1-4 East Road, Residential

Energy Statement





Glenveagh Living 18_D064 April 2019



1-4 East Road, Residential Energy Statement

Glenveagh Living

CURRENT ISSUE								
Issue No:	Р3	Issue Date:	19th April 2019 Reason For Issue:					
Sign Off	Originator:	Checker:						
Print Name:	Jamie Molony	PJ Ryan	Issue for Planning					

PREVIOUS ISSUES (Type Names)										
Issue No:	Date:	Originator:	Checker:	Reason For Issue:						
P0	23/11/2018	Jamie Molony	PJ Ryan	Draft Issue for Planning						
P1	14/12/2018	Jamie Molony	PJ Ryan	Draft Issue for Planning						
P2	02/04/2019	Jamie Molony	PJ Ryan	Draft Issue for Planning						



Contents

 1.1. Site and Building Summary	2 2 2 2
 2.1. Part L 2.1.1. Limitation of Primary Energy Use and CO₂ Emissions 2.1.2. Building fabric 	2 2 2 2
2.1.1. Limitation of Primary Energy Use and CO₂ Emissions2.1.2. Building fabric	2 2 2
-	2
2.1.3. Use of Renewable Energy Sources	3
2.2. Nearly Zero Energy Buildings (NZEB) 2.2.1. About NZEB Standard	
2.2.2. Implementation of NZEB in Ireland	3
2.3. Dublin City Development Plan 2016-2022	3
3. Part L Compliance	5
 3.1. Building Fabric	5 6 6
3.4.2. Space Heating and Hot Water Supply System Control	6
3.4.3. Insulation of Hot Water Storage Vessels, Pipes and Ducts	6
3.4.4. Low Flow Sanitary Ware	7
3.4.5. Lighting Design	7
3.4.6. User Information	7
3.5. Use of Renewable Energy Sources	7
4. Passive Design	. 11
 4.1. Natural Ventilation	. 12 . 12
5. DEAP Calculation Summary	. 13
 5.1. SEAI DEAP 4.1 (beta) Inputs – Apartment (Centralised System) 5.2. SEAI DEAP 4.2(beta) Outputs – Apartments 5.3. Conclusions	. 14 . 14

Appendix 1: DEAP Part L Compliance Report

1. Introduction

This Energy Statement prepared by Ethos Engineering is to form part of the planning submission documentation to An Bord Pleanala for the proposed East Road residential development.

Located at the address East Road, East Wall, Co. Dublin, the development is subject to the planning requirements applicable to the Dublin City Council Development Plan 2016-2022.

This report aims to satisfy the legislative planning requirements by addressing how the overall energy strategy of the proposed development has been approached in a holistic manner, striving to meet the highest standards of sustainable building design such as passive solar design, high efficiency systems and use of renewable energy technologies.

This report also addresses how the proposed development will comply with NZEB (Part L 2018 Dwellings). The principles underpinning Part L compliance are energy demand reduction through passive measures and increased supply from renewable and efficient sources. The proposed design will follow this principle.

Assessments carried out in this report are based on latest floor plans and elevations received from the architect.

1.1. Site and Building Summary

The subject site is located at East Road, East Wall, Co. Dublin.

The application consists of the demolition of all existing structures on site and the construction of a mixed use development with a gross floor area of c. 52,769 sq.m (excluding below podium parking areas) set out in 9 no. blocks, over two separate podium, ranging in height from 3 to 15 storeys to accommodate 554 no. apartments and commercial/enterprise space, 3 no. retail units, foodhub/café/exhibition space, residential tenant amenity, crèche and men's shed. The site will accommodate 241 no. car parking spaces, 810 no. bicycle parking spaces, storage, services and plant areas. Landscaping will include a new central public plaza and residential podium courtyards.

The proposed site development will meet or exceed where feasible the requirements of the Part L 2018 building regulations, which stipulates requirements on minimum renewable contribution, minimum fabric and air permeability requirements, maximum energy use and carbon dioxide emissions as calculated using the DEAP (Dwellings Energy Assessment Procedure) methodology.



Figure 1: East Road Residential Site location and floor plan layout (outlined in red)

2. Legislative/Planning Requirements

2.1. Part L

Draft 'Technical Guidance Document Part L 2018 – Conservation of Fuel and Energy – Dwellings (public consultation edition)' (referred to in this document as "Part L or NZEB") stipulates requirements on, minimum fabric and air permeability requirements, maximum primary energy use and carbon dioxide (CO_2) emissions as calculated using the DEAP (Domestic Energy Assessment Procedure) methodology. This is a national standard and compliance is compulsory for all new dwellings. Three design aspects demonstrate compliance:

- 1. The limitation of primary energy use and CO_2 emissions
- 2. Building fabric
- 3. The use of renewable energy sources

2.1.1. Limitation of Primary Energy Use and CO₂ Emissions

In order to demonstrate that an acceptable primary energy consumption rate has been achieved, the calculated Energy Performance Coefficient (EPC) will be no greater than the Maximum Energy Performance Coefficient (MEPC). The MPEPC is 0.30.

