITY:	100% by weight 20 deg. C
PARTITION COEFFICIENT	Not Determined
n-Octanol/water:	Not Determined
AUTO IGNITION TEMPERATURE:	416 deg. C / 780 deg. F
DECOMPOSITION TEMPERATURE:	Not Determined
VISCOSITY:	Low
PERCENT VOLATILES:	98 wt.%

NOTE: Physical and Chemical Properties are based on a 96% solution of Propylene Glycol. Diluted concentrations of Propylene Glycol may have slightly different Properties.

10. STABILITY AND REACTIVITY

STABILITY/INSTABILITY: Thermally stable at recommended temperatures and pressures.

CONDITIONS TO AVOID: Product can oxidize at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

MATERIALS TO AVOID: Avoid contact with: Strong acids, strong bases and strong oxidizers.

THERMAL DECOMPOSITION: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes, Alcohols, and Ethers.

HAZARDOUS POLYMERIZATION: Will not occur.



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11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

PERORAL

Rat; female; LD50 = 20300 mg/kg

PERCUTANEOUS

Based on information for a similar material:

Rabbit; LD50=> 10000 mg/kg

DEVELOPMENTAL TOXICITY: Contains component(s) which did not cause birth defects or any other fetal effects in lab animals. The component(s) is/are: Propylene glycol.

REPRODUCTIVE TOXICITY: Contains component(s) which did not interfere with reproduction in animal studies. Contains component(s) which did not interfere with fertility in animal studies. The component(s) is/are: Propylene glycol.

CHRONIC TOXICITY AND CARCINOGENICITY: Similar formulations did not cause cancer in laboratory animals.

GENETIC TOXICOLOGY:

In Vitro: In vitro genetic toxicity studies were negative.

In Vitro: Genetic toxicity studies in animals were negative for component(s) tested.

SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

POTENTIAL HEALTH EFFECTS:

EFFECTS OF SINGLE ACUTE OVEREXPOSURE

INHALATION: At room temperature, exposure to vapor is minimal due to low volatility. Mist may cause irritation of upper respiratory tract (nose and throat).

EYE CONTACT: May cause slight temporary eye irritation. Corneal injury is unlikely.

SKIN CONTACT: Prolonged contact is essentially nonirritating to the skin. Repeated contact may cause flaking and softening of skin.

SKIN ABSORPTION: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

INGESTION: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.



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CHRONIC, PROLONGED OR REPEATED OVEREXPOSURE

EFFECTS OF REPEATED OVEREXPOSURE: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

OTHER EFFECTS OF OVEREXPOSURE: No information currently available.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE: Based largely or completely on information for: Propylene glycol. Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Degradation is expected in the atmospheric environment within minutes to hours.

ECOTOXICITY: Based largely or completely on information for: Propylene glycol. Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50 > 100 mg/L in the most sensitive species tested).

FURTHER INFORMATION: Based largely or completely on information for: Propylene glycol. Bio-concentration potential is low (BCF < 100 or Log Pow < 3). Potential for mobility in soil is very high (Koc between 0 and 50).

13. DISPOSAL CONSIDERATIONS

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OR WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. NATIONAL REFRIGERANTS HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN THIS SDS'S COMPOSITION INFORMATION SECTION. FOR UNUSED & UNCONTAMINATED PRODUCT, THE PREFERRED OPTIONS INCLUDED SENDING TO A LICENSED, PERMITTED: RECYCLER. RECLAIMER. INCINERATOR OR OTHER THERMAL DESTRUCTION DEVICE.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:

NON-BULK-----Not Regulated by DOT

BULK-----Not Regulated by DOT



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15.REGULATORY INFORMATION

FEDERAL/NATIONAL:

OSHA Hazard communication standard

This product is not a “hazardous chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-To Know Act of 1986) Section 313

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-To Know Act of 1986) Section 302

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-To Know Act of 1986) Section 311 & 312

Delayed (Chronic) Health Hazard: No
Fire Hazard: No
Immediate (Acute) Health Hazard: No
Reactive Hazard: No
Sudden Release of Pressure Hazard: No

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

CEPA – Domestic substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

European Inventory of Existing Commercial Chemical Substances (EINECS)

All components of this product are on the EINECS inventory or are exempt from EINECS inventory requirements.

STATE/LOCAL:

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or

Pennsylvania Environmental Hazardous Substance List:



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The following product components are cited in the Pennsylvania Hazardous Substance List and/or the

Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS#
Propylene glycol	57-55-6

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

California SCAQMD Rule 443.1 (South Coast Air Quality Management District Rule 443.1, Labeling of Materials Containing Organic Solvents)

VOC: Vapor pressure 0.66 mmHg @ 20 deg. C
1002 g/l VOC
1030 g/l less water and less exempted solvents

This section provides selected regulatory information on this product including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

16. OTHER INFORMATION

(NFPA RATINGS)

HEALTH:	0
FIRE:	1
REACTIVITY:	0

DISCLAIMER:

INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BELIEVED TO BE ACCURATE AT THE TIME OF PREPARATION. NO WARRANTY IS MADE CONCERNING THE ACCURACY AND NO LIABILITY SHALL BE MADE FOR CLAIMS FOR USE OR RELIANCE OF THE RECOMMENDATIONS CONTAINED HEREIN

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(30222040/SDS_GEN_US/EN)

1. Identification

Product identifier used on the label

Sodium Hydroxide Solution 50%

Recommended use of the chemical and restriction on use

Recommended use*: industrial chemicals

Recommended use*: Raw material; initial product for chemical syntheses; process chemical

* The "Recommended use" identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:

BASF CORPORATION

100 Park Avenue

Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

24 Hour Emergency Response Information

CHEMTREC: 1-800-424-9300

BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification

2. Hazards Identification

According to Regulation 2024 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

Met. Corr.	1	Corrosive to metals
Skin Corr.	1A	Skin corrosion
Eye Dam.	1	Serious eye damage

Label elements

Pictogram:

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Signal Word:

Danger

Hazard Statement:

H290

May be corrosive to metals.

H314

Causes severe skin burns and eye damage.

Precautionary Statements (Prevention):

P280

Wear protective gloves, protective clothing and eye protection or face protection.

P260

Do not breathe mist or vapour.

P264

Wash contaminated body parts thoroughly after handling.

P234

Keep only in original packaging.

Precautionary Statements (Response):

P305 + P351 + P338

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310

Immediately call a POISON CENTER or physician.

P303 + P361 + P353

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

P304 + P340

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P301 + P330 + P331

IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

P363

Wash contaminated clothing before reuse.

P390

Absorb spillage to prevent material damage.

Precautionary Statements (Storage):

P405

Store locked up.

P406

Store in a corrosion-resistant container with a resistant inner liner.

Precautionary Statements (Disposal):

P501

Dispose of contents/container in accordance with local regulations.

Hazards not otherwise classified

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.

High risk of slipping due to leakage/spillage of product.

3. Composition / Information on Ingredients

According to Regulation 2024 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Sodium Hydroxide

CAS Number: 1310-73-2

Content (W/W): ≥ 45.0 - $\leq 55.0\%$

Synonym: Sodium hydroxide; Caustic soda

Potassium hydroxide

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CAS Number: 1310-58-3
Content (W/W): $\geq 0.1 - \leq 1.0\%$
Synonym: Potassium hydroxide

4. First-Aid Measures

Description of first aid measures

General advice:

Immediately remove contaminated clothing. First aid personnel should pay attention to their own safety. If the patient is likely to become unconscious, place and transport in stable sideways position (recovery position).

If inhaled:

Keep patient calm, remove to fresh air, seek medical attention. Immediately administer a corticosteroid from a controlled/metered dose inhaler.

If on skin:

Immediately wash thoroughly with plenty of water, apply sterile dressings, consult a skin specialist.

If in eyes:

Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

If swallowed:

Immediately rinse mouth and then drink 200-300 ml of water, seek medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms: skin corrosion, irritates the eyes and respiratory tract, coughing, dyspnea, cyanosis, lung oedema

Information on: Sodium Hydroxide

Symptoms: Overexposure may cause: vomiting, circulatory collapse, death, stenosis, dyspnea, salivation, severe pain

Hazards: Symptoms can appear later.

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment:	Treat according to symptoms (decontamination, vital functions), no known specific antidote. Pulmonary odema prophylaxis. Medical monitoring for at least 24 hours. If necessary, give oxygen.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
water spray, foam

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Unsuitable extinguishing media for safety reasons:
ABC powder

Additional information:
Product will not burn.

Use extinguishing measures to suit surroundings.

Special hazards arising from the substance or mixture

Hazards during fire-fighting:
corrosive gases/vapours

Advice for fire-fighters

Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:

Contaminated extinguishing water must be disposed of in accordance with official regulations.
Product itself is non-combustible; fire extinguishing method of surrounding areas must be considered.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid contact with the skin, eyes and clothing.

Environmental precautions

Do not empty into drains. Due to the pH-value of the product, neutralization is generally required before discharging sewage into treatment plants.

Methods and material for containment and cleaning up

For large amounts: Pump off product.
For residues: Rinse away with water.

7. Handling and Storage

Precautions for safe handling

Avoid aerosol formation. Avoid contact with the skin, eyes and clothing.

Protection against fire and explosion:
The substance/product is non-combustible.

Conditions for safe storage, including any incompatibilities

Segregate from acids and acid forming substances.

Suitable materials for containers: Stainless steel 1.4301 (V2), Stainless steel 1.4401, Stainless steel 1.4402 (V4A), Stainless steel 1.4404, Stainless steel 1.4436, Stainless steel 1.4541, Stainless steel 1.4551, Stainless steel 1.4571, High density polyethylene (HDPE), glass

Further information on storage conditions: Store only in corrosion proof containers.

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Protect from temperatures below: 12 °C

The packed product must be protected from temperatures below the indicated one.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

Sodium Hydroxide	ACGIH, US:	CLV 2 mg/m ³ ;
	OSHA Z1:	PEL 2 mg/m ³ ;
	NIO ID, US:	IDLH 10 mg/m ³ ; IDLH values based on the 1994 Revised Criteria

Advice on system design:

Provide local exhaust ventilation to control vapours/mists.

Personal protective equipment

Respiratory protection:

Wear a NIOSH-certified (or equivalent) respirator as necessary. Do not exceed the maximum use concentration for the respirator facepiece/cartridge combination. For emergency or non-routine, high exposure situations, use a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

Observe OSHA regulations for respirator use (29 CFR 1910.134).

Hand protection:

Chemical resistant protective gloves should be worn to prevent all skin contact., Suitable materials may include, polyvinylchloride (Pylox), chloroprene rubber (Neoprene), fluoroelastomer (Viton), nitrile rubber (Buna N), butyl rubber, Consult with glove manufacturer for testing data., Protective glove selection must be based on the user's assessment of the workplace hazards.

Eye protection:

Tightly fitting safety goggles (chemical goggles) and face shield.

Body protection:

Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

General safety and hygiene measures:

Avoid contact with the skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice. Eye wash fountains and safety showers must be easily accessible.

9. Physical and Chemical Properties

Physical state:	liquid	
Form:	solution	
Odour:	odourless	
Odour threshold:	not applicable, odour not perceivable	
Colour:	colourless	
pH value:	14	(pH Meter)

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freezing range:	10 - 15 °C	
	Literature data.	
Melting point:	No data available.	
Freezing point:	No data available.	
Boiling point:	approx. 142 °C	
	Literature data.	
Sublimation point:	No applicable information available.	
Flash point:	The substance/product is non-combustible.	
Flammability:	not flammable	(derived from flash point)
Lower explosion limit:	For liquids not relevant for classification and labelling.	
Upper explosion limit:	For liquids not relevant for classification and labelling.	
Autoignition:	not applicable	
Vapour pressure:	0.5 mbar (20 °C) Literature data. 2.5 mbar (40 °C) Literature data. 9 mbar (60 °C) Literature data. 1.5289 g/cm3 (15 °C) Literature data. 1.5251 g/cm3 (20 °C) Literature data. 1.5251 g/cm3 (50 °C) Literature data.	
Density:		
Relative density:	No data available.	
Relative vapour density:	not determined	
Partitioning coefficient n-octanol/water (log Pow):	The value has not been determined because the substance is inorganic.	
Self-ignition temperature:	not self-igniting	
Thermal decomposition:	Stable up to boiling point.	
Viscosity, dynamic:	approx. 40 mPa.s (30 °C) Literature data. 78 mPa.s (20 °C) 50 mPa.s (27 °C)	
Viscosity, kinematic:	No applicable information available.	
Solubility in water:	soluble	
Miscibility with water:	completely (e.g. >=90%)	
Solubility (quantitative):	No data available.	
Solubility (qualitative):	No data available.	
Molecular weight:	No applicable information available.	

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Evaporation rate: negligible, Value can be approximated from Henry's Law Constant or vapor pressure.

Particle characteristics

Particle size distribution: The substance / product is marketed or used in a non solid or granular form.

10. Stability and Reactivity

Reactivity

No hazardous reactions if stored and handled as prescribed/indicated., Strong exothermic reaction with acids.

Corrosion to metals:

Corrosive effect on: Aluminium

Oxidizing properties:

not fire-propagating

Chemical stability

The product is chemically stable.

Possibility of hazardous reactions

Reacts with light metals, with evolution of hydrogen.

Conditions to avoid

Incompatible materials

| acids

Hazardous decomposition products

Decomposition products:

| Possible decomposition products: alkaline vapours, caustics

Thermal decomposition:

Stable up to boiling point.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity

Assessment of acute toxicity: The toxicity of the product is based on its corrosivity.

Oral

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Information on: Sodium Hydroxide
Study scientifically not justified.

Inhalation

Information on: Sodium Hydroxide
Study scientifically not justified.

Dermal

Due to the corrosive properties of the substance higher doses cannot be tested. Study does not need to be conducted.

Irritation / corrosion

Assessment of irritating effects: Causes severe burns.

Information on: Sodium Hydroxide
Assessment of irritating effects: Highly corrosive! Damages skin and eyes.

Skin

Species: rabbit

Result: Corrosive.

Data refer to a diluted aqueous solution of the substance.

Eye

Study scientifically not justified.

Sensitization

Information on: Sodium Hydroxide
Assessment of sensitization:
The substance did not cause skin sensitization in humans.

Patch-Test

Species: human

Result: Non-sensitizing.

Method: Human patch test

Aspiration Hazard

not applicable

Chronic Toxicity/Effects

Repeated dose toxicity

Information on: Sodium Hydroxide
Assessment of repeated dose toxicity: Prolonged exposure to high concentrations may cause discomfort and ulceration of nasal passages.
After repeated administration the prominent effect is the induction of corrosion.

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Genetic toxicity

Assessment of mutagenicity: Most of the results from the available studies show no evidence of a mutagenic effect. Literature data.

Information on: Sodium Hydroxide

Assessment of mutagenicity: No valid studies concerning mutagenic properties are available. Study scientifically not justified.

Carcinogenicity

Assessment of carcinogenicity: Study scientifically not justified.

Information on: Sodium Hydroxide

Assessment of carcinogenicity: Study scientifically not justified.

Reproductive toxicity

Assessment of reproduction toxicity: No data available.

Information on: Sodium Hydroxide

Assessment of reproduction toxicity: Study scientifically not justified.

Teratogenicity

Information on: Sodium Hydroxide

Assessment of teratogenicity: Study scientifically not justified.

12. Ecological Information

Toxicity

Aquatic toxicity

Information on: Sodium Hydroxide

Assessment of aquatic toxicity:

Depending on local conditions and existing concentrations, disturbances in the nitrification process of activated sludge are possible. There is a high probability that the product is not acutely harmful to aquatic organisms.

The effect strongly depends on the pH-value. The data refers to the dissociated form of the substance.

Toxicity to fish

Information on: Sodium Hydroxide

LC50 (96 h) 125 mg/l, Gambusia affinis (other, static)

The product will cause changes in the pH value of the test system. The result refers to an unneutralized sample. Literature data.

Aquatic invertebrates

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*Information on: Sodium Hydroxide
EC50 (48 h) 40.4 mg/l, Ceriodaphnia sp. (other, static)
Literature data.*

Persistence and degradability

Assessment biodegradation and elimination (H₂O)

Inorganic product which cannot be eliminated from water by biological purification processes.

Bioaccumulative potential

Bioaccumulation potential

Accumulation in organisms is not to be expected.

Mobility in soil

Assessment transport between environmental compartments

Adsorption to solid soil phase is not expected.

Because of the high water solubility, part of the product will immediately dissolve.

Information on: Sodium Hydroxide

The substance will not evaporate into the atmosphere from the water surface.

Adsorption to solid soil phase is not expected.

Study scientifically not justified.

Additional information

Other ecotoxicological advice:

Due to the pH-value of the product, neutralization is generally required before discharging sewage into treatment plants. After neutralization only the relatively minor harmful effect of the resulting salts remains.

13. Disposal considerations

Waste disposal of substance:

Contact waste centre regarding recycling. Contact manufacturer regarding recycling.

Container disposal:

Transport containers should be completely emptied and returned.

14. Transport Information

Land transport

USDOT

Hazard class: 8

Packing group: II

ID number: UN 1824

Hazard label: 8

Proper shipping name: SODIUM HYDROXIDE SOLUTION

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Sea transport

IMDG

Hazard class: 8
Packing group: II
ID number: UN 1824
Hazard label: 8
Marine pollutant: NO
Proper shipping name: SODIUM HYDROXIDE SOLUTION

Air transport

IATA/ICAO

Hazard class: 8
Packing group: II
ID number: UN 1824
Hazard label: 8
Proper shipping name: SODIUM HYDROXIDE SOLUTION

15. Regulatory Information

Federal Regulations

Registration status:

Chemical TSCA, US

All substances are TSCA listed and active.

EPCRA 311/312 (Hazard categories): Refer to SDS section 2 for GHS hazard classes applicable for this product.

CERCLA RQ

1000 LBS

CAS Number

1310-73-2

Chemical name

Sodium Hydroxide

State regulations

State RTK

PA

NJ

CAS Number

1310-73-2

1310-73-2

Chemical name

Sodium Hydroxide

Sodium Hydroxide

Safe Drinking Water & Toxic Enforcement Act, CA Prop. 65:

WARNING: This product can expose you to chemicals including Nickel (metallic), which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov.

NFPA Hazard codes:

Health: 3 Fire: 0 Reactivity: 0 Special:

16. Other Information

SDS Prepared by:

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BASF NA Product Regulations
SDS Prepared on: 2026/04/27

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

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Previous version: 5.0

END OF DATA SHEET

Safety data sheet

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BASF Safety data sheet
Date / Revised: 28.01.2025
Product: **Sorbead R 2860**

Version: 9.1

(30492480/SDS_GEN_SG/EN)

Date of print: 23.05.2026

1. Substance/preparation and manufacturer/supplier identification

Product name:
Sorbead R 2860

Use: Solid material for drying of liquids and gases

Recommended use: Desiccant, adsorbent

Manufacturer/supplier:

BASF South East Asia Pte Ltd.
128 Beach Road #18-01
Guoco Midtown, 189773, Singapore
Telephone: +65 8322 4420
Telefax number: +65 6 334-0330
E-mail address: benny.zou@basf.com

Emergency information:

Singapore Emergency Toll-Free Number:
Telephone: +65 31638374
International emergency number:
Telephone: +49 180 2273-112

2. Hazard identification

Classification of the substance and mixture:

No need for classification according to GHS criteria for this product.

Label elements and precautionary statement:

The product does not require a hazard warning label in accordance with GHS criteria.

Other hazards which do not result in classification:

No specific dangers known, if the regulations/notes for storage and handling are considered.

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Product: **Sorbead R 2860**

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(30492480/SDS_GEN_SG/EN)

Date of print: 23.05.2026

3. Composition/information on ingredients

Chemical nature

Substance nature: Substance

adsorbent

Aluminatesilicate (Content (W/W): 99.75 %)
CAS Number: 1327-36-2

4. First-Aid Measures

General advice:

Remove contaminated clothing.

If inhaled:

Keep patient calm, remove to fresh air.

On skin contact:

Wash thoroughly with soap and water

On contact with eyes:

Wash affected eyes for at least 15 minutes under running water with eyelids held open.

On ingestion:

Rinse mouth and then drink 200-300 ml of water.

Note to physician:

Symptoms: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11., (Further) symptoms and / or effects are not known so far

Treatment: Symptomatic treatment (decontamination, vital functions).

5. Fire-Fighting Measures

Suitable extinguishing media:

water spray, foam, dry powder

Additional information:

Use extinguishing measures to suit surroundings.

Specific hazards:

No particular hazards known.

Special protective equipment:

Wear a self-contained breathing apparatus.

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Further information:

Product itself is non-combustible; fire extinguishing method of surrounding areas must be considered. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

6. Accidental Release Measures

Personal precautions:

Avoid dust formation. Do not breathe dust. Avoid contact with the skin, eyes and clothing. Use personal protective clothing. Information regarding personal protective measures, see section 8.

Environmental precautions:

Discharge into the environment must be avoided.

Methods for cleaning up or taking up:

Avoid raising dust. Dampen, pick up mechanically and dispose of. Dispose of absorbed material in accordance with regulations. Reclaim for processing if possible.

7. Handling and Storage

Handling

Avoid dust formation. Avoid inhalation of dusts. Avoid contact with the skin, eyes and clothing. Wear suitable protective clothing and gloves. Provide suitable exhaust ventilation at the processing machines. Ensure adequate ventilation. Keep container tightly closed.

Protection against fire and explosion:

The product is not an oxidizer, not self-combustible and not explosive. The substance/product is non-combustible.

Storage

Suitable materials for containers: Carbon steel (Iron), Low density polyethylene (LDPE), High density polyethylene (HDPE)

Further information on storage conditions: Containers should be stored tightly sealed in a dry place.

8. Exposure controls and personal protection

Components with occupational exposure limits

Aluminatesilicate, 1327-36-2;

TWA value 1 mg/m³ (ACGIHTLV), Respirable fraction

Personal protective equipment

Respiratory protection:

Particle filter with high efficiency for solid and liquid particles (e.g. EN 143 or 149, Type P3 or FFP3).
Self-contained breathing apparatus.

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Hand protection:

Suitable chemical resistant safety gloves (EN ISO 374-1) also with prolonged, direct contact
(Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to
EN ISO 374-1): E.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), butyl rubber (0.7 mm) etc.

Eye protection:

Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Body protection:

No body protection required if used for intended purpose and satisfying generally accepted industrial hygiene rules.

General safety and hygiene measures:

Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	beads
Colour:	light brown to brown
Odour:	odourless
Odour threshold:	not applicable, odour not perceivable
pH value:	4 (water)
Melting point:	> 55 °C not determined
Boiling point:	not determined
Flash point:	not applicable, the product is a solid
Evaporation rate:	The product is a non-volatile solid.
Flammability (solid/gas):	Not a flammable solid according to UN transport regulations division 4.1 and GHS chapter 2.7. The product is not combustible.
Lower explosion limit:	For solids not relevant for classification and labelling.
Upper explosion limit:	For solids not relevant for classification and labelling.
Ignition temperature:	No data available.

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Thermal decomposition:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1. No decomposition if correctly stored and handled.
Self ignition:	not self-igniting
Self heating ability:	It is not a substance capable of spontaneous heating according to UN transport regulations class 4.2.
SADT:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1.
Explosion hazard:	not explosive
Fire promoting properties:	not fire-propagating
Radioactivity:	not radioactive for transport purposes
Vapour pressure:	(20 °C) negligible
Relative density:	No data available.
Bulk density:	400 - 900 kg/m ³
Relative vapour density (air):	The product is a non-volatile solid.
Solubility in water:	not soluble
Miscibility with water:	not soluble
Partitioning coefficient n-octanol/water (log Pow):	not applicable for mixtures
Viscosity, dynamic:	not applicable, the product is a solid
Viscosity, kinematic:	not applicable, the product is a solid

Particle characteristics

Particle size distribution:	No data available. -	
Specific Surface Area:	500 - 800 m ² /g	(MSSA)
Particle Shape:	spheres, Fraction (Weight): 100 %	
Dustiness:	No data available.	

10. Stability and Reactivity

Conditions to avoid:
 Avoid dust formation. Avoid humidity.

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Product: **Sorbead R 2860**

Version: 9.1

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Date of print: 23.05.2026

Thermal decomposition: Not a substance liable to self-decomposition according to UN transport regulations, class 4.1. No decomposition if correctly stored and handled.

Substances to avoid:
strong acids, strong bases, strong oxidizing agents

Corrosion to metals: No corrosive effect on metal.

Hazardous reactions:
No hazardous reactions when stored and handled according to instructions.
The product is stable if stored and handled as prescribed/indicated.

Hazardous decomposition products:
No hazardous decomposition products known.

Chemical stability:
The product is chemically stable.

Reactivity:
No hazardous reactions if stored and handled as prescribed/indicated.

11. Toxicological Information

Routes of exposure

Acute oral toxicity

Experimental/calculated data:
ATE (oral): > 5,000 mg/kg

Acute inhalation toxicity

ATE (by inhalation): > 5 mg/l 4 h
Determined for dust

Acute dermal toxicity

ATE (dermal): > 5,000 mg/kg

Assessment of acute toxicity

Virtually nontoxic after a single ingestion. Virtually nontoxic by inhalation. Virtually nontoxic after a single skin contact.

Information on: Aluminatesilicate

Acute oral toxicity

Experimental/calculated data:
LD50 rat (oral): > 5,000 mg/kg (OECD Guideline 401)
No mortality was observed. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

LD50 rat (oral): > 2,000 mg/kg (OECD Guideline 423)

No mortality was observed. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate

Acute inhalation toxicity

Experimental/calculated data:

LC50 rat (by inhalation): > 5,055 mg/l 4 h (OECD Guideline 436)

No mortality was observed. Tested as dust aerosol.

Information on: Aluminatesilicate

Acute dermal toxicity

Experimental/calculated data:

LD50 rabbit (dermal): > 5,000 mg/kg (similar to OECD guideline 402)

No mortality was observed. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Symptoms

Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11.

(Further) symptoms and / or effects are not known so far

Irritation

Assessment of irritating effects:

Based on available data, the classification criteria are not met.

Experimental/calculated data:

Skin corrosion/irritation: No data available.

Serious eye damage/irritation: No data available.

Information on: Aluminatesilicate

Experimental/calculated data:

Skin corrosion/irritation In vitro assay: non-irritant (OECD Guideline 439)

Information on: Aluminatesilicate

Experimental/calculated data:

Serious eye damage/irritation In vitro assay: non-irritant (OECD Guideline 492)

Respiratory/Skin sensitization

Assessment of sensitization:

Based on available data, the classification criteria are not met.

Experimental/calculated data:

No data available.

Information on: Aluminatesilicate

Assessment of sensitization:

Skin sensitizing effects were not observed in animal studies. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Germ cell mutagenicity

Assessment of mutagenicity:

Based on available data, the classification criteria are not met.

Information on: Aluminatesilicate

Assessment of mutagenicity:

Mutagenicity tests revealed no genotoxic potential. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Carcinogenicity

Assessment of carcinogenicity:

Based on available data, the classification criteria are not met.

Experimental/calculated data:

No data available.

Information on: Aluminatesilicate

Assessment of carcinogenicity:

In long-term studies in rats in which the substance was given by feed, a carcinogenic effect was not observed. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Reproductive toxicity

Assessment of reproduction toxicity:

Not classified, due to lack of data.

Experimental/calculated data:

No data available.

Information on: Aluminatesilicate

Assessment of reproduction toxicity:

The results of animal studies gave no indication of a fertility impairing effect. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Developmental toxicity

Assessment of teratogenicity:

Based on available data, the classification criteria are not met.

Information on: Aluminatesilicate

Assessment of teratogenicity:

No indications of a developmental toxic / teratogenic effect were seen in animal studies. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Specific target organ toxicity (single exposure)

Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:

Based on available data, the classification criteria are not met.

Experimental/calculated data:

No data available.

Information on: Aluminatesilicate

Assessment of repeated dose toxicity:

The substance may cause damage to the lung after repeated inhalation of high doses. The product has not been fully tested. The statements have been derived in parts from products of a similar structure or composition.

Aspiration hazard

No aspiration hazard expected.

Other relevant toxicity information

The product has not been tested. The statement has been derived from the properties of the individual components. The product has been assessed on the basis of the components' available data. To some extent data gaps exist for individual components. According to our present knowledge and experience dangers which are not covered by the current labeling are not to be expected.

12. Ecological Information

Ecotoxicity

Assessment of aquatic toxicity:

There is a high probability that the product is not acutely harmful to aquatic organisms. Based on long-term (chronic) toxicity study data, the product is very likely not harmful to aquatic organisms.

Toxicity to fish:

No data available.

Aquatic invertebrates:

No data available.

Aquatic plants:

No data available.

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Microorganisms/Effect on activated sludge:
No data available.

Chronic toxicity to fish:
No data available.

Chronic toxicity to aquatic invertebrates:
No data available.

Information on: Aluminatesilicate

Toxicity to fish:

LC0 (96 h) 10,000 mg/l, Brachydanio rerio (OECD 203; ISO 7346; 92/69/EWG, C.1, static)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

other (96 h) 10,000 mg/l, Brachydanio rerio (OECD Guideline 203, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate

Aquatic invertebrates:

EC50 (48 h) > 10,000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (48 h) > 1,000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (48 h) > 100 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (24 h) > 1,000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (24 h) > 1,000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (48 h) > 5,000 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (24 h) > 10,000 mg/l, Daphnia magna (Screening (style of OECD 202), static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate

Aquatic plants:

EC50 (72 h) 2,500 mg/l (growth rate), Scenedesmus subspicatus (OECD Guideline 201, static)

Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (72 h) > 1,000 mg/l (growth rate), *Scenedesmus subspicatus* (OECD Guideline 201, other)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (72 h) > 173.1 mg/l (growth rate), *Desmodesmus subspicatus* (OECD Guideline 201, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EL50 (72 h) > 10,000 mg/l (growth rate), *Scenedesmus subspicatus* (OECD Guideline 201, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (72 h) > 100 mg/l (growth rate), *Desmodesmus subspicatus* (OECD Guideline 201, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (72 h) > 500 mg/l (growth rate), *Skeletonema costatum* (OECD Guideline 201, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

EC50 (72 h) > 1,000 mg/l (growth rate), *Desmodesmus subspicatus* (OECD Guideline 201, static)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate
Microorganisms/Effect on activated sludge:
Study scientifically not justified.

Information on: Aluminatesilicate
Chronic toxicity to fish:
Study scientifically not justified.

Information on: Aluminatesilicate
Chronic toxicity to aquatic invertebrates:
No observed effect concentration (21 d), 1,000 mg/l, *Daphnia magna* (OECD Guideline 211, semistatic)
Nominal concentration. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

No observed effect concentration (21 d), 68 mg/l, *Daphnia magna* (OECD Guideline 211, semistatic)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

No observed effect concentration (21 d), 132.7 mg/l, *Daphnia magna* (OECD Guideline 211, semistatic)
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

No observed effect concentration (21 d), 250 mg/l, Daphnia magna (OECD Guideline 211, semistatic)

The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Mobility

Assessment transport between environmental compartments:

Adsorption to solid soil phase is possible.

The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate

Assessment transport between environmental compartments:

No data available.

Study scientifically not justified.

No data available.

Study scientifically not justified.

Persistence and degradability

Assessment biodegradation and elimination (H₂O):

Not applicable for inorganic substances.

Bioaccumulation potential

Assessment bioaccumulation potential:

Significant accumulation in organisms is not to be expected.

The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Information on: Aluminatesilicate

Assessment bioaccumulation potential:

Accumulation in organisms is not to be expected.

Additional information

Other ecotoxicological advice:

The product has not been tested. The statement has been derived from the properties of the individual components. The product has been assessed on the basis of the components' available data. To some extent data gaps exist for individual components. According to our present knowledge and experience dangers which are not covered by the current labeling are not to be expected.

13. Disposal Considerations

Dispose of in accordance with national, state and local regulations.

This SDS does NOT apply to used catalysts when the product characteristics are not identical to the ones of the title product.

Used catalysts may have different hazardous properties than the original products.

All waste materials should be reviewed to determine the applicable hazards (testing may be necessary).

BASF Safety data sheet
 Date / Revised: 28.01.2025
 Product: **Sorbead R 2860**

Version: 9.1

(30492480/SDS_GEN_SG/EN)

Date of print: 23.05.2026

Contact specialized companies about recycling.

Contaminated packaging:

Dispose of in accordance with national, state and local regulations.

Contaminated packaging should be emptied as far as possible and disposed of in the same manner as the substance/product.

14. Transport Information

Domestic transport:

	Not classified as a dangerous good under transport regulations
UN number or ID number	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

Sea transport

IMDG

	Not classified as a dangerous good under transport regulations
UN number or ID number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
	Marine pollutant: no
Special precautions for user	None known

Air transport

IATA/ICAO

	Not classified as a dangerous good under transport regulations
UN number or ID number	Not applicable
Proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

Maritime transport in bulk according to IMO instruments

Maritime transport in bulk is not intended.

BASF Safety data sheet
Date / Revised: 28.01.2025
Product: **Sorbead R 2860**

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Date of print: 23.05.2026

15. Regulatory Information

Other regulations

16. Other Information

Vertical lines in the left hand margin indicate an amendment from the previous version.

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. This safety data sheet is neither a Certificate of Analysis (CoA) nor technical data sheet and shall not be mistaken for a specification agreement. Identified uses in this safety data sheet do neither represent an agreement on the corresponding contractual quality of the substance/mixture nor a contractually designated use. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.



SAFETY DATA SHEET

DOW EUROPE GMBH

Safety Data Sheet according to Reg. (EU) No 2015/830

Product name: UCARSOL™ AP Solv 814 E

Revision Date: 17.09.2020

Version: 1.0

Date of last issue: -

Print Date: 26.11.2021

DOW EUROPE GMBH encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name: UCARSOL™ AP Solv 814 E

UFI: 3RYE-K0F1-W00V-HP1H

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Gas treating.

1.3 Details of the supplier of the safety data sheet

COMPANY IDENTIFICATION

DOW EUROPE GMBH
BACHTOBELSTRASSE 3
8810 HORGEN
SWITZERLAND

Customer Information Number:

31 115 67 2626

SDSQuestion@dow.com

c/o

DOW BENELUX B.V.
HERBERT H.DOWWEG 5
HOEK
4542 NM TERNEUZEN
NETHERLANDS
Telephone: (31) 115 67 2626

1.4 EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 00 41 447 28 2820

Local Emergency Contact: 0049 4141 3679

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008:

Skin corrosion - Sub-category 1B - H314

Serious eye damage - Category 1 - H318

Respiratory sensitisation - Category 1 - H334

Skin sensitisation - Category 1 - H317

Reproductive toxicity - Category 2 - H361fd

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:

Hazard pictograms



Signal word: **DANGER**

Hazard statements

H314 Causes severe skin burns and eye damage.

H317 May cause an allergic skin reaction.

H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.

Precautionary statements

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

P303 + P361 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.

P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

+ P310 Immediately call a POISON CENTER/ doctor.

P305 + P351 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

+ P338 + P310

P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER/ doctor.

Contains Piperazine

2.3 Other hazards

This product contains no substances assessed to be PBT or vPvB at levels of 0.1% or higher.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

This product is a mixture.

CASRN / EC-No. / Index-No.	REACH Registration Number	Concentration	Component	Classification: REGULATION (EC) No 1272/2008
CASRN 105-59-9 EC-No. 203-312-7 Index-No. 603-079-00-5	01-2119488970-24	< 80,0 %	N-methyldiethanolamine	Eye Irrit. - 2 - H319
CASRN 110-85-0 EC-No. 203-808-3 Index-No. 612-057-00-4	01-2119480384-35	< 25,0 %	Piperazine	Skin Corr. - 1B - H314 Resp. Sens. - 1 - H334 Skin Sens. - 1 - H317 Repr. - 2 - H361fd

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice:

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Seek medical attention if symptoms occur or irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands. Suitable emergency safety shower facility should be immediately available.

Eye contact: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth unless the person is fully conscious.

4.2 Most important symptoms and effects, both acute and delayed:

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician: Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. If burn is present, treat as any thermal burn, after decontamination. Due to irritant properties, swallowing may result in burns and/or ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal or esophageal control if lavage is done. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Water fog or fine spray.. Dry chemical fire extinguishers.. Carbon dioxide fire extinguishers.. Foam.. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective..

Unsuitable extinguishing media: Do not use direct water stream.. May spread fire..

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.. Combustion products may include and are not limited to:. Nitrogen oxides.. Carbon monoxide.. Carbon dioxide..

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids..

5.3 Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry.. Burning liquids may be extinguished by dilution with water.. Do not use direct water stream. May spread fire.. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage..

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves).. Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location.. For protective equipment in post-fire or non-fire clean-up situations, see Section 8 of the safety data sheet..

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures: Evacuate area. Refer to section 7, Handling, for additional precautionary measures. Keep upwind of spill. Ventilate area of leak or spill. Keep personnel out of low areas. Only trained and properly protected personnel must be involved in clean-up operations. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

6.3 Methods and materials for containment and cleaning up: Small spills: Absorb with materials such as: Non-combustible material. Clay. Vermiculite. Zorb-all®. Do NOT use absorbent materials such as: Ground corn cobs. Moist organic absorbents. Peat moss. Cellulose. Sawdust. Large spills: Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

6.4 Reference to other sections: References to other sections, if applicable, have been provided in the previous sub-sections.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling: Do not get in eyes. Do not swallow. Avoid breathing vapor. Avoid contact with skin and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Do not use sodium nitrite or other nitrosating agents in formulations containing this product. Suspected cancer-causing nitrosamines could be formed. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

7.2 Conditions for safe storage, including any incompatibilities: Store in accordance with good manufacturing practices. Use only with adequate ventilation. Do not store in: Aluminum. Copper. Copper alloys. Galvanized containers. Zinc. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

7.3 Specific end use(s): See the technical data sheet on this product for further information.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
Piperazine	ACGIH	TWA Inhalable fraction and vapor	0,03 ppm, piperazine
	Further information: DSEN: Dermal Sensitization; RSEN: Respiratory sensitization; A4: Not classifiable as a human carcinogen		
	2000/39/EC	TWA	0,1 mg/m3
	Further information: Indicative		

	2000/39/EC	STEL	0,3 mg/m3
	Further information: Indicative		
	DE TRGS 900	AGW Vapour and aerosols	0,1 mg/m3

An Occupational Exposure Limit is available for one of the ingredients of this product. Please consult your business representative for assistance with exposure assessment and monitoring programs.

Recommended monitoring procedures

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with the Occupational Exposure Limits and the adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples should be analysed by an accredited laboratory.

Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy); European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents); European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents). Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods.

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods.

Health and Safety Executive (HSE), United Kingdom: Methods for the Determination of Hazardous Substances.

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany.

L'Institut National de Recherche et de Sécurité, (INRS), France.

Derived No Effect Level

N-methyldiethanolamine

Workers

Acute systemic effects		Acute local effects		Long-term systemic effects		Long-term local effects	
Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	19 mg/kg bw/day	26 mg/m3	n.a.	n.a.

Consumers

Acute systemic effects			Acute local effects		Long-term systemic effects			Long-term local effects	
Dermal	Inhalation	Oral	Dermal	Inhalation	Dermal	Inhalation	Oral	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	9,4 mg/kg bw/day	6,5 mg/m3	1,9 mg/kg bw/day	n.a.	n.a.

Piperazine

Workers

Acute systemic effects		Acute local effects		Long-term systemic effects		Long-term local effects	
Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation	Dermal	Inhalation

0,042 mg/m3 mg/kg bw/day	0,3 mg/m3	2 %	0,3 mg/m3	0,014 mg/m3 mg/kg bw/day	0,1 mg/m3	n.a.	0,3 mg/m3

Consumers

<i>Acute systemic effects</i>			<i>Acute local effects</i>		<i>Long-term systemic effects</i>			<i>Long-term local effects</i>	
Dermal	Inhalation	Oral	Dermal	Inhalation	Dermal	Inhalation	Oral	Dermal	Inhalation
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Predicted No Effect Concentration

N-methyldiethanolamine

Compartment	PNEC
Fresh water	0,1 mg/l
Marine water	0,004 mg/l
Intermittent use/release	1 mg/l
Sewage treatment plant	10 mg/l
Soil	0,097 mg/kg dry weight (d.w.)
Fresh water sediment	0,78 mg/kg dry weight (d.w.)
Marine sediment	0,035 mg/kg dry weight (d.w.)

Piperazine

Compartment	PNEC
Fresh water	1,25 mg/l
Intermittent use/release	1,25 mg/l
Marine water	0,125 mg/l
Sewage treatment plant	54 mg/l
Fresh water sediment	4,5 mg/kg dry weight (d.w.)
Marine sediment	0,45 mg/kg dry weight (d.w.)
Soil	11,5 mg/kg dry weight (d.w.)
Oral	4,6 mg/kg food

8.2 Exposure controls

Engineering controls: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent.

Skin protection

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or

"NBR"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. Polyvinyl alcohol ("PVA"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. Glove thickness alone is not a good indicator of the level of protection a glove provides against a chemical substance as this level of protection is also highly dependent on the specific composition of the material that the glove is fabricated from. The thickness of the glove must, depending on model and type of material, generally be more than 0.35 mm to offer sufficient protection for prolonged and frequent contact with the substance. As an exception to this general rule it is known that multilayer laminate gloves may offer prolonged protection at thicknesses less than 0.35 mm. Other glove materials with a thickness of less than 0.35 mm may offer sufficient protection when only brief contact is expected. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus.

Use the following CE approved air-purifying respirator: Organic vapor cartridge with a particulate pre-filter, type AP2 (meeting standard EN 14387).

Environmental exposure controls

See SECTION 7: Handling and storage and SECTION 13: Disposal considerations for measures to prevent excessive environmental exposure during use and waste disposal.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

Physical state	liquid
Color	Colorless to yellow
Odor	ammoniacal
Odor Threshold	No test data available
pH	No test data available
Melting point/range	No data available
Freezing point	-48 °C <i>Literature</i>
Boiling point (760 mmHg)	126 °C at 760 mmHg <i>Literature</i>
Flash point	closed cup 102 °C <i>ASTM D 93</i>

Evaporation Rate (Butyl Acetate = 1)	0,5 <i>Literature</i>
Flammability (solid, gas)	Not applicable to liquids
Flammability (liquids)	Not expected to be a static-accumulating flammable liquid.
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	0,613 kPa at 20 °C <i>Literature</i>
Relative Vapor Density (air = 1)	2,8 <i>Literature</i>
Relative Density (water = 1)	1,05 at 20 °C / 20 °C <i>Literature</i>
Water solubility	at 20 °C <i>Literature</i> completely soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	304 - 307 °C <i>Literature</i>
Decomposition temperature	No test data available
Kinematic Viscosity	No test data available
Explosive properties	No test data available
Oxidizing properties	No test data available

9.2 Other information

Molecular weight No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: No data available

10.2 Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.

10.3 Possibility of hazardous reactions: Polymerization will not occur.

10.4 Conditions to avoid: Exposure to elevated temperatures can cause product to decompose.

10.5 Incompatible materials: Avoid contact with: Acrylates. Alcohols. Aldehydes. Ketones. Nitrites. Strong acids. Strong oxidizers. Avoid contact with metals such as: Aluminum. Copper. Copper alloys. Galvanized metals. Zinc. Avoid unintended contact with: Halogenated hydrocarbons. Avoid contact with absorbent materials such as: Ground corn cobs. Moist organic absorbents. Peat moss. Sawdust.

10.6 Hazardous decomposition products

Thermal decomposition:

Decomposition products can include and are not limited to: Nitrogen.

SECTION 11: TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

11.1 Information on toxicological effects

Information on likely routes of exposure

Ingestion, Inhalation, Skin contact, Eye contact.

Acute toxicity (represents short term exposures with immediate effects - no chronic/delayed effects known unless otherwise noted)

Acute oral toxicity

Low toxicity if swallowed. Swallowing may result in burns of the mouth and throat. Swallowing may result in gastrointestinal irritation or ulceration. May cause nausea and vomiting. May cause abdominal discomfort or diarrhea.

As product: Single dose oral LD50 has not been determined.

Based on information for component(s):
LD50, > 4 000 mg/kg Estimated.

Information for components:

N-methyldiethanolamine

LD50, Rat, male and female, 4 680 mg/kg

Piperazine

LD50, Rat, 2 600 mg/kg

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

The dermal LD50 has not been determined.

Based on information for component(s):
LD50, > 5 000 mg/kg Estimated.

Information for components:

N-methyldiethanolamine

LD50, Rabbit, > 2 000 mg/kg No deaths occurred at this concentration.

Piperazine

LD50, Rabbit, > 5 000 mg/kg

Acute inhalation toxicity

At room temperature, exposure to vapor is minimal due to low volatility. If material is heated or aerosol/mist is produced, concentrations may be attained that are sufficient to cause respiratory irritation and other effects. Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest. Occasionally, breathing difficulties may be life threatening.

As product: The LC50 has not been determined.

Information for components:**N-methyldiethanolamine**

No deaths occurred following exposure to a saturated atmosphere.

Piperazine

LC0, Rat, 4 Hour, vapour, 2 mg/l

Skin corrosion/irritation

Based on information for component(s):

Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Information for components:**N-methyldiethanolamine**

Brief contact may cause slight skin irritation with local redness.

Prolonged contact may cause moderate skin irritation with local redness.

Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage.

May cause more severe response if skin is abraded (scratched or cut).

May cause more severe response on covered skin (under clothing, gloves).

Piperazine

Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Prolonged contact may cause severe skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage.

Serious eye damage/eye irritation

Based on information for component(s):

May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Information for components:**N-methyldiethanolamine**

May cause severe eye irritation.

May cause corneal injury.

Piperazine

May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Sensitization

Based on information for component(s):

Skin contact may cause an allergic skin reaction.

Based on information for component(s):

May cause allergic respiratory reaction.

Information for components:

N-methyldiethanolamine

Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

Piperazine

Skin contact may cause an allergic skin reaction.

Individuals who have had an allergic skin reaction to similar materials may have an allergic skin reaction to this product.

The similar material(s) is/are:

Triethylenetetramine (TETA).

Has demonstrated the potential for contact allergy in mice.

For respiratory sensitization:

May cause allergic respiratory reaction.

Specific Target Organ Systemic Toxicity (Single Exposure)

Material is corrosive. Material is not classified as a respiratory irritant; however, upper respiratory tract irritation or corrosivity may be expected.

Information for components:

N-methyldiethanolamine

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Piperazine

Material is corrosive. Material is not classified as a respiratory irritant; however, upper respiratory tract irritation or corrosivity may be expected.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

Information for components:

N-methyldiethanolamine

Based on physical properties, not likely to be an aspiration hazard.

Piperazine

Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Chronic toxicity (represents longer term exposures with repeated dose resulting in chronic/delayed effects - no immediate effects known unless otherwise noted)

Specific Target Organ Systemic Toxicity (Repeated Exposure)

For the minor component(s):

Excessive exposure may cause neurologic signs and symptoms.

Information for components:

N-methyldiethanolamine

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Piperazine

Excessive exposure may cause neurologic signs and symptoms.

Carcinogenicity

For the minor component(s): Did not cause cancer in laboratory animals.

Information for components:**N-methyldiethanolamine**

No relevant data found.

Piperazine

Did not cause cancer in laboratory animals.

Teratogenicity

For the minor component(s): Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in laboratory animals at doses toxic to the mother. For the major component(s): Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother.

Information for components:**N-methyldiethanolamine**

Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother.

Piperazine

Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

Reproductive toxicity

For the minor component(s): In animal studies, has been shown to interfere with reproduction. In animal studies, has been shown to interfere with fertility.

Information for components:**N-methyldiethanolamine**

In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

Piperazine

In animal studies, has been shown to interfere with fertility. In animal studies, has been shown to interfere with reproduction.

Mutagenicity

In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity studies in animals were negative for component(s) tested.

Information for components:

N-methyldiethanolamine

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Piperazine

In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

12.1 Toxicity**N-methyldiethanolamine****Acute toxicity to fish**

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

LC50, *Leuciscus idus* (Golden orfe), static test, 96 Hour, 1 466 mg/l, DIN 38412

LC50, *Pimephales promelas* (fathead minnow), static test, 96 Hour, 1 200 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, *Daphnia magna* (Water flea), static test, 48 Hour, 2 330 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

EC50, *Desmodesmus subspicatus* (green algae), static test, 72 Hour, Growth rate inhibition, > 100 mg/l, OECD Test Guideline 201 or Equivalent

Piperazine**Acute toxicity to fish**

Material is harmful to aquatic organisms (LC50/EC50/IC50 between 10 and 100 mg/L in the most sensitive species).

LC50, *Poecilia reticulata* (guppy), semi-static test, 96 Hour, > 1 800 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, *Daphnia magna* (Water flea), static test, 48 Hour, 21 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

EC50, *Pseudokirchneriella subcapitata* (green algae), static test, 72 Hour, Growth rate inhibition, > 1 000 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria

IC50, Bacteria, 16 Hour, > 5 000 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, *Daphnia magna* (Water flea), semi-static test, 21 d, 12,5 mg/l

12.2 Persistence and degradability**N-methyldiethanolamine**

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

10-day Window: Pass

Biodegradation: 96 %

Exposure time: 18 d

Method: OECD Test Guideline 301A or Equivalent

Piperazine

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

10-day Window: Pass

Biodegradation: 65,3 %

Exposure time: 28 d

Method: OECD Test Guideline 301F or Equivalent

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitization: OH radicals

Atmospheric half-life: 2,8 Hour

Method: Estimated.

12.3 Bioaccumulative potential

Bioaccumulation: No data available for this product. See Section 12 for individual component data.

12.4 Mobility in soil

N-methyldiethanolamine

Potential for mobility in soil is high (Koc between 50 and 150).

Partition coefficient (Koc): 53 Estimated.

Piperazine

Potential for mobility in soil is low (Koc between 500 and 2000).

Partition coefficient (Koc): 507 Measured

12.5 Results of PBT and vPvB assessment

N-methyldiethanolamine

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Piperazine

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects

N-methyldiethanolamine

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Piperazine

This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water.

The definitive assignment of this material to the appropriate EWC group and thus its proper EWC code will depend on the use that is made of this material. Contact the authorized waste disposal services.

SECTION 14: TRANSPORT INFORMATION

Classification for ROAD and Rail transport (ADR/RID):

14.1 UN number	UN 2735
14.2 UN proper shipping name	AMINES, LIQUID, CORROSIVE, N.O.S.(Piperazine)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
14.5 Environmental hazards	Not considered environmentally hazardous based on available data.
14.6 Special precautions for user	Hazard Identification Number: 80

Classification for SEA transport (IMO-IMDG):

14.1 UN number	UN 2735
14.2 UN proper shipping name	AMINES, LIQUID, CORROSIVE, N.O.S.(Piperazine)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
14.5 Environmental hazards	Not considered as marine pollutant based on available data.
14.6 Special precautions for user	EmS: F-A, S-B
14.7 Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

14.1 UN number	UN 2735
14.2 UN proper shipping name	Amines, liquid, corrosive, n.o.s.(Piperazine)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
14.5 Environmental hazards	Not applicable

14.6 Special precautions for user No data available.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**REACH Regulation (EC) No 1907/2006**

This product contains only components that have been either registered, are exempt from registration, are regarded as registered or are not subject to registration according to Regulation (EC) No. 1907/2006 (REACH). The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer's/user's responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)

Conditions of restriction for the following entries should be considered:
Number on list 3

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

Listed in Regulation: Not applicable

Wassergefährdungsklasse (Deutschland)

WGK 1: slightly hazardous to water

Further information

Take note of Law on the protection of mothers at work, in education and in studies (Maternity Protection Act - MuSchG).

Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture.

SECTION 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) No 1272/2008

Skin Corr. - 1B - H314 - Calculation method
 Eye Dam. - 1 - H318 - Calculation method
 Resp. Sens. - 1 - H334 - Calculation method
 Skin Sens. - 1 - H317 - Calculation method
 Repr. - 2 - H361fd - Calculation method

Revision

Identification Number: 99175652 / A305 / Issue Date: 17.09.2020 / Version: 1.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

2000/39/EC	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
ACGIH	USA. ACGIH Threshold Limit Values (TLV)
AGW	Time Weighted Average
DE TRGS 900	Germany. TRGS 900 - Occupational exposure limit values.
STEL	Short term exposure limit
TWA	8-hour, time-weighted average
Eye Irrit.	Eye irritation
Repr.	Reproductive toxicity
Resp. Sens.	Respiratory sensitisation
Skin Corr.	Skin corrosion
Skin Sens.	Skin sensitisation

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying

Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

DOW EUROPE GMBH urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

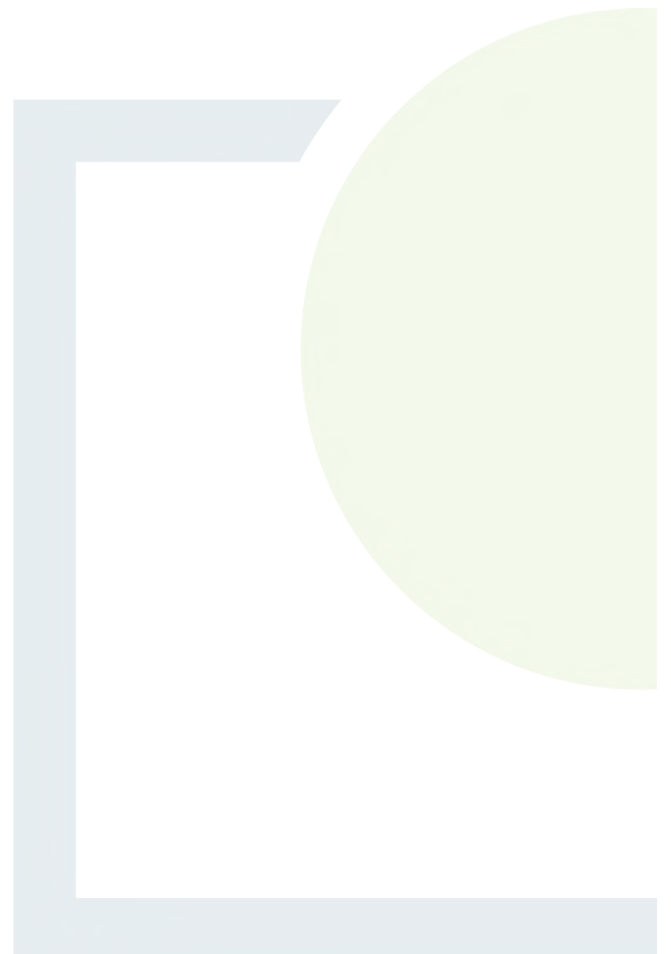
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DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX 5

FWRA Worksheets



FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas 001 Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@ftco.ie
	Direct Tel.	01-6583500
	Date:	23/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	

Significance of Fire Event

Administration Building

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored					
		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)				Tonnes
2.3	Flammable Solids Storage	0	0		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	0			Tonnes
	Any other combustible material	1		General Office	Tonnes
2.4	Combustible Materials Storage	1	0.5		Tonnes
	Percent of S1 Storage	50%	N/A		
	Percent of S2 Storage	3%	N/A		
	Percent of S3 Storage	1%	N/A		
		0			
			2. Max	0.0	

Fire Significance

**S1 - Low
Significance**

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1 H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential

Administration Building



Number	Material Stored in this Area	Response		Hazard Category
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)			
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
			Max	0

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

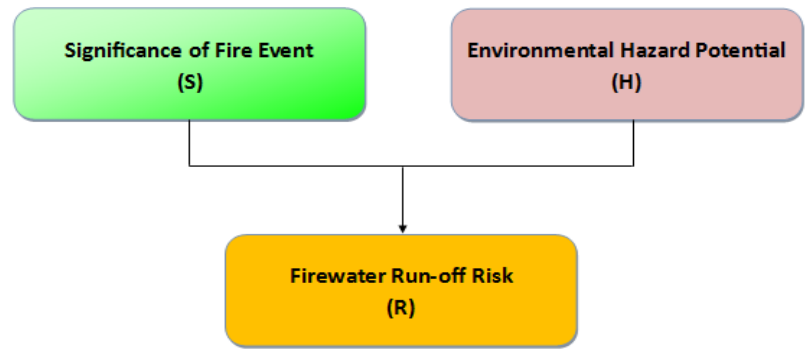
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3) H411: Toxic to aquatic life with long lasting effects	2
Ethanol	H225: Highly flammable liquid and vapour	1

Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
Isopropanol	H225: Highly flammable liquid and vapour	1
Isobutanol	H226: Flammable liquid and vapour	1
Methanol	H225: Highly flammable liquid and vapour	1
Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
Phenol	H411: Toxic to aquatic life with long lasting effects	2
Sodium Nitrite	H400: Very toxic to aquatic life	2
Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
Toluene	H225: Highly flammable liquid and vapour	2
Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference	Score
Significance of Fire Event	S1 - Low Significance
Hazard Potential	H0 - No Hazard Potential

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	R0 - No Risk

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	No

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)	0	Not Required
1.2	Flammable Material (tonnes)	0	From Significance table
1.3	Combustible Material (tonnes)	1	From Significance table
1.4	Assess materials, are already classified as flammable - 1022, 1023 (tonnes)	0	Not Required
1.6	Outgoing Material not already classified - 1029, 1031 (tonnes)	0	Not Required
1.7	Outgoing Material not already classified - 1022 (tonnes)	0	Not Required
1.8	Non Combustible Material (tonnes) (see note 1)	0	Not Required
1.9	Total F1/F2 Materials	0	
1.9	Total F3/F4 Materials	1	
1.1	Total Storage in this Area (tonnes)	1	
1.11	Fire Hazard Category	F3/F4	
1.12	Storage Density (kg/m ²)	400/50	
1.13	Storage Density Factor	400/50	
1.14	Type of Storage	Non-racked Storage	Not Required
Preliminary Fire Water Retention Required ¹ (without storage density factor)	Sprinklers	No	PNA
	Sprinklers	No	PNA
	Note on Preliminary Result	0	

Total Storage Quantity (kg) 1
 Fire Hazard Category F3/F4
 Warehouse Area (m²) 0
 Sprinklers? No
 Storage Type Non-racked Storage

Retention Volume Required m³ (with density factor) Method not Suitable

1.10	Area of Site which shares common drainage with Area (m ²)	0	Not Required
1.11	1 in 10 year 24-hour rainfall event for local area (mm)	0	Not Required
1.12	Rain Water (m ³)	0/0	
	Fire Water Retention Required (m ³)	0/0/0/0	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards.

The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
 - The fire hazard associated with the stored materials
 - The storage methodology (racking, piled, heights)
 - The density of stored materials and equipment
 - The assessment area size
- The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA-guideline "Storage of hazardous material".

Area of fire section in m ²	Theoretical Firewater Retention in m ³						No. Sprinklers						Sprinklers and fire detection and alarm					
	Fire detection and Alarm						Fire detection and Alarm						Fire detection and Alarm					
	F1/F2	F3/F4	F4/F5	F5/F6	F6/F7	F7/F8	F1/F2	F3/F4	F4/F5	F5/F6	F6/F7	F7/F8	F1/F2	F3/F4	F4/F5	F5/F6	F6/F7	F7/F8
50	50	25	15	10	5	5	50	25	15	10	5	5	50	25	15	10	5	5
100	50	25	15	10	5	5	50	25	15	10	5	5	50	25	15	10	5	5
150	150	75	45	30	15	10	150	75	45	30	15	10	150	75	45	30	15	10
200	200	100	60	40	20	10	200	100	60	40	20	10	200	100	60	40	20	10
250	250	125	75	50	25	15	250	125	75	50	25	15	250	125	75	50	25	15
300	300	150	90	60	30	15	300	150	90	60	30	15	300	150	90	60	30	15
350	350	175	105	70	35	15	350	175	105	70	35	15	350	175	105	70	35	15
400	400	200	120	80	40	20	400	200	120	80	40	20	400	200	120	80	40	20
450	450	225	135	90	45	20	450	225	135	90	45	20	450	225	135	90	45	20
500	500	250	150	100	50	20	500	250	150	100	50	20	500	250	150	100	50	20
550	550	275	165	110	55	20	550	275	165	110	55	20	550	275	165	110	55	20
600	600	300	180	120	60	20	600	300	180	120	60	20	600	300	180	120	60	20
650	650	325	195	130	65	20	650	325	195	130	65	20	650	325	195	130	65	20
700	700	350	210	140	70	20	700	350	210	140	70	20	700	350	210	140	70	20
750	750	375	225	150	75	20	750	375	225	150	75	20	750	375	225	150	75	20
800	800	400	240	160	80	20	800	400	240	160	80	20	800	400	240	160	80	20
850	850	425	255	170	85	20	850	425	255	170	85	20	850	425	255	170	85	20
900	900	450	270	180	90	20	900	450	270	180	90	20	900	450	270	180	90	20
950	950	475	285	190	95	20	950	475	285	190	95	20	950	475	285	190	95	20
1,000	1,000	500	300	200	100	20	1,000	500	300	200	100	20	1,000	500	300	200	100	20
1,100	1,100	550	330	220	110	20	1,100	550	330	220	110	20	1,100	550	330	220	110	20
1,200	1,200	600	360	240	120	20	1,200	600	360	240	120	20	1,200	600	360	240	120	20
1,300	1,300	650	390	260	130	20	1,300	650	390	260	130	20	1,300	650	390	260	130	20
1,400	1,400	700	420	280	140	20	1,400	700	420	280	140	20	1,400	700	420	280	140	20
1,500	1,500	750	450	300	150	20	1,500	750	450	300	150	20	1,500	750	450	300	150	20
1,600	1,600	800	480	320	160	20	1,600	800	480	320	160	20	1,600	800	480	320	160	20
1,700	1,700	850	510	340	170	20	1,700	850	510	340	170	20	1,700	850	510	340	170	20
1,800	1,800	900	540	360	180	20	1,800	900	540	360	180	20	1,800	900	540	360	180	20
1,900	1,900	950	570	380	190	20	1,900	950	570	380	190	20	1,900	950	570	380	190	20
2,000	2,000	1,000	600	400	200	20	2,000	1,000	600	400	200	20	2,000	1,000	600	400	200	20
2,100	2,100	1,050	630	420	210	20	2,100	1,050	630	420	210	20	2,100	1,050	630	420	210	20
2,200	2,200	1,100	660	440	220	20	2,200	1,100	660	440	220	20	2,200	1,100	660	440	220	20
2,300	2,300	1,150	690	460	230	20	2,300	1,150	690	460	230	20	2,300	1,150	690	460	230	20
2,400	2,400	1,200	720	480	240	20	2,400	1,200	720	480	240	20	2,400	1,200	720	480	240	20
2,500	2,500	1,250	750	500	250	20	2,500	1,250	750	500	250	20	2,500	1,250	750	500	250	20
2,600	2,600	1,300	780	520	260	20	2,600	1,300	780	520	260	20	2,600	1,300	780	520	260	20
2,700	2,700	1,350	810	540	270	20	2,700	1,350	810	540	270	20	2,700	1,350	810	540	270	20
2,800	2,800	1,400	840	560	280	20	2,800	1,400	840	560	280	20	2,800	1,400	840	560	280	20
2,900	2,900	1,450	870	580	290	20	2,900	1,450	870	580	290	20	2,900	1,450	870	580	290	20
3,000	3,000	1,500	900	600	300	20	3,000	1,500	900	600	300	20	3,000	1,500	900	600	300	20
3,100	3,100	1,550	930	620	310	20	3,100	1,550	930	620	310	20	3,100	1,550	930	620	310	20
3,200	3,200	1,600	960	640	320	20	3,200	1,600	960	640	320	20	3,200	1,600	960	640	320	20
3,300	3,300	1,650	990	660	330	20	3,300	1,650	990	660	330	20	3,300	1,650	990	660	330	20
3,400	3,400	1,700	1,020	680	340	20	3,400	1,700	1,020	680	340	20	3,400	1,700	1,020	680	340	20
3,500	3,500	1,750	1,050	700	350	20	3,500	1,750	1,050	700	350	20	3,500	1,750	1,050	700	350	20
3,600	3,600	1,800	1,080	720	360	20	3,600	1,800	1,080	720	360	20	3,600	1,800	1,080	720	360	20
3,700	3,700	1,850	1,110	740	370	20	3,700	1,850	1,110	740	370	20	3,700	1,850	1,110	740	370	20
3,800	3,800	1,900	1,140	760	380	20	3,800	1,900	1,140	760	380	20	3,800	1,900	1,140	760	380	20
3,900	3,900	1,950	1,170	780	390	20	3,900	1,950	1,170	780	390	20	3,900	1,950	1,170	780	390	20
4,000	4,000	2,000	1,200	800	400	20	4,000	2,000	1,200	800	400	20	4,000	2,000	1,200	800	400	20
4,100	4,100	2,050	1,230	820	410	20	4,100	2,050	1,230	820	410	20	4,100	2,050	1,230	820	410	20
4,200	4,200	2,100	1,260	840	420	20	4,200	2,100	1,260	840	420	20	4,200	2,100	1,260	840	420	20
4,300	4,300	2,150	1,290	860	430	20	4,300	2,150	1,290	860	430	20	4,300	2,150	1,290	860	430	20
4,400	4,400	2,200	1,320	880	440	20	4,400	2,200	1,320	880	440	20	4,400	2,200	1,320	880	440	20
4,500	4,500	2,250	1,350	900	450	20	4,500	2,250	1,350	900	450	20	4,500	2,250	1,350	900	450	20
4,600	4,600	2,300	1,380	920	460	20	4,600	2,300	1,380	920	460	20	4,600	2,300	1,380	920	460	20
4,700	4,700	2,350	1,410	940	470	20	4,700	2,350	1,410	940	470	20	4,700	2,350	1,410	940	470	20
4,800	4,800	2,400	1,440	960	480	20	4,800	2,400	1,440	960	480	20	4,800	2,400	1,440	960	480	20
4,900	4,900	2,450	1,470	980	490	20	4,900	2,450	1,470	980	490	20	4,900	2,450	1,470	980	490	20

Fire Water Retention Calculation

Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other bunded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)		Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours		Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³		
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)		
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information		Solid materials - Woodchips is completely contained within a large precast concrete bunker. No product loss
1.7	Area of Site which shares common drainage with Assessment Area (m ²)		Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)		Input Required
1.9	Rain Water (m ³)		
	Fire Water Retention Required (m ³)	0	

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Principal Engineer
	Email	james.oneill@ftco.ie
	Direct Tel.	01-6583500
	Date:	23/09/2025

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	

Significance of Fire Event

Solid Digestate Storage Building and Liquid Reception Building

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored					
		Tonnes		Substance Name(s)	
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)	2		Ferric Powder	Tonnes
2.3	Flammable Solids Storage	2	1		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	2820		Solid Feedstock	Tonnes
	Any other combustible material	0			Tonnes
2.4	Combustible Materials Storage	2820	2		Tonnes
	Percent of S1 Storage	145000%	0.5		
	Percent of S2 Storage	9800%	1		
	Percent of S3 Storage	1430%	2		
			2		
			2. Max	2.0	

Fire Significance

S3 - High Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1

H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential

Solids Reception



Number	Material Stored in this Area	Response	Hazard Category	
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
Max			0	

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

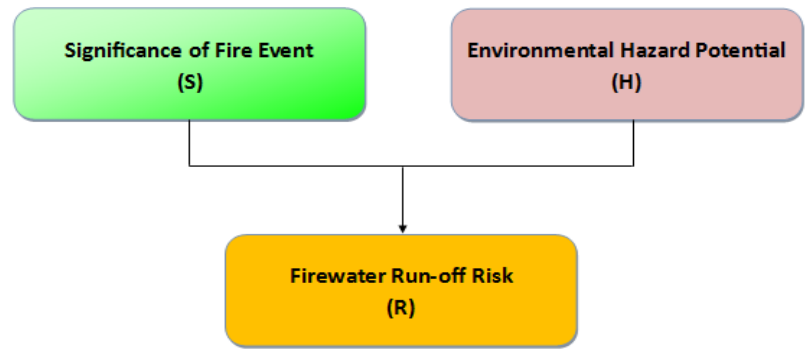
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3) H411: Toxic to aquatic life with long lasting effects	2
Ethanol	H225: Highly flammable liquid and vapour	1

Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
Isopropanol	H225: Highly flammable liquid and vapour	1
Isobutanol	H226: Flammable liquid and vapour	1
Methanol	H225: Highly flammable liquid and vapour	1
Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
Phenol	H411: Toxic to aquatic life with long lasting effects	2
Sodium Nitrite	H400: Very toxic to aquatic life	2
Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
Toluene	H225: Highly flammable liquid and vapour	2
Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score	
Significance of Fire Event		S3 - High Significance	
Hazard Potential		H0 - No Hazard Potential	

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	R1 - Risk of Environmental Contamination

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	Yes

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Area of Storage Area (m ²)	0	Apex Required
1.2	Flammable Material (tonnes)	2	From Significance tab
1.3	Combustible Material (tonnes)	2820	From Significance tab
1.5	Hazardous materials, not already classified as flammable - H220, H228 (tonnes)	0	Apex Required
1.6	Explosive Material not already classified - H228, H251 (tonnes)	0	Apex Required
1.7	Explosive Material not already classified - H228 (tonnes)	0	Apex Required
1.8	Non-Combustible Material (tonnes) (see note 1)	0	Apex Required
1.9	Total F1-F2 Materials	2	
1.9	Total F3-F4 Materials	2820	
1.1	Total Storage in this Area (tonnes)	2822	
1.11	Fire Hazard Category	F1-F2	
1.12	Storage Density (kg/m ³)	0.50	
1.13	Storage Density Factor	0.5	
1.14	Type of Storage	Non-racked Storage	Apex Required
Preliminary Fire Water Retention Required m ³ (without storage density factor)		N/A	
Sprinklers		No	N/A
Note on Preliminary Result		0	

Total Storage Quantity (kg)
Fire Hazard Category
Warehouse Area (m²)
Sprinklers?
Storage Type

2822
F1-F2
0
No
Non-racked Storage

Retention Volume Required m³ (with density factor)
Method not Suitable

1.10	Area of Site which drains common drainage with Area (m ²)	0	Apex Required
1.11	1 in 10 year 2-hour rainfall event for local area (mm)	0	Apex Required
1.12	Rain Water (m ³)	0.00	
Fire Water Retention Required (m ³)		0.0000	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards.

The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA guideline "Storage of hazardous material".

Theoretical Firewater Retention in m³												
Area of fire section in m²	Fire detection and Alarm				Sprinklers and fire detection and alarm							
	Fire detection and Alarm				Stacking height < 6 m				Stacking height <12 m			
	F1-F2	F3-F4	F5-F6	F7-F8	F1-F2	F3-F4	F5-F6	F1-F4	F5-F6	F1-F4	F5-F6	
50	50	25	10	25	15	5	15	5	25	10	20	
100	100	50	20	45	30	10	35	15	50	20	40	
150	150	75	30	70	45	15	55	20	75	30	60	
200	200	100	40	95	60	20	80	25	100	40	80	
250	250	125	50	120	75	25	105	30	125	50	100	
300	300	150	60	145	90	30	130	35	150	60	120	
400	400	200	80	190	120	40	170	45	200	80	160	
500	500	250	100	240	150	50	220	55	250	100	200	
600	600	300	120	290	180	60	270	65	300	120	240	
700	700	350	140	340	210	70	320	75	350	140	280	
800	800	400	160	390	240	80	370	85	400	160	320	
900	900	450	180	440	270	90	420	95	450	180	360	
1,000	1,000	500	200	490	300	100	470	105	500	200	400	
1,100	1,100	550	220	540	330	110	520	115	550	220	440	
1,200	1,200	600	240	590	360	120	570	125	600	240	480	
1,300	1,300	650	260	640	390	130	620	135	650	260	520	
1,400	1,400	700	280	690	420	140	670	145	700	280	560	
1,500	1,500	750	300	740	450	150	720	155	750	300	600	
1,600	1,600	800	320	790	480	160	770	165	800	320	640	
1,700	1,700	850	340	840	510	170	820	175	850	340	680	
1,800	1,800	900	360	890	540	180	870	185	900	360	720	
1,900	1,900	950	380	940	570	190	920	195	950	380	760	
2,000	2,000	1,000	400	990	600	200	970	205	1,000	400	800	
2,100	2,100	1,050	420	1,040	630	210	1,020	215	1,050	420	840	
2,200	2,200	1,100	440	1,090	660	220	1,070	225	1,100	440	880	
2,300	2,300	1,150	460	1,140	690	230	1,120	235	1,150	460	920	
2,400	2,400	1,200	480	1,190	720	240	1,170	245	1,200	480	960	
2,500	2,500	1,250	500	1,240	750	250	1,220	255	1,250	500	1,000	
2,600	2,600	1,300	520	1,290	780	260	1,270	265	1,300	520	1,040	
2,700	2,700	1,350	540	1,340	810	270	1,320	275	1,350	540	1,080	
2,800	2,800	1,400	560	1,390	840	280	1,370	285	1,400	560	1,120	
2,900	2,900	1,450	580	1,440	870	290	1,420	295	1,450	580	1,160	
3,000	3,000	1,500	600	1,490	900	300	1,470	305	1,500	600	1,200	
3,100	3,100	1,550	620	1,540	930	310	1,520	315	1,550	620	1,240	
3,200	3,200	1,600	640	1,590	960	320	1,570	325	1,600	640	1,280	
3,300	3,300	1,650	660	1,640	990	330	1,620	335	1,650	660	1,320	
3,400	3,400	1,700	680	1,690	1,020	340	1,670	345	1,700	680	1,360	
3,500	3,500	1,750	700	1,740	1,050	350	1,720	355	1,750	700	1,400	
3,600	3,600	1,800	720	1,790	1,080	360	1,770	365	1,800	720	1,440	
3,700	3,700	1,850	740	1,840	1,110	370	1,820	375	1,850	740	1,480	
3,800	3,800	1,900	760	1,890	1,140	380	1,870	385	1,900	760	1,520	
3,900	3,900	1,950	780	1,940	1,170	390	1,920	395	1,950	780	1,560	
4,000	4,000	2,000	800	1,990	1,200	400	1,970	405	2,000	800	1,600	
4,100	4,100	2,050	820	2,040	1,230	410	2,020	415	2,050	820	1,640	
4,200	4,200	2,100	840	2,090	1,260	420	2,070	425	2,100	840	1,680	
4,300	4,300	2,150	860	2,140	1,290	430	2,120	435	2,150	860	1,720	
4,400	4,400	2,200	880	2,190	1,320	440	2,170	445	2,200	880	1,760	
4,500	4,500	2,250	900	2,240	1,350	450	2,220	455	2,250	900	1,800	
4,600	4,600	2,300	920	2,290	1,380	460	2,270	465	2,300	920	1,840	
4,700	4,700	2,350	940	2,340	1,410	470	2,320	475	2,350	940	1,880	
4,800	4,800	2,400	960	2,390	1,440	480	2,370	485	2,400	960	1,920	
4,900	4,900	2,450	980	2,440	1,470	490	2,420	495	2,450	980	1,960	
5,000	5,000	2,500	1,000	2,490	1,500	500	2,470	505	2,500	1,000	2,000	

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other banded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)		Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours		Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³		
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)	240	
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information	2820	Solid materials - Agricultural Residual is completely contained within a large precast concrete bunker.
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33000	Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)	0.0564	Input Required
1.9	Rain Water (m ³)	1861	
	Fire Water Retention Required (m ³)	4921	

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas 001 Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@ftco.ie
	Direct Tel.	01-6583500
	Date:	22/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	

Significance of Fire Event

Solid Digestate Storage Building and Liquid Reception Building

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)	2		Ferric Powder	Tonnes
2.3	Flammable Solids Storage	2	1		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	636		Solid Digestate	Tonnes
	Any other combustible material	0			Tonnes
2.4	Combustible Materials Storage	636	2		Tonnes
	Percent of S1 Storage	35784%	0.5		
	Percent of S2 Storage	2519%	1		
	Percent of S3 Storage	338%	2		
			2		
			2.0 Max		2.0

Fire Significance

S3 - High Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1 H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential



Solid Digestate Storage Building and Liquid Reception Building

Number	Material Stored in this Area	Response	Hazard Category	
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
Max			0	

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

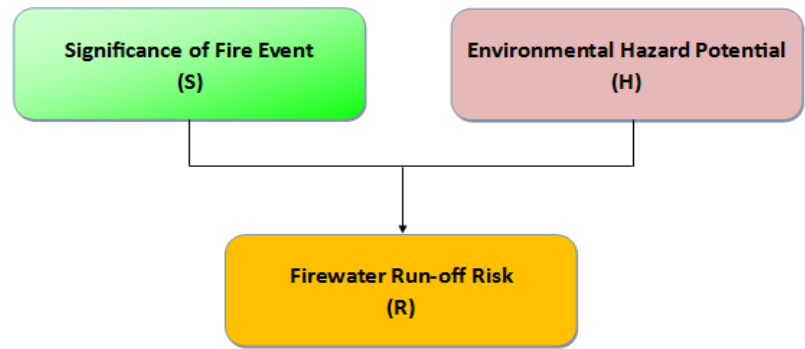
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3) H411: Toxic to aquatic life with long lasting effects	2
Ethanol	H225: Highly flammable liquid and vapour	1

Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
Isopropanol	H225: Highly flammable liquid and vapour	1
Isobutanol	H226: Flammable liquid and vapour	1
Methanol	H225: Highly flammable liquid and vapour	1
Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
Phenol	H411: Toxic to aquatic life with long lasting effects	2
Sodium Nitrite	H400: Very toxic to aquatic life	2
Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
Toluene	H225: Highly flammable liquid and vapour	2
Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score	
Significance of Fire Event		S3 - High Significance	
Hazard Potential		H0 - No Hazard Potential	

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	R1 - Risk of Environmental Contamination

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	Yes

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)	0	Not Required
1.2	Flammable Material (tonnes)	2	From Significance table
1.3	Combustible Material (tonnes)	637.6849215	From Significance table
1.5	Assess materials, are already classified as flammable - 10270, 10271, 10272 (tonnes)	0	Not Required
1.6	Outgoing Material not already classified - 10270, 10271 (tonnes)	0	Not Required
1.7	Outgoing Material not already classified - 10272 (tonnes)	0	Not Required
1.8	Non Combustible Material (tonnes) (see note 1)	0	Not Required
1.9	Total F1/F2 Materials	2	
1.9	Total F3/F4 Materials	637.6849215	
1.1	Total Storage in this Area (tonnes)	637.6849215	
1.11	Fire Hazard Category	F1/F2	
1.12	Storage Density (kg/m ³)	0.50	
1.13	Storage Density Factor	0.5	
1.14	Type of Storage	Non-racked Storage	Not Required
Preliminary Fire Water Retention Required ¹ (without storage density factor)	Sprinklers	No	PNA
			PNA
			0
			Note on Preliminary Result

Total Storage Quantity (kg) 637.6849215
 Fire Hazard Category F1/F2
 Warehouse Area (m²) 0
 Sprinklers? No
 Storage Type Non-racked Storage

Retention Volume Required m³ (with density factor) Method not Suitable

1.10	Area of Site which shares common drainage with Area (m ²)	0	Not Required
1.11	1 in 10 year 24-hour rainfall event for local area (mm)	0	Not Required
1.12	Rain Water (m ³)	0.00	
Fire Water Retention Required (m ³)		0.0000	

Note 1

Examples of non-combustible materials include HCL, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards. The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA-guideline "Storage of hazardous material".

Theoretical Firewater Retention in m³																			
Area of fire section in m²		No. Sprinklers						Sprinklers and fire detection and alarm											
		Fire detection and Alarm						Stacking height < 6 m											
								Non-racked storage				Racked storage / high bay racked storage				Stacking height ≥12 m			
		F1/F2	F3/F4	F5/F6	F1-F4	F1-F4	F5/F6	F1-F4	F5/F6	F1-F4	F5/F6	F1-F4	F5/F6	F1-F4	F5/F6				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14				
50	50	25	15	25	15	5	50	25	15	25	15	5	50	25	15				
100	100	50	25	50	25	10	100	50	25	50	25	10	100	50	25				
150	150	50	40	70	50	20	150	50	40	70	50	20	150	50	40				
200	200	100	80	80	50	20	200	100	80	80	50	20	200	100	80				
250	250	100	80	110	80	30	250	100	80	110	80	30	250	100	80				
300	300	100	80	110	80	30	300	100	80	110	80	30	300	100	80				
350	350	100	80	110	80	30	350	100	80	110	80	30	350	100	80				
400	400	100	80	110	80	30	400	100	80	110	80	30	400	100	80				
450	450	100	80	110	80	30	450	100	80	110	80	30	450	100	80				
500	500	100	80	110	80	30	500	100	80	110	80	30	500	100	80				
550	550	100	80	110	80	30	550	100	80	110	80	30	550	100	80				
600	600	100	80	110	80	30	600	100	80	110	80	30	600	100	80				
650	650	100	80	110	80	30	650	100	80	110	80	30	650	100	80				
700	700	100	80	110	80	30	700	100	80	110	80	30	700	100	80				
750	750	100	80	110	80	30	750	100	80	110	80	30	750	100	80				
800	800	100	80	110	80	30	800	100	80	110	80	30	800	100	80				
850	850	100	80	110	80	30	850	100	80	110	80	30	850	100	80				
900	900	100	80	110	80	30	900	100	80	110	80	30	900	100	80				
950	950	100	80	110	80	30	950	100	80	110	80	30	950	100	80				
1,000	1,000	100	80	110	80	30	1,000	100	80	110	80	30	1,000	100	80				
1,050	1,050	100	80	110	80	30	1,050	100	80	110	80	30	1,050	100	80				
1,100	1,100	100	80	110	80	30	1,100	100	80	110	80	30	1,100	100	80				
1,150	1,150	100	80	110	80	30	1,150	100	80	110	80	30	1,150	100	80				
1,200	1,200	100	80	110	80	30	1,200	100	80	110	80	30	1,200	100	80				
1,250	1,250	100	80	110	80	30	1,250	100	80	110	80	30	1,250	100	80				
1,300	1,300	100	80	110	80	30	1,300	100	80	110	80	30	1,300	100	80				
1,350	1,350	100	80	110	80	30	1,350	100	80	110	80	30	1,350	100	80				
1,400	1,400	100	80	110	80	30	1,400	100	80	110	80	30	1,400	100	80				
1,450	1,450	100	80	110	80	30	1,450	100	80	110	80	30	1,450	100	80				
1,500	1,500	100	80	110	80	30	1,500	100	80	110	80	30	1,500	100	80				
1,550	1,550	100	80	110	80	30	1,550	100	80	110	80	30	1,550	100	80				
1,600	1,600	100	80	110	80	30	1,600	100	80	110	80	30	1,600	100	80				
1,650	1,650	100	80	110	80	30	1,650	100	80	110	80	30	1,650	100	80				
1,700	1,700	100	80	110	80	30	1,700	100	80	110	80	30	1,700	100	80				
1,750	1,750	100	80	110	80	30	1,750	100	80	110	80	30	1,750	100	80				
1,800	1,800	100	80	110	80	30	1,800	100	80	110	80	30	1,800	100	80				
1,850	1,850	100	80	110	80	30	1,850	100	80	110	80	30	1,850	100	80				
1,900	1,900	100	80	110	80	30	1,900	100	80	110	80	30	1,900	100	80				
1,950	1,950	100	80	110	80	30	1,950	100	80	110	80	30	1,950	100	80				
2,000	2,000	100	80	110	80	30	2,000	100	80	110	80	30	2,000	100	80				
2,050	2,050	100	80	110	80	30	2,050	100	80	110	80	30	2,050	100	80				
2,100	2,100	100	80	110	80	30	2,100	100	80	110	80	30	2,100	100	80				
2,150	2,150	100	80	110	80	30	2,150	100	80	110	80	30	2,150	100	80				
2,200	2,200	100	80	110	80	30	2,200	100	80	110	80	30	2,200	100	80				
2,250	2,250	100	80	110	80	30	2,250	100	80	110	80	30	2,250	100	80				
2,300	2,300	100	80	110	80	30	2,300	100	80	110	80	30	2,300	100	80				
2,350	2,350	100	80	110	80	30	2,350	100	80	110	80	30	2,350	100	80				
2,400	2,400	100	80	110	80	30	2,400	100	80	110	80	30	2,400	100	80				
2,450	2,450	100	80	110	80	30	2,450	100	80	110	80	30	2,450	100	80				
2,500	2,500	100	80	110	80	30	2,500	100	80	110	80	30	2,500	100	80				
2,550	2,550	100	80	110	80	30	2,550	100	80	110	80	30	2,550	100	80				
2,600	2,600	100	80	110	80	30	2,600	100	80	110	80	30	2,600	100	80				
2,650	2,650	100	80	110	80	30	2,650	100	80	110	80	30	2,650	100	80				
2,700	2,700	100	80	110	80	30	2,700	100	80	110	80	30	2,700	100	80				
2,750	2,750	100	80	110	80	30	2,750	100	80	110	80	30	2,750	100	80				
2,800	2,800	100	80	110	80	30	2,800	100	80	110	80	30	2,800	100	80				
2,850	2,850	100	80	110	80	30	2,850	100	80	110	80	30	2,850	100	80				
2,900	2,900	100	80	110	80	30	2,900	100	80	110	80	30	2,900	100	80				
2,950	2,950	100	80	110	80	30	2,950	100	80	110	80	30	2,950	100	80				
3,000	3,000	100	80	110	80	30	3,000	100	80	110	80	30	3,000	100	80				
3,050	3,050	100	80	110	80	30	3,050	100	80	110	80	30	3,050	100	80				
3,100	3,100	100	80	110	80	30	3,100	100	80	110	80	30	3,100	100	80				
3,150	3,150	100	80	110	80	30	3,150	100	80	110	80	30	3,150	100	80				
3,200	3,200	100	80	110	80	30	3,200	100	80	110	80	30	3,200	100	80				
3,250	3,250	100	80	110	80	30	3,250	100	80	110	80	30	3,250	100	80				
3,300	3,300	100	80	110	80	30	3,300	100	80	110	80	30	3,300	100	80				
3,350	3,350	100	80	110	80	30	3,350	100	80	110	80	30	3,350	100	80				
3,400	3,400	100	80	110	80	30	3,400	100	80	110	80	30	3,400	100	80				
3,450	3,450	100	80	110	80	30	3,450	100	80	110	80	30	3,450	100	80				
3,500	3,500	100	80	110	80	30	3,500	100	80	110	80	30	3,500	100	80				
3,550	3,550	100	80	110	80	30	3,550	100	80	110	80	30	3,550	100	80				
3,600	3,600	100	80	110	80	30	3,600	100	80	110	80	30	3,600	100	80				
3,650	3,650	100	80	110	80	30	3,650	100	80	110	80	30	3,650	100	80				
3,700	3,700	100	80	110	80	30	3,700	100	80	110	80	30	3,700	100	80				
3,750	3,750	100	80	110	80	30	3,750	100	80	110	80	30	3,750	100	80				
3,800	3,800	100	80	110	80	30	3,800	100	80	110	80	30	3,800	100	80				
3,850	3,850	100	80	110	80	30	3,850	100	80	110	80	30	3,850	100	80				
3,900	3,900	100	80	110	80	30	3,900	100	80	110	80	30	3,900	100	80				
3,950	3,950	100	80	110	80	30	3,950	100	80	110	80	30	3,950	100	80				
4,000	4,000	100	80	110	80	30	4,000	100	80	110	80	30	4,000	100	80				
4,050	4,050	100	80	110	80	30	4,050	100	80	110	80	30	4,050	100	80				
4,100	4,100	100	80	110	80	30	4,100	100	80	110	80	30	4,100	100	80				
4,150	4,150	100	80	110	80	30	4,150	100	80	110	80	30	4,150	100	80				
4,200	4,200	100	80	110	80	30	4,200	100	80	110	80	30	4,200	100	80				
4,250	4,250	100	80	110	80	30	4,250	100	80	110	80	30	4,250	100	80				
4,300	4,300	100	80	110	80	30	4,300	100	80	110	80	30	4,300	100	80				
4,350	4,350	100	80	110	80	30	4,350	100	80	110	80	30	4,350	100	80				
4,400	4,400	100	80	110	80	30	4,400	100	80	110	80	30	4,400	100	80				
4,450	4,450	100	80	110	80	30	4,450	100	80	110	80	30	4,450	100	80				
4,500	4,500	100	80	110	80	30	4,500	100	80	110	80	30	4,500	100	80				
4,550	4,550	100	80	110	80	30	4,550	100	80	110	80	30	4,550	100	80				
4,600	4,600	100	80	110	80	30	4,600												

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other banded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)		Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours		Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³		
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)	240	
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information	0	Solid materials - Agricultural Residual is completely contained within a large precast concrete bunker. See explanatory note in FWRA main report
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33000	Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)	0.0564	Input Required
1.9	Rain Water (m ³)	1861	
	Fire Water Retention Required (m ³)	2101	

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@fco.ie
	Direct Tel.	01-6583500
	Date:	22/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	

Significance of Fire Event



Tank Farm

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS) BS 5218:2011	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable)	0			Tonnes
2.1	Flammable Liquid Storage	0	0		Tonnes
	H228 (extremely flammable)	0			Tonnes
	H229 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)				Tonnes
2.3	Flammable Solids Storage	0	0		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Off-site (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	127,741.00			Tonnes
	Any other combustible material	0			Tonnes
2.4	Combustible Materials Storage	127741	2		Tonnes
	Percent of S1 Storage	638705%	0.5		
	Percent of S2 Storage	425003%	1		
	Percent of S3 Storage	63871%	2		
			2		
			2.0		
			2. Max		2.0

Fire Significance

S3 - High Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1

H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See HSG140 - Safe Use and Handling of Flammable Liquids, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

Ref.	Tank Type	Dia (m)	Volume (m³)	No. Of	Total Quantity (m³)
Pr	Primary Digester	23.9	10,408.00	6	62,448.00
S	Secondary Digester	23.9	10,408.00	3	31,224.00
PS	Post Storage Tank	35	12,026.00	1	12,026.00
T	Tertiary Digester	33	7,356.00	1	7,356.00
PS	Liquid Pre Storage Tank	35	12,026.00	1	12,026.00
DS	Digestate Storage	35	962.00	1	962.00
P	Pasteurisation	5	183.00	3	549.00
B	Buffer Storage	11	500.00	2	1,000.00
DSL	Digestate Storage Load-in	8	150.00	1	150.00
	Total				127,741.00
	Tonnes				127,741.00

Get density, assuming 1 m³ = 1 tonne

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)				
Threshold	Flammable Liquid	Flammable Solids	Flammable Gas	Combustibles
Upper	≥50	≥10	≥5	≥200
Middle	(5 - 50)	(0.5 - 10)	(0.1 - 5)	(50 - 200)
Lower	(0.1 - 5)	(0.05 - 0.5)	(0.01 - 0.1)	(2 - 50)
None/ Negligible	<0.1	<0.05	<0.01	<2

Hazard Potential

Tank Farm



Number	Material Stored in this Area	Response		Hazard Category
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
			Max	0

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

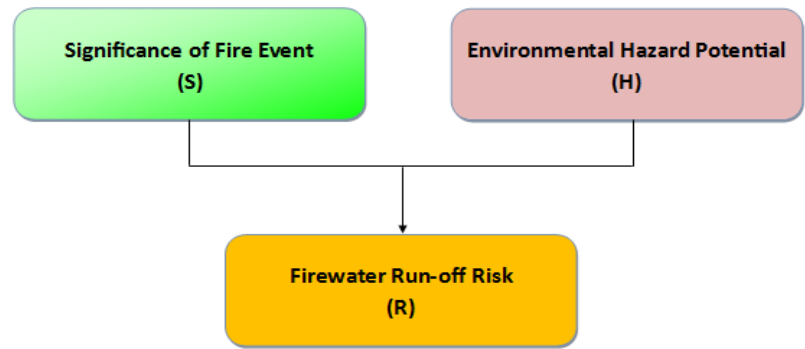
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3)	2

	H411: Toxic to aquatic life with long lasting effects	
Ethanol	H225: Highly flammable liquid and vapour	1
Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
Isopropanol	H225: Highly flammable liquid and vapour	1
Isobutanol	H226: Flammable liquid and vapour	1
Methanol	H225: Highly flammable liquid and vapour	1
Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
Phenol	H411: Toxic to aquatic life with long lasting effects	2
Sodium Nitrite	H400: Very toxic to aquatic life	2
Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
Toluene	H225: Highly flammable liquid and vapour	2
Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score	
Significance of Fire Event		S3 - High Significance	
Hazard Potential		H0 - No Hazard Potential	

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	R1 - Risk of Environmental Contamination

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	Yes

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)		Apex Required
1.2	Flammable Material (tonnes)		Form Significance tab
1.3	Combustible Material (tonnes)		Form Significance tab
1.5	Assess materials not already classified as flammable - 1022, 1023 (tonnes)		Apex Required
1.6	Outgoing Material not already classified - 1021, 1021 (tonnes)		Apex Required
1.7	Outgoing Material not already classified - 1022 (tonnes)		Apex Required
1.4	Non Combustible Material (tonnes) (see note 1)		Apex Required
1.8	Total F1-F3 Materials		
1.9	Total F3-F4 Materials		
1.1	Total Storage in this Area (tonnes)		
1.11	Fire Hazard Category		
1.12	Storage Density (kg/m ³)		
1.13	Storage Density Factor		
1.14	Type of Storage		Apex Required
Preliminary Fire Water Retention Required m ³ (without storage density factor)			N/A
Sprinklers		No	N/A
Note on Preliminary Result			0

Total Storage Quantity (kg) 0
Fire Hazard Category 0
Warehouse Area (m²) 0
Sprinklers? No
Storage Type 0

Retention Volume Required m³ (with density factor) Method not Suitable

1.10	Area of site which allows constant drainage with Area (m ²)	0	Apex Required
1.11	1 in 10 year 2-hour rainfall event for local area (mm)	0	Apex Required
1.12	Rain Water (m ³)	0.00	
Fire Water Retention Required (m ³)		0.0000	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swias Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards. The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA guideline "Storage of hazardous material".

Area of fire section	Theoretical Firewater Retention in m ³			Sprinklers and fire detection and alarm							
	Fire detection and Alarm			Stacking height < 6 m							
	Non-racked storage			Racked storage / High bay racked storage							
	F1/F2	F3/F4	F5/F6	F1-F4	F1-F4	F5/F6	F1-F4	F5/F6	F1-F4	F5/F6	
in m ²	1	2	3	4	5	6	7	8	9	10	
50	50	25	10	25	15	5	15	5	25	10	
100	100	50	20	45	30	10	35	15	50	20	
150	150	75	30	70	50	20	60	25	75	30	
200	200	100	40	95	70	30	85	40	100	40	
250	250	125	50	120	95	40	110	50	125	50	
300	300	150	60	145	120	50	135	60	150	60	
350	350	175	70	170	145	60	160	70	175	70	
400	400	200	80	195	170	70	185	80	200	80	
450	450	225	90	220	195	80	210	90	225	90	
500	500	250	100	245	220	90	235	100	250	100	
550	550	275	110	270	245	100	260	110	275	110	
600	600	300	120	295	270	110	285	120	300	120	
650	650	325	130	320	295	120	310	130	325	130	
700	700	350	140	345	320	130	335	140	350	140	
750	750	375	150	370	345	140	360	150	375	150	
800	800	400	160	395	370	150	385	160	400	160	
850	850	425	170	420	395	160	410	170	425	170	
900	900	450	180	445	420	170	435	180	450	180	
950	950	475	190	470	445	180	460	190	475	190	
1,000	1,000	500	200	495	470	190	485	200	500	200	
1,050	1,050	525	210	520	495	200	510	210	525	210	
1,100	1,100	550	220	545	520	210	535	220	550	220	
1,150	1,150	575	230	570	545	220	560	230	575	230	
1,200	1,200	600	240	595	570	230	585	240	600	240	
1,250	1,250	625	250	620	595	240	610	250	625	250	
1,300	1,300	650	260	645	620	250	635	260	650	260	
1,350	1,350	675	270	670	645	260	660	270	675	270	
1,400	1,400	700	280	695	670	270	685	280	700	280	
1,450	1,450	725	290	720	695	280	710	290	725	290	
1,500	1,500	750	300	745	720	290	735	300	750	300	
1,550	1,550	775	310	770	745	300	760	310	775	310	
1,600	1,600	800	320	795	770	310	785	320	800	320	
1,650	1,650	825	330	820	795	320	810	330	825	330	
1,700	1,700	850	340	845	820	330	835	340	850	340	
1,750	1,750	875	350	870	845	340	860	350	875	350	
1,800	1,800	900	360	895	870	350	885	360	900	360	
1,850	1,850	925	370	920	895	360	910	370	925	370	
1,900	1,900	950	380	945	920	370	935	380	950	380	
1,950	1,950	975	390	970	945	380	960	390	975	390	
2,000	2,000	1,000	400	995	970	390	985	400	1,000	400	
2,050	2,050	1,025	410	1,020	995	400	1,010	410	1,025	410	
2,100	2,100	1,050	420	1,045	1,020	410	1,035	420	1,050	420	
2,150	2,150	1,075	430	1,070	1,045	420	1,060	430	1,075	430	
2,200	2,200	1,100	440	1,095	1,070	430	1,085	440	1,100	440	
2,250	2,250	1,125	450	1,120	1,095	440	1,110	450	1,125	450	
2,300	2,300	1,150	460	1,145	1,120	450	1,135	460	1,150	460	
2,350	2,350	1,175	470	1,170	1,145	460	1,160	470	1,175	470	
2,400	2,400	1,200	480	1,195	1,170	470	1,185	480	1,200	480	
2,450	2,450	1,225	490	1,220	1,195	480	1,210	490	1,225	490	
2,500	2,500	1,250	500	1,245	1,220	490	1,235	500	1,250	500	
2,550	2,550	1,275	510	1,270	1,245	500	1,260	510	1,275	510	
2,600	2,600	1,300	520	1,295	1,270	510	1,285	520	1,300	520	
2,650	2,650	1,325	530	1,320	1,295	520	1,310	530	1,325	530	
2,700	2,700	1,350	540	1,345	1,320	530	1,335	540	1,350	540	
2,750	2,750	1,375	550	1,370	1,345	540	1,360	550	1,375	550	
2,800	2,800	1,400	560	1,395	1,370	550	1,385	560	1,400	560	
2,850	2,850	1,425	570	1,420	1,395	560	1,410	570	1,425	570	
2,900	2,900	1,450	580	1,445	1,420	570	1,435	580	1,450	580	
2,950	2,950	1,475	590	1,470	1,445	580	1,460	590	1,475	590	
3,000	3,000	1,500	600	1,495	1,470	590	1,485	600	1,500	600	
3,050	3,050	1,525	610	1,520	1,495	600	1,510	610	1,525	610	
3,100	3,100	1,550	620	1,545	1,520	610	1,535	620	1,550	620	
3,150	3,150	1,575	630	1,570	1,545	620	1,560	630	1,575	630	
3,200	3,200	1,600	640	1,595	1,570	630	1,585	640	1,600	640	
3,250	3,250	1,625	650	1,620	1,595	640	1,610	650	1,625	650	
3,300	3,300	1,650	660	1,645	1,620	650	1,635	660	1,650	660	
3,350	3,350	1,675	670	1,670	1,645	660	1,660	670	1,675	670	
3,400	3,400	1,700	680	1,695	1,670	670	1,685	680	1,700	680	
3,450	3,450	1,725	690	1,720	1,695	680	1,710	690	1,725	690	
3,500	3,500	1,750	700	1,745	1,720	690	1,735	700	1,750	700	
3,550	3,550	1,775	710	1,770	1,745	700	1,760	710	1,775	710	
3,600	3,600	1,800	720	1,795	1,770	710	1,785	720	1,800	720	
3,650	3,650	1,825	730	1,820	1,795	720	1,810	730	1,825	730	
3,700	3,700	1,850	740	1,845	1,820	730	1,835	740	1,850	740	
3,750	3,750	1,875	750	1,870	1,845	740	1,860	750	1,875	750	
3,800	3,800	1,900	760	1,895	1,870	750	1,885	760	1,900	760	
3,850	3,850	1,925	770	1,920	1,895	760	1,910	770	1,925	770	
3,900	3,900	1,950	780	1,945	1,920	770	1,935	780	1,950	780	
3,950	3,950	1,975	790	1,970	1,945	780	1,960	790	1,975	790	
4,000	4,000	2,000	800	1,995	1,970	790	1,985	800	2,000	800	
4,050	4,050	2,025	810	2,020	1,995	800	2,010	810	2,025	810	
4,100	4,100	2,050	820	2,045	2,020	810	2,035	820	2,050	820	
4,150	4,150	2,075	830	2,070	2,045	820	2,060	830	2,075	830	
4,200	4,200	2,100	840	2,095	2,070	830	2,085	840	2,100	840	
4,250	4,250	2,125	850	2,120	2,095	840	2,110	850	2,125	850	
4,300	4,300	2,150	860	2,145	2,120	850	2,135	860	2,150	860	
4,350	4,350	2,175	870	2,170	2,145	860	2,160	870	2,175	870	
4,400	4,400	2,200	880	2,195	2,170	870	2,185	880	2,200	880	
4,450	4,450	2,225	890	2,220	2,195	880	2,210	890	2,225	890	
4,500	4,500	2,250	900	2,245	2,220	890	2,235	900	2,250	900	
4,550	4,550	2,275	910	2,270	2,245	900	2,260	910	2,275	910	
4,600	4,600	2,300	920	2,295	2,270	910	2,285	920	2,300	920	
4,650	4,650	2,325	930	2,320	2,295	920	2,310	930	2,325	930	
4,700	4,700	2,350	940	2,345	2,320	930	2,335	940	2,350	940	
4,750	4,750	2,375	950	2,370	2,345	940	2,360	950	2,375	950	
4,800	4,800	2,400	960	2,395	2,370	950	2,385	960	2,400	960	
4,850	4,850	2,425	970	2,420	2,395	960	2,410	970	2,425	970	
4,900	4,900	2,450	980	2,445	2,420	970	2,435	980	2,450	980	
4,950	4,950	2,475	990	2,470	2,445	980	2,460	990	2,475	990	
5,000	5,000	2,500	1,000	2,495	2,470	990	2,485	1,000	2,500	1,000	

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other bunded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	12,026.00
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	-
Cooling Water for Adjacent Tanks (WF)	240.00
Rainwater Contribution (Rw) - see Section 4.6.2	1,065.96
Retention Volume Directly Available (i.e. capacity at area on fire only)	40,987.00

Fire Water Retention Required (VR) - 27,655.04 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)		
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours		
1.3	Max FW volume from hydrants during Fire Event m ³		
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		
1.5	Total Fire Water/Foam Stored on Site (m ³)		
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information		
1.7	Area of Site which shares common drainage with Assessment Area (m ²)		
1.8	1 in 10 year 24hour rainfall event for local area (m)		
1.9	Rain Water (m ³)		
	Fire Water Retention Required (m ³)		

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@ftco.ie
	Direct Tel.	01-6583500
	Date:	22/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	Input Required
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	Input Required
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	Risk Assessment Result
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	Input Required
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	Input of Calculation and Support Data
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	Input Required

Significance of Fire Event

Heating Centre

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	Yes	0	Water Cannon/Deluge System	
2. Materials Stored		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)	180		Biomass woodchips	Tonnes
2.3	Flammable Solids Storage	180	2		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)				Tonnes
	Any other combustible material				Tonnes
2.4	Combustible Materials Storage	0	0		Tonnes
	Percent of S1 Storage	36000%	0.5		
	Percent of S2 Storage	1800%	1		
	Percent of S3 Storage	1800%	2		
			2		
			2. Max	2.0	

Fire Significance

S3 - High Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1 H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential

Heating Centre



Number	Material Stored in this Area	Response	Hazard Category	
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0.206		411
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)			
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0.0206	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
Max			0	

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

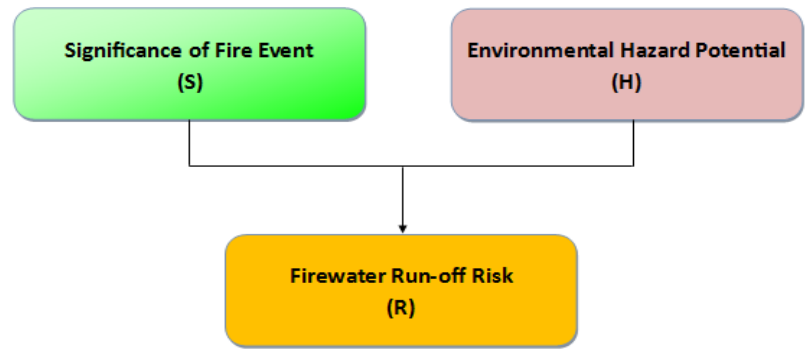
Substance/Material	Flammable or Environmental H-Statements	Water Hazard Class (WGK)
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3) H411: Toxic to aquatic life with long lasting effects	2

	Ethanol	H225: Highly flammable liquid and vapour	1
	Heptane	H225: Highly flammable liquid and vapour	2
		H400: Very toxic to aquatic life	
		H410: Very toxic to aquatic life with long lasting effects	
	Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
	Isopropanol	H225: Highly flammable liquid and vapour	1
	Isobutanol	H226: Flammable liquid and vapour	1
	Methanol	H225: Highly flammable liquid and vapour	1
	Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
	Phenol	H411: Toxic to aquatic life with long lasting effects	2
	Sodium Nitrite	H400: Very toxic to aquatic life	2
	Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
	Toluene	H225: Highly flammable liquid and vapour	2
	Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
	Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
	2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
		H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	
	Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score	
Significance of Fire Event		S3 - High Significance	
Hazard Potential		H0 - No Hazard Potential	

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	R1 - Risk of Environmental Contamination

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	Yes

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)		<i>Apex Required</i>
1.2	Flammable Material (tonnes)		From Significance table
1.3	Combustible Material (tonnes)		From Significance table
1.5	Assess materials not already classified as flammable - H220, H223 (tonnes)		<i>Apex Required</i>
1.6	Outgoing Material not already classified - H250, H251 (tonnes)		<i>Apex Required</i>
1.7	Outgoing Material not already classified - H272 (tonnes)		<i>Apex Required</i>
1.4	Non Combustible Material (tonnes) (see note 1)		<i>Apex Required</i>
1.8	Total F1-F3 Materials		
1.9	Total F3-F4 Materials		
1.1	Total Storage in this Area (tonnes)		
1.11	Fire Hazard Category		
1.12	Storage Density (kg/m ³)		
1.13	Storage Density Factor		
1.14	Type of Storage	Non-racked Storage	<i>Apex Required</i>
Preliminary Fire Water Retention Required m ³ (without storage density factor)			
Sprinklers		Yes	N/A
Note on Preliminary Result			0

Total Storage Quantity (kg) 0
 Fire Hazard Category 0
 Warehouse Area (m²) 0
 Sprinklers? Yes
 Storage Type Non-racked Storage

Retention Volume Required m³ (with density factor) Method not Suitable

1.10	Area of site which allows maximum drainage with Area (m ²)	0	<i>Apex Required</i>
1.11	1 in 10 year 2-hour rainfall event for local area (mm)	0	<i>Apex Required</i>
1.12	Rain Water (m ³)	0.00	
	Fire Water Retention Required (m ³)	ERR000	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards. The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA guideline "Storage of hazardous material".

Area of fire section in m ²	Theoretical Firewater Retention in m ³			Sprinklers and fire detection and alarm							
	Fire detection and Alarm			Stacking height < 6 m							
	Fire detection and Alarm			Non-racked storage				Racked storage / high bay racked storage			
	F1/F2	F3/F4	F5/F6	F1-F6	F1-F4	F5/F6	F1-F4	F5/F6	F1-F4	F5/F6	
50	50	25	10	25	15	5	15	5	25	15	5
100	100	50	20	45	30	10	30	15	50	30	20
150	150	75	30	70	50	20	60	25	75	50	30
200	200	100	40	90	60	30	80	40	100	60	40
250	250	125	50	110	80	40	100	50	125	80	50
300	300	150	60	130	100	50	120	60	150	100	60
350	350	175	70	150	120	60	140	70	175	120	70
400	400	200	80	170	140	70	160	80	200	140	80
450	450	225	90	190	160	80	180	90	225	160	90
500	500	250	100	210	180	90	200	100	250	180	100
550	550	275	110	230	200	100	220	110	275	200	110
600	600	300	120	250	220	110	240	120	300	220	120
650	650	325	130	270	240	120	260	130	325	240	130
700	700	350	140	290	260	130	280	140	350	260	140
750	750	375	150	310	280	140	300	150	375	280	150
800	800	400	160	330	300	150	320	160	400	300	160
850	850	425	170	350	320	160	340	170	425	320	170
900	900	450	180	370	340	170	360	180	450	340	180
950	950	475	190	390	360	180	380	190	475	360	190
1,000	1,000	500	200	410	380	190	400	200	500	380	200
1,050	1,050	525	210	430	400	200	420	210	525	400	210
1,100	1,100	550	220	450	420	210	440	220	550	420	220
1,150	1,150	575	230	470	440	220	460	230	575	440	230
1,200	1,200	600	240	490	460	230	480	240	600	460	240
1,250	1,250	625	250	510	480	240	500	250	625	480	250
1,300	1,300	650	260	530	500	250	520	260	650	500	260
1,350	1,350	675	270	550	520	260	540	270	675	520	270
1,400	1,400	700	280	570	540	270	560	280	700	540	280
1,450	1,450	725	290	590	560	280	580	290	725	560	290
1,500	1,500	750	300	610	580	290	600	300	750	580	300
1,550	1,550	775	310	630	600	300	620	310	775	600	310
1,600	1,600	800	320	650	620	310	640	320	800	620	320
1,650	1,650	825	330	670	640	320	660	330	825	640	330
1,700	1,700	850	340	690	660	330	680	340	850	660	340
1,750	1,750	875	350	710	680	340	700	350	875	680	350
1,800	1,800	900	360	730	700	350	720	360	900	700	360
1,850	1,850	925	370	750	720	360	740	370	925	720	370
1,900	1,900	950	380	770	740	370	760	380	950	740	380
1,950	1,950	975	390	790	760	380	780	390	975	760	390
2,000	2,000	1,000	400	810	780	390	800	400	1,000	780	400
2,050	2,050	1,025	410	830	800	400	820	410	1,025	800	410
2,100	2,100	1,050	420	850	820	410	840	420	1,050	820	420
2,150	2,150	1,075	430	870	840	420	860	430	1,075	840	430
2,200	2,200	1,100	440	890	860	430	880	440	1,100	860	440
2,250	2,250	1,125	450	910	880	440	900	450	1,125	880	450
2,300	2,300	1,150	460	930	900	450	920	460	1,150	900	460
2,350	2,350	1,175	470	950	920	460	940	470	1,175	920	470
2,400	2,400	1,200	480	970	940	470	960	480	1,200	940	480
2,450	2,450	1,225	490	990	960	480	980	490	1,225	960	490
2,500	2,500	1,250	500	1,010	980	490	1,000	500	1,250	980	500
2,550	2,550	1,275	510	1,030	1,000	500	1,020	510	1,275	1,000	510
2,600	2,600	1,300	520	1,050	1,020	510	1,040	520	1,300	1,020	520
2,650	2,650	1,325	530	1,070	1,040	520	1,060	530	1,325	1,040	530
2,700	2,700	1,350	540	1,090	1,060	530	1,080	540	1,350	1,060	540
2,750	2,750	1,375	550	1,110	1,080	540	1,100	550	1,375	1,080	550
2,800	2,800	1,400	560	1,130	1,100	550	1,120	560	1,400	1,100	560
2,850	2,850	1,425	570	1,150	1,120	560	1,140	570	1,425	1,120	570
2,900	2,900	1,450	580	1,170	1,140	570	1,160	580	1,450	1,140	580
2,950	2,950	1,475	590	1,190	1,160	580	1,180	590	1,475	1,160	590
3,000	3,000	1,500	600	1,210	1,180	590	1,200	600	1,500	1,180	600
3,050	3,050	1,525	610	1,230	1,200	600	1,220	610	1,525	1,200	610
3,100	3,100	1,550	620	1,250	1,220	610	1,240	620	1,550	1,220	620
3,150	3,150	1,575	630	1,270	1,240	620	1,260	630	1,575	1,240	630
3,200	3,200	1,600	640	1,290	1,260	630	1,280	640	1,600	1,260	640
3,250	3,250	1,625	650	1,310	1,280	640	1,300	650	1,625	1,280	650
3,300	3,300	1,650	660	1,330	1,300	650	1,320	660	1,650	1,300	660
3,350	3,350	1,675	670	1,350	1,320	660	1,340	670	1,675	1,320	670
3,400	3,400	1,700	680	1,370	1,340	670	1,360	680	1,700	1,340	680
3,450	3,450	1,725	690	1,390	1,360	680	1,380	690	1,725	1,360	690
3,500	3,500	1,750	700	1,410	1,380	690	1,400	700	1,750	1,380	700
3,550	3,550	1,775	710	1,430	1,400	700	1,420	710	1,775	1,400	710
3,600	3,600	1,800	720	1,450	1,420	710	1,440	720	1,800	1,420	720
3,650	3,650	1,825	730	1,470	1,440	720	1,460	730	1,825	1,440	730
3,700	3,700	1,850	740	1,490	1,460	730	1,480	740	1,850	1,460	740
3,750	3,750	1,875	750	1,510	1,480	740	1,500	750	1,875	1,480	750
3,800	3,800	1,900	760	1,530	1,500	750	1,520	760	1,900	1,500	760
3,850	3,850	1,925	770	1,550	1,520	760	1,540	770	1,925	1,520	770
3,900	3,900	1,950	780	1,570	1,540	770	1,560	780	1,950	1,540	780
3,950	3,950	1,975	790	1,590	1,560	780	1,580	790	1,975	1,560	790
4,000	4,000	2,000	800	1,610	1,580	790	1,600	800	2,000	1,580	800
4,050	4,050	2,025	810	1,630	1,600	800	1,620	810	2,025	1,600	810
4,100	4,100	2,050	820	1,650	1,620	810	1,640	820	2,050	1,620	820
4,150	4,150	2,075	830	1,670	1,640	820	1,660	830	2,075	1,640	830
4,200	4,200	2,100	840	1,690	1,660	830	1,680	840	2,100	1,660	840
4,250	4,250	2,125	850	1,710	1,680	840	1,700	850	2,125	1,680	850
4,300	4,300	2,150	860	1,730	1,700	850	1,720	860	2,150	1,700	860
4,350	4,350	2,175	870	1,750	1,720	860	1,740	870	2,175	1,720	870
4,400	4,400	2,200	880	1,770	1,740	870	1,760	880	2,200	1,740	880
4,450	4,450	2,225	890	1,790	1,760	880	1,780	890	2,225	1,760	890
4,500	4,500	2,250	900	1,810	1,780	890	1,800	900	2,250	1,780	900
4,550	4,550	2,275	910	1,830	1,800	900	1,820	910	2,275	1,800	910
4,600	4,600	2,300	920	1,850	1,820	910	1,840	920	2,300	1,820	920
4,650	4,650	2,325	930	1,870	1,840	920	1,860	930	2,325	1,840	930
4,700	4,700	2,350	940	1,890	1,860	930	1,880	940	2,350	1,860	940
4,750	4,750	2,375	950	1,910	1,880	940	1,900	950	2,375	1,880	950
4,800	4,800	2,400	960	1,930	1,900	950	1,920	960	2,400	1,900	960
4,850	4,850	2,425	970	1,950	1,920	960	1,940	970	2,425	1,920	970
4,900	4,900	2,450	980	1,970	1,940	970	1,960	980	2,450	1,940	980
4,950	4,950	2,475	990	1,990	1,960	980	1,980	990	2,475	1,960	990
5,000	5,000	2,500	1,000	2,010	1,980	990	2,000	1,000	2,500	1,980	1,000

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other bunded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)	0	Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours	0	Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³	Fire Duration Unacceptable	
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)	240	4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)		
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information	0	Solid materials - Woodchips is completely contained within a large precast concrete bunker. No product loss See FWRA Main report for detailed description
1.7	Area of Site which shares common drainage with Assessment Area (m ²)	33000	Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)	0.0564	Input Required
1.9	Rain Water (m ³)	1861	
	Fire Water Retention Required (m ³)	2101	

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@fco.ie
	Direct Tel.	01-6583500
	Date:	22/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	

Significance of Fire Event

Heating Centre

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)				Tonnes
2.3	Flammable Solids Storage	0	0		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	0			Tonnes
	Any other combustible material	0			Tonnes
2.4	Combustible Materials Storage	0	0		Tonnes
	Percent of S1 Storage	0%	N/A		
	Percent of S2 Storage	0%	N/A		
	Percent of S3 Storage	0%	N/A		
			0		
			2. Max	0.0	

Fire Significance

S1 - Low Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1

H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential

Administration Building



Number	Material Stored in this Area	Response		Hazard Category
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)			
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	0		
Total WGK3 Equivalent Material		0	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
Max			0	

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

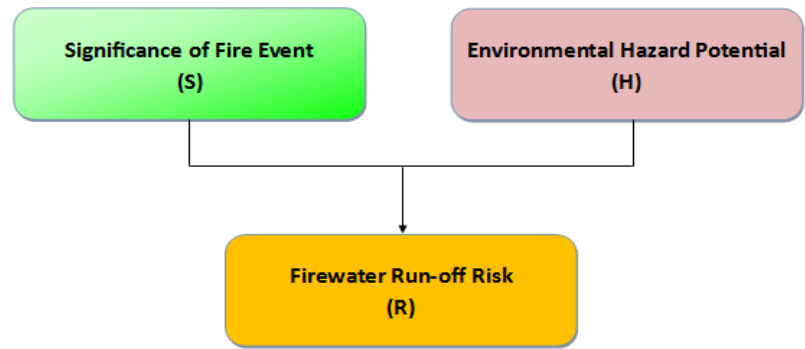
Substance/Material	Flammable or Environmental H-Statements	Water Hazard Class (WGK)
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3) H411: Toxic to aquatic life with long lasting effects	2
Ethanol	H225: Highly flammable liquid and vapour	1
Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life	2

		H410: Very toxic to aquatic life with long lasting effects	
	Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
	Isopropanol	H225: Highly flammable liquid and vapour	1
	Isobutanol	H226: Flammable liquid and vapour	1
	Methanol	H225: Highly flammable liquid and vapour	1
	Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
	Phenol	H411: Toxic to aquatic life with long lasting effects	2
	Sodium Nitrite	H400: Very toxic to aquatic life	2
	Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
	Toluene	H225: Highly flammable liquid and vapour	2
	Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
	Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
	2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
	Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score
Significance of Fire Event		S1 - Low Significance
Hazard Potential		#REF!

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	#REF!

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	#REF!

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Size of Storage Area (m ²)	0	Apex Required
1.2	Flammable Material (tonnes)	0	From Significance table
1.3	Combustible Material (tonnes)	0	From Significance table
1.5	Assess materials not already classified as flammable - H220, H223 (tonnes)	0	Apex Required
1.6	Corrosive Material not already classified - H314, H317 (tonnes)	0	Apex Required
1.7	Corrosive Material not already classified - H372 (tonnes)	0	Apex Required
1.4	Non-Combustible Material (tonnes) (see note 1)	0	Apex Required
1.8	Total F1-F3 Materials	0	
1.9	Total F1-F4 Materials	0	
1.1	Total Storage in this Area (tonnes)	0	
1.11	Fire Hazard Category	N/A	
1.12	Storage Density (kg/m ³)	<1000	
1.13	Storage Density Factor	<1000	
1.14	Type of Storage	Non-racked Storage	Apex Required
Preliminary Fire Water Retention Required m ³ (without storage density factor)			N/A
Sprinklers		No	N/A
Note on Preliminary Result			0

Total Storage Quantity (kg) 0
 Fire Hazard Category N/A
 Warehouse Area (m²) 0
 Sprinklers? No
 Storage Type Non-racked Storage

Retention Volume Required m³ (with density factor)
 Method not Suitable

1.10	Area of site which drains towards drainage with Area (m ²)	0	Apex Required
1.11	1 in 10 year 2-hour rainfall event for local area (mm)	0	Apex Required
1.12	Rain Water (m ³)	0.00	
	Fire Water Retention Required (m ³)	0.0000	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "Assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards.

The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type - in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA guideline "Storage of hazardous material".

Area of fire section	Theoretical Firewater Retention in m³										
	No Sprinklers					Sprinklers and fire detection and alarm					
	Fire detection and Alarm					Stacking height + 6 m					
						Non-racked storage		Racked storage / high bay racked storage		Stacking height +12 m	
No. m²	F1/F2	F3/F4	F5/F6	F7/F8	F9/F10	F1-F4	F5-F6	F1-F4	F5-F6	F1-F4	F5-F6
50	50	25	10	25	15	5	15	5	25	10	
100	100	50	20	45	30	10	35	15	50	20	
150	150	75	30	70	50	20	60	25	75	30	
200	200	100	40	95	70	30	85	40	100	40	
250	250	125	50	120	90	40	110	50	125	50	
300	300	150	60	145	110	50	135	60	150	60	
350	350	175	70	170	130	60	160	70	175	70	
400	400	200	80	195	150	70	185	80	200	80	
450	450	225	90	220	170	80	210	90	225	90	
500	500	250	100	245	190	90	235	100	250	100	
550	550	275	110	270	210	100	260	110	275	110	
600	600	300	120	295	230	110	285	120	300	120	
650	650	325	130	320	250	120	310	130	325	130	
700	700	350	140	345	270	130	335	140	350	140	
750	750	375	150	370	290	140	360	150	375	150	
800	800	400	160	395	310	150	385	160	400	160	
850	850	425	170	420	330	160	410	170	425	170	
900	900	450	180	445	350	170	435	180	450	180	
950	950	475	190	470	370	180	460	190	475	190	
1,000	1,000	500	200	495	390	190	485	200	500	200	
1,050	1,050	525	210	520	410	200	510	210	525	210	
1,100	1,100	550	220	545	430	210	535	220	550	220	
1,150	1,150	575	230	570	450	220	560	230	575	230	
1,200	1,200	600	240	595	470	230	585	240	600	240	
1,250	1,250	625	250	620	490	240	610	250	625	250	
1,300	1,300	650	260	645	510	250	635	260	650	260	
1,350	1,350	675	270	670	530	260	660	270	675	270	
1,400	1,400	700	280	695	550	270	685	280	700	280	
1,450	1,450	725	290	720	570	280	710	290	725	290	
1,500	1,500	750	300	745	590	290	735	300	750	300	
1,550	1,550	775	310	770	610	300	760	310	775	310	
1,600	1,600	800	320	795	630	310	785	320	800	320	
1,650	1,650	825	330	820	650	320	810	330	825	330	
1,700	1,700	850	340	845	670	330	835	340	850	340	
1,750	1,750	875	350	870	690	340	860	350	875	350	
1,800	1,800	900	360	895	710	350	885	360	900	360	
1,850	1,850	925	370	920	730	360	910	370	925	370	
1,900	1,900	950	380	945	750	370	935	380	950	380	
1,950	1,950	975	390	970	770	380	960	390	975	390	
2,000	2,000	1,000	400	995	790	390	985	400	1,000	400	
2,050	2,050	1,025	410	1,020	810	400	1,010	410	1,025	410	
2,100	2,100	1,050	420	1,045	830	410	1,035	420	1,050	420	
2,150	2,150	1,075	430	1,070	850	420	1,060	430	1,075	430	
2,200	2,200	1,100	440	1,095	870	430	1,085	440	1,100	440	
2,250	2,250	1,125	450	1,120	890	440	1,110	450	1,125	450	
2,300	2,300	1,150	460	1,145	910	450	1,135	460	1,150	460	
2,350	2,350	1,175	470	1,170	930	460	1,160	470	1,175	470	
2,400	2,400	1,200	480	1,195	950	470	1,185	480	1,200	480	
2,450	2,450	1,225	490	1,220	970	480	1,210	490	1,225	490	
2,500	2,500	1,250	500	1,245	990	490	1,235	500	1,250	500	
2,550	2,550	1,275	510	1,270	1,010	500	1,260	510	1,275	510	
2,600	2,600	1,300	520	1,295	1,030	510	1,285	520	1,300	520	
2,650	2,650	1,325	530	1,320	1,050	520	1,310	530	1,325	530	
2,700	2,700	1,350	540	1,345	1,070	530	1,335	540	1,350	540	
2,750	2,750	1,375	550	1,370	1,090	540	1,360	550	1,375	550	
2,800	2,800	1,400	560	1,395	1,110	550	1,385	560	1,400	560	
2,850	2,850	1,425	570	1,420	1,130	560	1,410	570	1,425	570	
2,900	2,900	1,450	580	1,445	1,150	570	1,435	580	1,450	580	
2,950	2,950	1,475	590	1,470	1,170	580	1,460	590	1,475	590	
3,000	3,000	1,500	600	1,495	1,190	590	1,485	600	1,500	600	
3,050	3,050	1,525	610	1,520	1,210	600	1,510	610	1,525	610	
3,100	3,100	1,550	620	1,545	1,230	610	1,535	620	1,550	620	
3,150	3,150	1,575	630	1,570	1,250	620	1,560	630	1,575	630	
3,200	3,200	1,600	640	1,595	1,270	630	1,585	640	1,600	640	
3,250	3,250	1,625	650	1,620	1,290	640	1,610	650	1,625	650	
3,300	3,300	1,650	660	1,645	1,310	650	1,635	660	1,650	660	
3,350	3,350	1,675	670	1,670	1,330	660	1,660	670	1,675	670	
3,400	3,400	1,700	680	1,695	1,350	670	1,685	680	1,700	680	
3,450	3,450	1,725	690	1,720	1,370	680	1,710	690	1,725	690	
3,500	3,500	1,750	700	1,745	1,390	690	1,735	700	1,750	700	
3,550	3,550	1,775	710	1,770	1,410	700	1,760	710	1,775	710	
3,600	3,600	1,800	720	1,795	1,430	710	1,785	720	1,800	720	
3,650	3,650	1,825	730	1,820	1,450	720	1,810	730	1,825	730	
3,700	3,700	1,850	740	1,845	1,470	730	1,835	740	1,850	740	
3,750	3,750	1,875	750	1,870	1,490	740	1,860	750	1,875	750	
3,800	3,800	1,900	760	1,895	1,510	750	1,885	760	1,900	760	
3,850	3,850	1,925	770	1,920	1,530	760	1,910	770	1,925	770	
3,900	3,900	1,950	780	1,945	1,550	770	1,935	780	1,950	780	
3,950	3,950	1,975	790	1,970	1,570	780	1,960	790	1,975	790	
4,000	4,000	2,000	800	1,995	1,590	790	1,985	800	2,000	800	
4,050	4,050	2,025	810	2,020	1,610	800	2,010	810	2,025	810	
4,100	4,100	2,050	820	2,045	1,630	810	2,035	820	2,050	820	
4,150	4,150	2,075	830	2,070	1,650	820	2,060	830	2,075	830	
4,200	4,200	2,100	840	2,095	1,670	830	2,085	840	2,100	840	
4,250	4,250	2,125	850	2,120	1,690	840	2,110	850	2,125	850	
4,300	4,300	2,150	860	2,145	1,710	850	2,135	860	2,150	860	
4,350	4,350	2,175	870	2,170	1,730	860	2,160	870	2,175	870	
4,400	4,400	2,200	880	2,195	1,750	870	2,185	880	2,200	880	
4,450	4,450	2,225	890	2,220	1,770	880	2,210	890	2,225	890	
4,500	4,500	2,250	900	2,245	1,790	890	2,235	900	2,250	900	
4,550	4,550	2,275	910	2,270	1,810	900	2,260	910	2,275	910	
4,600	4,600	2,300	920	2,295	1,830	910	2,285	920	2,300	920	
4,650	4,650	2,325	930	2,320	1,850	920	2,310	930	2,325	930	
4,700	4,700	2,350	940	2,345	1,870	930	2,335	940	2,350	940	
4,750	4,750	2,375	950	2,370	1,890	940	2,360	950	2,375	950	
4,800	4,800	2,400	960	2,395	1,910	950	2,385	960	2,400	960	
4,850	4,850	2,425	970	2,420	1,930	960	2,410	970	2,425	970	
4,900	4,900	2,450	980	2,445	1,950	970	2,435	980	2,450	980	
4,950	4,950	2,475	990	2,470	1,970	980	2,460	990	2,475	990	
5,000	5,000	2,500	1,000	2,495	1,990	990	2,485	1,000	2,500	1,000	

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bunding) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other bunded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)	0	Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours	0	Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³	Fire Duration Unacceptable	
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)		
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information	0	Solid materials - Woodchips is completely contained within a large precast concrete bunker. No product loss
1.7	Area of Site which shares common drainage with Assessment Area (m ²)		Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)		Input Required
1.9	Rain Water (m ³)	0	
	Fire Water Retention Required (m ³)	0	

FIRE WATER RETENTION RISK ASSESSMENT



Organisation Name	Greengate Biogas Ltd	
Licence Number	n/a	
Completed By	Name	James O'Neill
	Position	Associate Director
	Email	james.oneill@ftco.ie
	Direct Tel.	01-6583500
	Date:	22/05/2026

This Fire Water Retention Risk Assessment Spreadsheet is to be used in conjunction with the EPA Guidance on Retention Requirements for Firewater Run-off. The purpose of this workbook is to determine, at a conservative level, whether firewater retention is required for the facility, and if so the required retention capacity.

SHEET DESCRIPTION	INSTRUCTIONS	COMMENT
Significance of Fire Event	Please enter the fire protection measures that are available in each area of the site and the quantity of flammable and combustible material storage within these areas.	Input Required
Hazard Potential	Please enter the quantities of hazardous substances stored within each "assessment area" of the site. If the site is a licensed waste disposal facility please select "Hazardous" or "Non-Hazardous", or "N/A" if this does not apply.	Input Required
Fire Water Run-Off Risk	This tab will outline the Overall Fire Water Run-Off Risk of each area based on the Significance of a Fire event and the Hazard Potential in each "assessment area". The conclusion as to whether or not the site requires fire water retention is stated here.	Risk Assessment Result
Method 1: Warehouse Retention Calculation	A calculation of the fire water retention required for a warehouse area storage is outlined here. The method is based on the Swiss Federation Firewater Retention Practical Guide.	Input Required
Method 2: Tank Farm / Process Plant Retention Calculation	For other areas, e.g. tank farm, process room, etc. a detailed assessment should be carried out to determine firewater retention volume required. This involves acquiring information on expected fire duration, sprinkler flow rates, etc. See Section 4.3 of the Guidance Report.	Input of Calculation and Support Data
Method 3: General Retention Calculation	A generic calculation can also be used based on first principles of fire water retention. This is a conservative approach to retention volume calculation.	Input Required

Significance of Fire Event

Sample Assessment Area

Number	Fire Protection Measures in this Area	Response			
1. Fire Prevention Measures					
1.1	Fire Detection and Alarm Systems (FDAS). IS 3218:2013	Yes	0		
1.2	Automatic Fire Protection	No	1		
2. Materials Stored		Tonnes	Substance Name(s)		
	H224 (extremely flammable)	0			Tonnes
	H225 (highly flammable)	0			Tonnes
	H226 (flammable) ¹	0			Tonnes
2.1	Flammable Liquids Storage	0	0		Tonnes
	H220 (extremely flammable)	0			Tonnes
	H221 (flammable)	0			Tonnes
2.2	Flammable Gas Storage	0	0		Tonnes
	H228 (flammable)				Tonnes
2.3	Flammable Solids Storage	0	0		Tonnes
	H227 Combustible Liquids	0			Tonnes
	Waste	0			Tonnes
	Packaging (including pallets)	0			Tonnes
	Plastic (if not in packaging above)	0			Tonnes
	Oils/fuels (not classified as flammable)	0			Tonnes
	Process materials (not classified as flammable)	10		General Allowance: Activated Carbon	Tonnes
	Any other combustible material				Tonnes
2.4	Combustible Materials Storage	10	0.5		Tonnes
	Percent of S1 Storage	500%	0.5		
	Percent of S2 Storage	33%	N/A		
	Percent of S3 Storage	5%	N/A		
			0.5		
			2. Max	0.5	

Fire Significance

S1 - Low Significance

Likelihood	Description
S 1	Low Significance
S 2	Medium Significance
S 3	High Significance

Scoring Details			
Flammable Material Threshold (see Information Tab for Threshold details)	Fire Protection		Significance
None	N/A		S 1
Lower	FDAS		S 1
Lower	None		S 2
Middle	FDAS Sprinklers		S 1
Middle	FDAS		S 2
Middle	None		S 3
Upper	Any		S 3

Note 1

H226 Flammable Liquids have a large flash point range. Higher flash point flammables (e.g. Diesel - Flash Point 55-56°C) can be considered as combustible for the purpose of this exercise if the material under normal environmental or workplace operational conditions will always be handled at temperatures at least 15°C below their flashpoint and in consequence will not produce a flammable atmosphere. See *HSG140 - Safe Use and Handling of Flammable Liquids*, UK HSE 2015, for more information. Ambient external temperature in Ireland does not generally exceed 30°C. See Appendix A of Guidance Report for more information.

FURTHER INFORMATION

Flammable Substance Thresholds (Tonnes)					
Threshold	Flammable Liquid		Flammable Solids	Flammable Gas	Combustibles
Upper	≥50		≥10	≥5	≥200
Middle	≥5 - <50		≥0.5 - <10	≥0.1 - <5	≥30 - <200
Lower	≥0.1 - <5		≥0.05 - <0.5	≥0.01 - <0.1	≥2 - <30
None/ Negligible	<0.1		<0.05	<0.01	<2

Hazard Potential

Sample Assessment Area



Number	Material Stored in this Area	Response		Hazard Category
1. Hazardous Material Storage on Site ³				
1.1	H400/H410 Environmentally Hazardous Material (GHS Classification) (tonnes)	0.2		
1.2	H401/411 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.3	H402/412 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
1.4	H413 Environmentally Hazardous Material (GHS Classification) (tonnes)	0		
Total H400 Equivalent Material		0.2	0	H0
Note on WGK Classification: Use either H statement or WGK classification of a material. Start with H statement if available, if not available use WGK classification instead. DO NOT ENTER THE SAME MATERIAL UNDER BOTH CLASSIFICATIONS See Appendix A of the Guidance Document for further instruction				
1.5	WGK3 Water Hazardous Material (German Classification) (tonnes)	0		
1.6	WGK2 Water Hazardous Material (German Classification) (tonnes)	0		
1.7	WGK1 Water Hazardous Material (German Classification - See information tab) (tonnes)	5.6		
Total WGK3 Equivalent Material		0.056	0	H0
1.8	Laboratories which contain Genetically Modified Micro-Organisms (GMOs) According to Directive 2009/41/EC (Groups 3 & 4) See Appendix A of the Guidance Document for further instruction.	No	0	H0
1.90	Licensed Hazardous Waste Facility	No	0	H0
			Max	0

Hazard Potential	Description
H0	No Hazard Potential
H1	Hazard Potential

Scoring Details	
Hazard Potential	Quantity of Material / Type of Facility
H0 <i>No hazard potential</i>	<1t WGK 3 or Equivalent ¹ <1t Toxic (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ²
H1 <i>Hazard potential</i>	>1t WGK 3 or Equivalent ¹ <1t (H400/H410 Harmful to Aquatic Life) <u>or</u> Equivalent ² Laboratories Which Contain Genetically Modified Micro-Organisms (GMOs) According To Directive 2009/41/EC (Groups 3 & 4) Licenced Waste Storage Facility

Note 1: Hazardous to the Aquatic Environment Equivalent Calculation: 100t H412/H413 = 10t H411 = 1t H400/410

Note 2: WGK Equivalent Calculation: 100t WGK1 = 10t WGK2 = 1t WGK3

Note 3: Fire-fighting foam to be used in this area should be included if relevant hazard classifications apply

Hazard Potential:

The ECHA Chemical Database contains information for the safe handling of hazardous substances and other chemical substances at work. Furthermore the user is offered information on important physical and chemical properties as well as special regulations e.g. GHS classification and labelling according to CLP regulation (pictograms, H phrases, P phrases).

<https://echa.europa.eu/>

The GESTIS database provides WGK ratings for the majority of substances.

<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

Examples of some commonly used substance on industrial sites in large quantities;

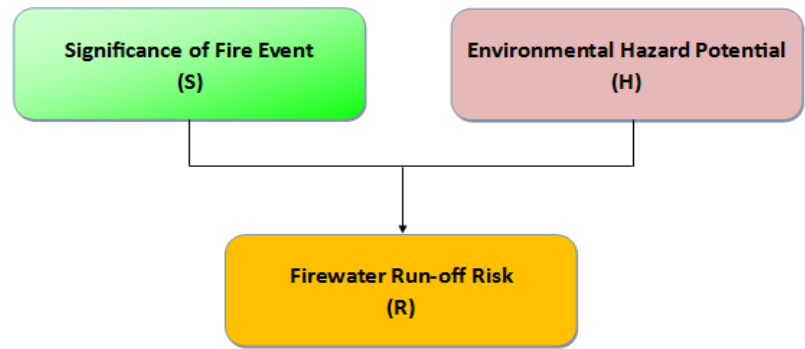
Substance/Material	Flammable or Environmental H-Statements	Water Hazard Class (WGK)
Acetic Acid	H226: Flammable liquid and vapour	1
Acetone	H225: Highly flammable liquid and vapour	1
Aqueous Ammonia	H400: Very toxic to aquatic life	2
Chlorine	H400: Very toxic to aquatic life	2
Chromic Acid	H410: Very toxic to aquatic life with long lasting effects	3
Copper Sulphate	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3
Cyclohexane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Diesel	H226: Flammable liquid and vapour *(Diesel can be considered combustible liquid for FWRA Tool as per Appendix A, Section 1.2.3)	2

	H411: Toxic to aquatic life with long lasting effects	
Ethanol	H225: Highly flammable liquid and vapour	1
Heptane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Hydrochloric Acid	No environmental or flammable H-Statement assigned	1
Isopropanol	H225: Highly flammable liquid and vapour	1
Isobutanol	H226: Flammable liquid and vapour	1
Methanol	H225: Highly flammable liquid and vapour	1
Methyl tert-butyl ether (MTBE)	H225: Highly flammable liquid and vapour	1
Phenol	H411: Toxic to aquatic life with long lasting effects	2
Sodium Nitrite	H400: Very toxic to aquatic life	2
Tetrahydrofuran	H225: Highly flammable liquid and vapour	1
Toluene	H225: Highly flammable liquid and vapour	2
Trichloroacetic Acid	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Trichloroethylene	H412: Harmful to aquatic life with long lasting effects.	3
2,2,4-Trimethylpentane	H225: Highly flammable liquid and vapour H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	2
Zinc Chloride	H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	3

Overall Fire Water Run-Off Risk



Sample Assessment Area



Sheet Reference		Score
Significance of Fire Event		S1 - Low Significance
Hazard Potential		#REF!

	H0	H1
S1	R0	R1
S2	R0	R1
S3	R1	R1

Score	
Fire Water Run-Off Risk	#REF!

Risk	Minimum Firewater Retention Measures Required
R0 No Risk	No dedicated firewater retention required.
R1 Risk of Environmental Contamination	Firewater run-off must be retained within the operational site. The retention can be provided by means of the site's drainage system and other suitable infrastructure which is not exclusively foreseen for firewater retention (e.g. storm water ponds / tanks in waste water treatment plants). All elements of the site infrastructure to be used for firewater retention (including shutoff valves) must be regularly inspected to ensure functionality and impermeability. The retention facility must remain impermeable for the duration of the incident up to the removal of the firewater run-off The documented available retention capacity in the existing site infrastructure must be monitored and maintained. Automatic shut-off valves must be maintained and tested. Diversion of firewater to retention facilities must be automatic on activation of the site fire alarm. Onsite bunds cannot be used to provide firewater retention unless the content of a bund is directly involved in the fire event.

Conclusion	
Fire Water Retention Required on Site?	#REF!

Fire Water Retention Calculation



Warehouse Area

Number	Calculation Steps	Response	Comment
1.1	Area of Storage Area (m ²)	0	Apex Required
1.2	Flammable Material (tonnes)	0	From Significance tab
1.3	Combustible Material (tonnes)	10	From Significance tab
1.5	Across materials, not already classified as flammable - H222, H223 (tonnes)	0	Apex Required
1.6	Oxidising Material not already classified - H270, H271 (tonnes)	0	Apex Required
1.7	Explosive Material not already classified - H222 (tonnes)	0	Apex Required
1.8	New Combustible Material (tonnes) (see note 1)	0	Apex Required
1.9	Total F1-F2 Materials	0	
1.9	Total F3-F4 Materials	10	
1.1	Total Storage in this Area (tonnes)	10	
1.11	Fire Hazard Category	F3-F4	
1.12	Storage Density (kg/m ³)	400/10	
1.13	Storage Density Factor	400/10	
1.14	Type of Storage	Non-racked Storage	Apex Required
Preliminary Fire Water Retention Required m ³ (without storage density factor)		N/A	
Sprinklers		No	N/A
Note on Preliminary Result		0	

Total Storage Quantity (kg) 10
 Fire Hazard Category F3-F4
 Warehouse Area (m²) 0
 Sprinklers? No
 Storage Type Non-racked Storage

Retention Volume Required m³ (with density factor) Method not Suitable

1.10	Area of Site which shares common storage with Area (m ²)	0	Apex Required
1.11	1 in 10 year 24-hour rainfall count for local area (m)	0	Apex Required
1.12	Rain Water (m ³)	0.00	
	Fire Water Retention Required (m ³)	10.00	

Note 1

Examples of non-combustible materials include HCl, NaOH, glass container storage etc. Any non-combustible materials stored in this "assessment area" should be reviewed against their relevant Material Safety Data Sheets and confirmed as non-combustible before being included in the calculation above.

Warehouse Fire Water Retention Volume Required:

A suitable firewater run-off calculation methodology for warehouse storage is a risk-based approach based on the Swiss Federation Firewater Retention Practical Guide. This method provides an opportunity for a reduction in firewater retention volume required for the site, if special fire protection measures, such as sprinklers, are provided to control and limit the fire area. This method should only be used by sites that can provide evidence of the appropriate levels of maintenance of such systems, as recommended by the applicable international or national codes or standards.

The fundamental assessment factors that this method depends upon are the following:

- The fire protection measures (e.g. fire detection, sprinkler type – in rack, roof level)
- The fire hazard associated with the stored materials
- The storage methodology (racking, piled, heights)
- The density of stored materials and equipment
- The assessment area size

The table below outlines the preliminary retention volumes listed based on the fire compartment area, the fire hazard and the fire protection facilities. They are based on the CEA guideline "Storage of hazardous material".

Theoretical Firewater Retention in m ³									
Area of fire section in m ²	Fire detection and alarm				Sprinklers and fire detection and alarm				
	Fire detection and alarm				Stacking height < 6 m				Stacking height > 12 m
	F1-F2	F3-F4	F5-F6	F7-F8	F1-F6	F1-F4	F5-F6	F1-F4	F5-F6
50	50	25	15	25	25	15	5	15	5
100	100	50	20	45	30	10	35	15	20
150	150	75	25	70	40	20	60	20	30
200	200	100	30	95	50	30	85	30	40
250	250	125	35	120	60	40	110	40	50
300	300	150	40	145	70	50	135	50	60
350	350	175	45	170	80	60	160	60	70
400	400	200	50	195	90	70	185	70	80
450	450	225	55	220	100	80	210	80	90
500	500	250	60	245	110	90	235	90	100
550	550	275	65	270	120	100	260	100	110
600	600	300	70	295	130	110	285	110	120
650	650	325	75	320	140	120	310	120	130
700	700	350	80	345	150	130	335	130	140
750	750	375	85	370	160	140	360	140	150
800	800	400	90	395	170	150	385	150	160
850	850	425	95	420	180	160	410	160	170
900	900	450	100	445	190	170	435	170	180
950	950	475	105	470	200	180	460	180	190
1,000	1,000	500	110	495	210	190	485	190	200
1,050	1,050	525	115	520	220	200	510	200	210
1,100	1,100	550	120	545	230	210	535	210	220
1,150	1,150	575	125	570	240	220	560	220	230
1,200	1,200	600	130	595	250	230	585	230	240
1,250	1,250	625	135	620	260	240	610	240	250
1,300	1,300	650	140	645	270	250	635	250	260
1,350	1,350	675	145	670	280	260	660	260	270
1,400	1,400	700	150	695	290	270	685	270	280
1,450	1,450	725	155	720	300	280	710	280	290
1,500	1,500	750	160	745	310	290	735	290	300
1,550	1,550	775	165	770	320	300	760	300	310
1,600	1,600	800	170	795	330	310	785	310	320
1,650	1,650	825	175	820	340	320	810	320	330
1,700	1,700	850	180	845	350	330	835	330	340
1,750	1,750	875	185	870	360	340	860	340	350
1,800	1,800	900	190	895	370	350	885	350	360
1,850	1,850	925	195	920	380	360	910	360	370
1,900	1,900	950	200	945	390	370	935	370	380
1,950	1,950	975	205	970	400	380	960	380	390
2,000	2,000	1,000	210	995	410	390	985	390	400
2,050	2,050	1,025	215	1,020	420	400	1,010	400	410
2,100	2,100	1,050	220	1,045	430	410	1,035	410	420
2,150	2,150	1,075	225	1,070	440	420	1,060	420	430
2,200	2,200	1,100	230	1,095	450	430	1,085	430	440
2,250	2,250	1,125	235	1,120	460	440	1,110	440	450
2,300	2,300	1,150	240	1,145	470	450	1,135	450	460
2,350	2,350	1,175	245	1,170	480	460	1,160	460	470
2,400	2,400	1,200	250	1,195	490	470	1,185	470	480
2,450	2,450	1,225	255	1,220	500	480	1,210	480	490
2,500	2,500	1,250	260	1,245	510	490	1,235	490	500
2,550	2,550	1,275	265	1,270	520	500	1,260	500	510
2,600	2,600	1,300	270	1,295	530	510	1,285	510	520
2,650	2,650	1,325	275	1,320	540	520	1,310	520	530
2,700	2,700	1,350	280	1,345	550	530	1,335	530	540
2,750	2,750	1,375	285	1,370	560	540	1,360	540	550
2,800	2,800	1,400	290	1,395	570	550	1,385	550	560
2,850	2,850	1,425	295	1,420	580	560	1,410	560	570
2,900	2,900	1,450	300	1,445	590	570	1,435	570	580
2,950	2,950	1,475	305	1,470	600	580	1,460	580	590
3,000	3,000	1,500	310	1,495	610	590	1,485	590	600
3,050	3,050	1,525	315	1,520	620	600	1,510	600	610
3,100	3,100	1,550	320	1,545	630	610	1,535	610	620
3,150	3,150	1,575	325	1,570	640	620	1,560	620	630
3,200	3,200	1,600	330	1,595	650	630	1,585	630	640
3,250	3,250	1,625	335	1,620	660	640	1,610	640	650
3,300	3,300	1,650	340	1,645	670	650	1,635	650	660
3,350	3,350	1,675	345	1,670	680	660	1,660	660	670
3,400	3,400	1,700	350	1,695	690	670	1,685	670	680
3,450	3,450	1,725	355	1,720	700	680	1,710	680	690
3,500	3,500	1,750	360	1,745	710	690	1,735	690	700
3,550	3,550	1,775	365	1,770	720	700	1,760	700	710
3,600	3,600	1,800	370	1,795	730	710	1,785	710	720
3,650	3,650	1,825	375	1,820	740	720	1,810	720	730
3,700	3,700	1,850	380	1,845	750	730	1,835	730	740
3,750	3,750	1,875	385	1,870	760	740	1,860	740	750
3,800	3,800	1,900	390	1,895	770	750	1,885	750	760
3,850	3,850	1,925	395	1,920	780	760	1,910	760	770
3,900	3,900	1,950	400	1,945	790	770	1,935	770	780
3,950	3,950	1,975	405	1,970	800	780	1,960	780	790
4,000	4,000	2,000	410	1,995	810	790	1,985	790	800
4,050	4,050	2,025	415	2,020	820	800	2,010	800	810
4,100	4,100	2,050	420	2,045	830	810	2,035	810	820
4,150	4,150	2,075	425	2,070	840	820	2,060	820	830
4,200	4,200	2,100	430	2,095	850	830	2,085	830	840
4,250	4,250	2,125	435	2,120	860	840	2,110	840	850
4,300	4,300	2,150	440	2,145	870	850	2,135	850	860
4,350	4,350	2,175	445	2,170	880	860	2,160	860	870
4,400	4,400	2,200	450	2,195	890	870	2,185	870	880
4,450	4,450	2,225	455	2,220	900	880	2,210	880	890
4,500	4,500	2,250	460	2,245	910	890	2,235	890	900
4,550	4,550	2,275	465	2,270	920	900	2,260	900	910
4,600	4,600	2,300	470	2,295	930	910	2,285	910	920
4,650	4,650	2,325	475	2,320	940	920	2,310	920	930
4,700	4,700	2,350	480	2,345	950	930	2,335	930	940
4,750	4,750	2,375	485	2,370	960	940	2,360	940	950
4,800	4,800	2,400	490	2,395	970	950	2,385	950	960
4,850	4,850	2,425	495	2,420	980	960	2,410	960	970
4,900	4,900	2,450	500	2,445	990	970	2,435	970	980

Fire Water Retention Calculation



Tank Farm and Process Plant Area

See Section 4.3 of the Guidance Report

A generalised calculation approach is required to calculate the firewater run-off retention required for a process plant or tank farm area and should take into account;

- Inventory that could be released in a credible scenario
- Fire-fighting water & foam from the following sources
 - Automatic fire-fighting systems
 - Fire Brigade contribution
- Extinguishing period (based on design standard or systems specifications)
- Cooling Water (based on design standard or systems specifications / discussions with local fire brigade)
- Local containment (bundling) available at area of fire only e.g. Tank Farm Bund (it is not permitted to include bunding volumes not directly affected by the fire i.e. it is not permissible to distribute contaminated firewater to other bunded areas of the site for storage)
- Rainwater contribution

The estimated volumes from the above data should be quantitatively assessed to calculate the required retention volume and the following formula applied. All quantities and values used in the calculation must be set out and fully justified.

$$VR = VT + WE + WF + Rw - E$$

Where,

VR = Fire Water Retention Required

VT = Volume of Process / Product Contribution

WE = Extinguishing Medium (Water & Foam) (including Fire Brigade resources)

WF = Cooling Water for Adjacent Tanks

Rw = Rainwater Contribution

E = Retention Volume Directly Available (i.e. capacity at area on fire only)

	m ³
Volume of Process / Product Contribution (VT)	
Extinguishing Medium (Water & Foam including Fire Brigade resources) (WE)	
Cooling Water for Adjacent Tanks (WF)	
Rainwater Contribution (Rw) - see Section 4.6.2	
Retention Volume Directly Available (i.e. capacity at area on fire only)	

Fire Water Retention Required (VR) 0 m³

Fire Water Retention Calculation



General Method - Any Area

Number	Calculation Steps	Response	Comment
1.1	Max Flow of Local Hydrants (l/min)		Hydrants should be supplied by means of a dedicated internal pumped rising main 150mm diameter, 3-4 bar operating pressure
1.2	Fire Duration (Hours) This should be set at 6 hours unless the local fire authority has advised that a reduced time is acceptable. Note: Minimum duration is 1.5 hours		Carlow County Councils Senior Assistant Fire Officer agreement
1.3	Max FW volume from hydrants during Fire Event m ³		
1.4	Total Fire Water/Foam to be provided by Local Fire Brigade (m ³)		4 tenders each with 1.8m ³
1.5	Total Fire Water/Foam Stored on Site (m ³)		2 tanks 100m ³ and 98 m ³
1.6	Volume of Product Loss (m ³) See Section 4.5 of the Guidance Document for further information		Solid materials - wood chips and feedstock - so no product loss
1.7	Area of Site which shares common drainage with Assessment Area (m ²)		Input Required
1.8	1 in 10 year 24hour rainfall event for local area (m)		Input Required
1.9	Rain Water (m ³)	0	
	Fire Water Retention Required (m ³)	0	

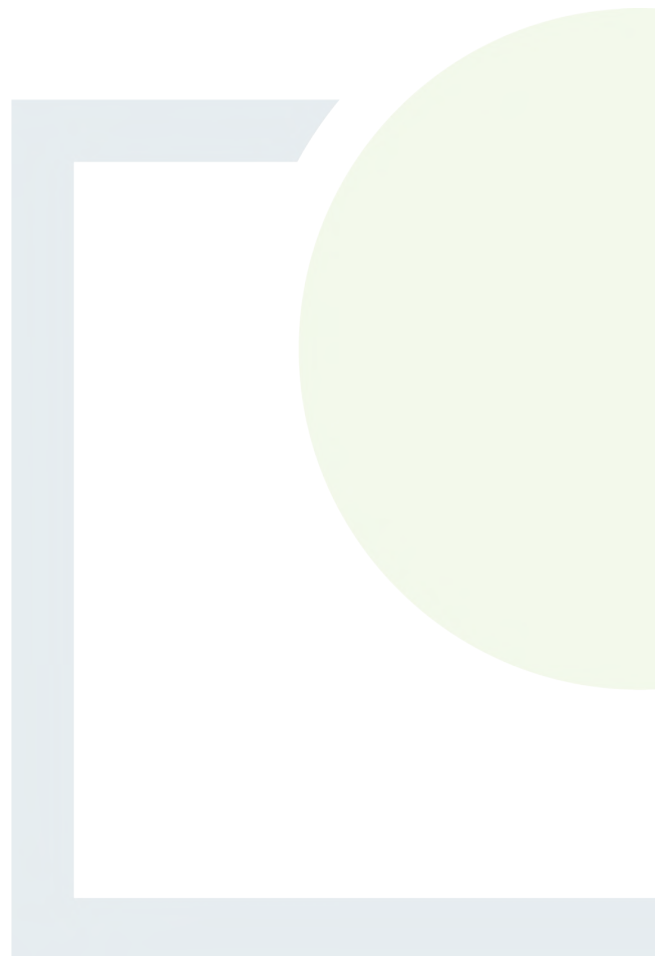


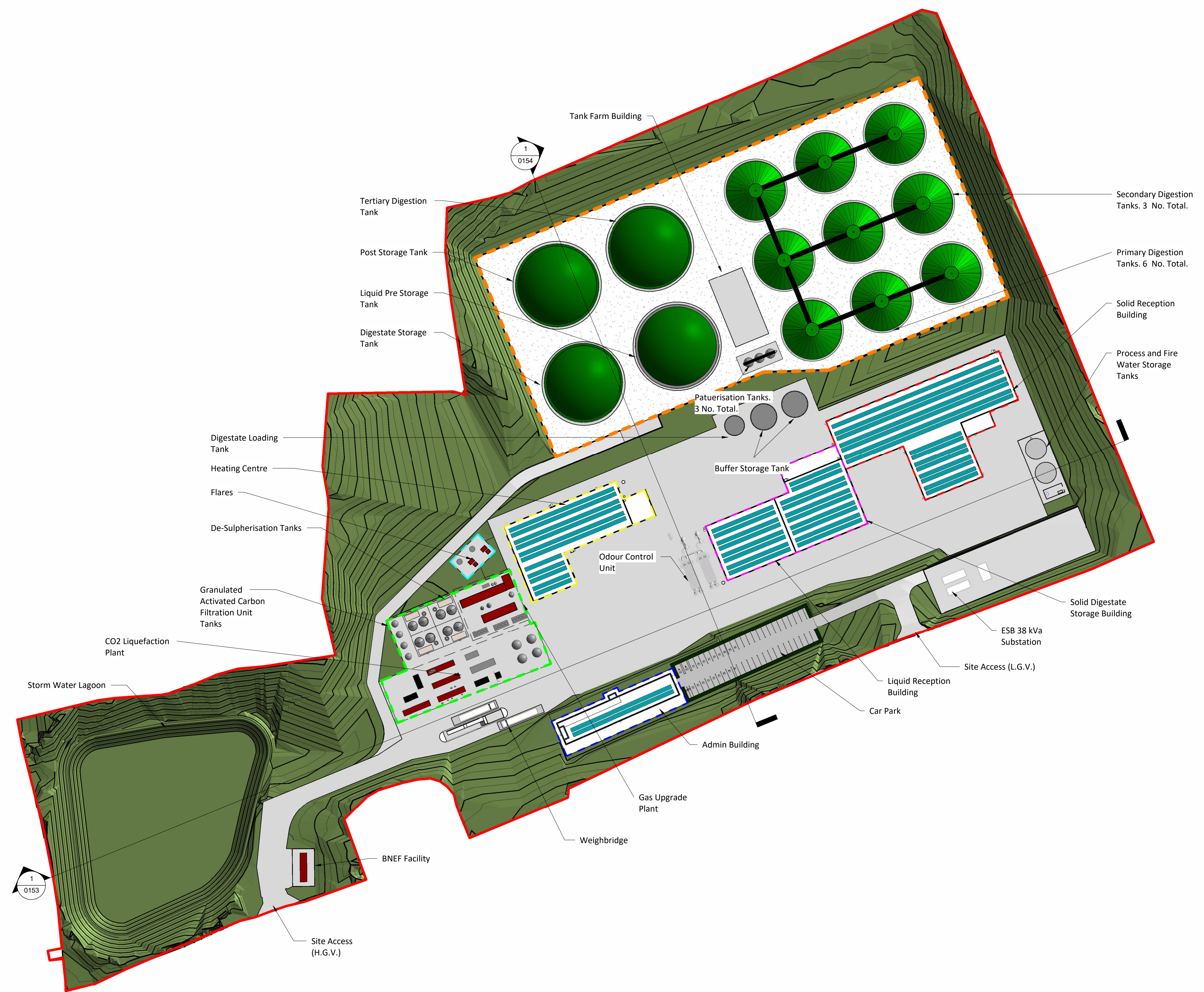
**FEHILY
TIMONEY**

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX 6

Zone Drawing





- Legend**
- Planning Boundary
 - Zone 1
 - Zone 2
 - Zone 3
 - Zone 4
 - Zone 5
 - Zone 6
 - Zone 7

PROPOSED SITE LAYOUT PLAN
Scale 1 : 1000

Rev.	Description	App By	Date

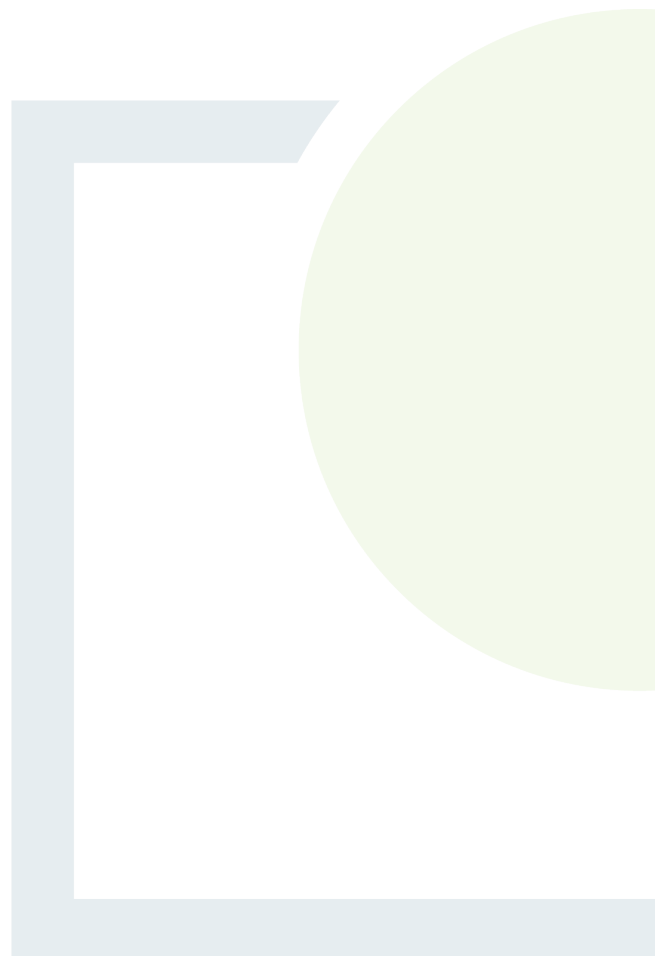
PROJECT	POWERSTOWN BIOENERGY	CLIENT					
							
SHEET	FWRA ZONE MAPPING	Date	19/06/26	Project Number	P24188	Scale (at A1)	As indicated
		Drawn by	EB	Drawing Number	P24188-FT-XX-XX-DR-CE-INFO 3		
		Checked by	JON				
					Rev		



DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

Appendix 3.3

Letters of Support for
Services



To:	Greengate Biogas 001 Limited
For attention of:	[REDACTED]
Telephone:	[REDACTED]
Email:	[REDACTED]
From:	[REDACTED]
Date:	22/04/2026

Dear [REDACTED]

Enva are pleased to provide a quotation for the scope of works outlined below;

Supply of Vac truck for vacuuming of Septic waste
Removal and disposal at an Enva licensed facility

Should you wish to proceed please provide a Purchase Order. New customers must complete a New Customer Form, which is available on request.

Please pay attention to the attached terms and conditions and notes on page two of this quotation.

If you have any further queries, please contact me on [REDACTED]

Your sincerely,

[REDACTED]

Terms and Conditions in relation to waste acceptance, carriage and brokering

The customer must fully and correctly describe wastes prior to collection. All information known or suspected regarding the nature of the waste, its constituents, properties and hazards must be fully disclosed by the customer so as to enable Enva to safely transport, handle and process the waste. If the waste is found to be different from that indicated or have properties not disclosed to Enva the waste may be returned or an additional charge made in respect of recovery/disposal and handling of the waste. Where samples have been provided for analysis these are assumed to be representative samples, and analysed based on the information provided regarding their origin and possible constituents.

CARRIAGE OF DANGEROUS GOODS BY ROAD AND SEA (Roles and Responsibilities):

Where wastes/goods to be accepted/carried/brokered by Enva are identified as materials which are known to be dangerous goods under ADR &/or IMDG, the following roles shall be fulfilled by relevant participants in the chain of custody of this waste.

CONSIGNOR:

Role: The consignor must ensure that the dangerous goods are handed over for carriage in a manner which conforms to the rules governing the carriage of dangerous goods, this shall include:

- Ensuring that the goods are classified correctly and authorised for collection from the Consignors site.
- Ensuring that the carrier is given all relevant information and documentation regarding the consignment. This includes the following, dangerous goods note (DGN), vehicle packing certificate (if sea journey involved) & any additional approval documents which may be needed for the journey for that particular dangerous goods.
- Ensuring that the means of containment e.g. package or container are approved and fit for purpose and compliant with ADR.
- Comply with any restrictions placed on the dangerous goods.
- Ensure that empty uncleaned containers or means of containment are marked, labelled, closed and tested in conformance with a full container.

The customer shall fulfil all the requirements of the role of consignor except where Enva specifically agree to provide the following:

- Assistance on the classification of the waste (based on customer information).
- Dangerous goods note for the collection, a copy of which may be taken by the Customer at the point of collection.
- Instructions in writing.
- Application of actual marking and labelling in accordance with ADR on the containers used for collection.

PACKER: (i.e. the party who placed the waste/goods into the packages to be transported)

Role: The packer shall comply with the following where applicable:

- Requirements regarding packing conditions and mixed packing conditions.
- Where the packer prepares the packages for carriage, the requirements concerning the labelling of packaging. (Note: all labels must reflect the contents of the container). It is therefore the responsibility of the Customer to ensure that each waste stream is packed into the appropriate labelled container for storage and subsequent transport.

The customer shall fulfil all the requirements of the role of packer except where Enva

specifically agree to provide the following:

- Appropriately labelled containers to the Customer for packing of the waste.
- Personnel to pack the waste or paid advice as to the packing of waste.

FILLER: (i.e. where tanks or tankers are filled)

Role: The filler shall comply with the following where applicable:

- Ascertain prior to the filling of tanks that both they and their equipment are in a technically satisfactory condition.
- Ascertain that the date for the next test for tank vehicles, battery vehicles, demountable tanks, portable tanks, tank-containers and MEGCs has not expired.
- Only fill tanks with the dangerous goods permitted for carriage in those tanks.

- During filling, comply with requirement concerning dangerous goods in adjoining compartments,
- Observe the maximum permissible degree of filling or mass of contents per litre of capacity for the substance being filled,
- Ensure that closures are in a closed position and that there is no leakage.
- No dangerous residue of the filling substance adheres to the outside of tanks.
- Shall ensure, in preparation of the dangerous goods for carriage, that all relevant marks or labels are affixed.
- Ensure that when filling vehicles or containers with dangerous goods in bulk that relevant provisions of Chapter 7.3 are complied with.

The customer shall fulfil all the requirements of the role of operator except where Enva specifically agree to supply personnel and equipment to carry this out.

TANK CONTAINER/PORTABLE TANK OPERATOR: (Owner/Provider of the tanker, ISO tanker etc.)

Role: The operator shall ensure the following requirements are met:

- Compliance for construction, equipment, tests and marking
- Ensure that maintenance of shells and their equipment is carried out in such a way as to ensure that under normal operating conditions, the tank container/portable tank satisfies the requirements of ADR until its next inspection
- Have an exceptional check made when the safety of the shell or its equipment is liable to be impaired by a repair, an alteration or an accident.

The customer shall fulfil all the requirements of the role of operator except where Enva specifically agree to supply personnel and equipment to carry this out.

CARRIER:

Role: The carrier must ensure that the dangerous goods are fit for carriage in a manner which conforms to ADR/IMDG, as follows:

- Ensure dangerous goods are carried in accordance with ADR (This is based on information provided to the carrier by relevant parties requiring the dangerous goods to be transported).
- Ensure that documentation required for the carriage of dangerous goods is provided.
- Ensure that vehicles are fit for purpose and meet any relevant ADR requirements.
- Ensure that vehicles are not overloaded.
- Apply relevant markings and labels to the vehicle.
- Where the carrier experiences an infringement of the requirements of ADR, the consignment shall not be moved until this infringement has been rectified.

Enva shall be responsible for all the requirements of the role of carrier where it carries out or arranges transport. Where Enva is not carrier of the goods, the role outlined below shall be fulfilled by the nominated carrier.

LOADER:

Role: The loader shall ensure the following are met:

- Accept for carriage containers only if they are authorized for carriage in accordance with ADR.
- Check if packaging is damaged (unsound/unsealed containers will not be accepted).
- Load and handle the goods safely.
- Ensure that dangerous markings are applied correctly.
- Ensure that loads are packed appropriately, taking into account any prohibitions or mixed loading requirements.

The Enva customer shall fulfil the requirements of the role of loader except where Enva supply personnel to carry this out.

CONSIGNEE: (Recipient of waste/dangerous goods)

Role: The consignee must ensure the following requirements are met:

- To verify that the requirements of ADR concerning the consignee are met.
- The consignee shall not defer acceptance unless there are valid reasons for this. If there are infringements with the load, these shall be remedied before transport by road.

Enva shall fulfil the requirements of the consignee, unless waste/goods is to be transported to another (non Enva) destination.

UNLOADER: (operator who unloads the consignment)

Role: The unloader must ensure that the following requirements are met:

- Ensure that the correct goods are unloaded by comparing with documentation with information on package, container, tank etc.
- Before and during offloading check whether packagings, the tank, the vehicle or container have been damaged to an extent that would endanger the offloading.
- Comply with any relevant requirements concerning unloading.
- Following unloading, remove any residues which have adhered to the outside of the tanker, vehicle or container and that valves and inspection openings are closed.
- Ensure that prescribed cleaning and decontamination of the vehicle or container is carried out.
- Ensure that containers once completely unloaded, cleaned and decontaminated no longer display markings conforming to Chapter 5.3 of ADR.

Enva shall fulfil the requirements of the role, unless waste/goods is to be transported to another waste destination.

CONSIGNMENT/WTF FORMS:

A Consignment form is required for the movement of most Hazardous Waste and must accompany the waste during transport; they are available from your Local Authority. All hazardous waste shall be accompanied by a consignment form (e.g. WTF) from point of collection to its end destination within the Republic of Ireland.

CONTAINERS (General conditions):

The customer is responsible to take all reasonable care of containers loaned by Enva and shall be liable for any loss or damage.

All containers used for waste must be in suitable condition for transport, particular attention must be given to containers to ensure the following:

1. Dangerous Goods must be packaged in appropriate UN approved containers;
2. All containers must be of sound integrity (no leaking containers are acceptable);
3. All lids, caps & bungs must be appropriate for the container and securely closed, for example:
 - i. Open-top drums must have proper lids, plastic film is not acceptable;
 - ii. Lids must be secured with the proper screw thread, rings or clips;
4. A surcharge will be incurred if containers have to be repackaged or new lids/caps/bungs fitted;
5. Containers used for Dangerous Goods must not be over 5 years old;
6. Containers must be secured to pallets and if stretch wrapped labelled before wrapping (i.e. don't label the stretch wrap);

ALL GOOD AND SERVICES ARE SUPPLIED IN ACCORDANCE WITH OUR STANDARD TERMS & CONDITIONS see

<http://enva.com/terms>

Letter of Support From Landspreading Contractors



1st June 2026

Mr. [REDACTED]
CEO

Dear [REDACTED],

RE PROPOSED POWERSTOWN BIOGAS PLANT

Kilkenny Carlow and District Farm Relief Services (KCD FRS) is an established agricultural contractor with extensive landbanks in the southeast region principally the counties of Carlow, Kildare, Wexford, Wicklow, Laois and Kilkenny.

Services:

Our services offered to Greengate Biogas include

- 1) Soil testing
- 2) Farm Nutrient Management Planning
- 3) Land sourcing
- 4) Land spreading of digestate and other organic materials

Landbank:

We have an extensive landbank in the region and have the capacity to facilitate the offtake of digestate material from the Greengate biogas facility at Powerstown, Co. Carlow.

Type of lands:

We have tillage, grassland and vegetable lands available in the area. The majority of this digestate would be destined for the tillage sector which is concentrated around the Powerstown plant. Lands would be assessed and tested before application of digestate.

Compliance:

We are an **NWCPO registered firm** and all land spreading activities would be undertaken in accordance with the latest best practice regulations including the Nitrates Directive, the Code of Good Agricultural Practice and the Biomethane Protocol 2026.

Spreading Digestate:

Digestate will be spread to land using the latest low emission technology with the use of trailed injectors and umbilical systems and flow meters deployed to ensure quality whilst minimising emissions.

Collection of Digestate from Powerstown:

KCD FRS would plan to remove digestate from the Powerstown biogas plant from January 16th to 1st October during the open spreading season.

Yours sincerely,

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

kcdfrs.ie



Mill Street, Baltinglass, Co. Wicklow.

T: (059) 6481266 F: (059) 6481080 E: sales@quinns.ie W: www.quinns.ie

15th June 2026

Mr. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Dear [REDACTED]
RE PROPOSED POWERSTOWN BIOGAS PLANT

Quinn's of Baltinglass Ltd is an established third generation agricultural merchants with extensive tillage and livestock customer base across Leinster, including the counties of Carlow, Kildare, Wexford, Wicklow, Laois and Kilkenny.

Services:

Our services offered to Greengate Biogas include

- 1) Soil testing
- 2) Farm Nutrient Management Planning
- 3) Sourcing suitable land via our long-standing customer relationships
- 4) Land spreading of digestate and other organic materials

Landbank:

Our customer base covers an extensive landbank in the region and have the capacity to facilitate the offtake of digestate material from the Greengate biogas facility at Powerstown, Co. Carlow.

Type of lands:

We have customers with tillage and grassland lands in the area. The majority of this digestate would be destined for the tillage sector which is concentrated around the Powerstown plant. Lands would be assessed and tested before application of digestate.

Compliance:

Our company has several accreditations including ISO 9001, ISO14001 and we run a UFAS approved feed mill. All land spreading activities would be undertaken in accordance with the latest best practice regulations including the Nitrates Directive, the Code of Good Agricultural Practice and the Biomethane Protocol 2026.

Spreading Digestate:

Digestate will be spread to land using the latest low emission technology with the use of trailed injectors and umbilical systems and flow meters deployed to ensure quality whilst minimising emissions.

Collection of Digestate from Powerstown:

Digestate would be removed from the Powerstown biogas plant from January 16th to 1st October during the open spreading season.

Yours sincerely,

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]