To demonstrate that an acceptable CO_2 emission rate has been achieved, the calculated Carbon Performance Coefficient (CPC) of the dwellings being assessed will be no greater than the Maximum Carbon Performance Coefficient (MPCPC). The MPCPC is 0.35.

2.1.2. Building fabric

In order to limit the heat loss through the building fabric the thermal insulation for each of the plane elements of a new dwelling must meet or better the area weighted average elemental U-Values (Um) as specified by Part L, listed in Table 1 (column; Part L 2018).

Element	U-value (W/m².K)	U-value (W/m ² .K)		
Element	Part L 2011	Draft Part L 2018 (NZEB)		
Pitched Roof (Insulated on slope or ceiling)	0.16	0.16		
Flat Roof	0.20	0.20		
Walls	0.21	0.18		
Ground Floors	0.21	0.18		
Exposed floors	0.21	0.18		
External doors, windows and roof lights	1.60	1.40		

Table 1: Fabric U Values Comparison Part L 2011 vs Part L 2018 (Draft)

2.1.3. Use of Renewable Energy Sources

In order to comply with NZEB, dwellings must conduct a comparative analysis for specified renewable technologies to demonstrate compliance with Regulation L3 (b).

Renewable Energy Ratio (RER) is the ratio of the primary energy from renewable energy sources to total primary energy as defined and calculated in DEAP. The following represents a very significant level of energy provision from renewable energy technologies in order to satisfy Regulation L3 (b).

Where the MPEPC of 0.3 and MPCPC of 0.35 are achieved, a RER of 0.20 represents a very significant level of energy provision from renewable energy technologies

2.2. Nearly Zero Energy Buildings (NZEB)

2.2.1. About NZEB Standard

The European Energy Performance of Buildings Directive Recast (EPBD) requires all new buildings to be Nearly Zero - Energy Buildings (NZEB) by 31st March 2020. This means that any building completed after these dates must achieve the standard irrespective of when they were started. This is quite different to the transitional arrangements for previous building regulations revisions.

'Nearly Zero - Energy Buildings' means a building that has a very high energy performance, Annex 1 of the Directive and in which "the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby"

2.2.2. Implementation of NZEB in Ireland

Each member Government has discretion in how the standard is applied nationally. To comply with the NZEB requirement, the Irish Government has amended the 2011 Part L to include the following paragraphs:

'In order to achieve the acceptable primary energy consumption rate for a nearly zero energy dwelling, the calculated energy performance coefficient (EPC) of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC). The MPEPC for a nearly zero energy dwelling is 0.30.

To demonstrate that an acceptable CO2 emission rate has been achieved for a nearly zero energy dwelling, the calculated carbon performance coefficient (CPC) of the dwelling being assessed should be no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPCPC for a nearly zero energy dwelling is 0.35.'

2.3. Dublin City Development Plan 2016-2022

The energy strategy will consider the following council policies and objectives as outlined in the Dublin City Development Plan 2016-2022.

Apartment Living

It is the **policy** of Dublin City Council:

- QH18: To promote the provision of high quality apartments within sustainable neighbourhoods by achieving suitable levels of amenity within individual apartments, and within each apartment development, and ensuring that suitable social infrastructure and other support facilities are available in the neighbourhood, in accordance with the standards for residential accommodation.
- QH19: To promote the optimum quality and supply of apartments for a range of needs and aspirations, including households with children, in attractive, sustainable, mixed-income, mixed-use neighbourhoods supported by appropriate social and other infrastructure.
- QH20: To ensure apartment developments on City Council sites are models of international best practice and deliver the highest quality energy efficient apartments with all the necessary infrastructure where a need is identified, to include community hubs, sports and recreational green open spaces and public parks and suitable shops contributing to the creation of attractive, sustainable, mixed-use and mixed-income neighbourhoods

Climate Change

It is the **policy** of Dublin City Council:

• CC1: To prioritise measures to address climate change by way of both effective mitigation and adaptation responses in accordance with available guidance and best practice.

 CC2: To mitigate the impacts of climate change through the implementation of policies that reduce energy consumption, reduce energy loss/wastage, and support the supply of energy from renewable sources.

It is an **objective** of Dublin City Council:

- CCO1: To implement the 'National Climate Change Adaptation Framework' (2012) by adopting a Climate Change Action Plan for Dublin City which will assist towards meeting National and EU targets. This will be adopted by end of 2018.
- CCO2: To support the implementation of the forthcoming 'Climate Change Strategy for Dublin and Climate Change Action Plan for Dublin City.
- CCO3: To support the implementation of the national level 'Strategy for Renewable Energy 2012-2020' and the related National Renewable Energy Action Plan (NREAP) and National Energy Efficiency Action Plan (NEEAP)
- CCO4: To support the implementation of the 'Dublin City Sustainable Energy Action Plan 2010-2020' and any replacement plan made during the term of this Development Plan.

Sustainable Energy / Renewable Energy

It is the **policy** of Dublin City Council:

- CCO5: To support and collaborate on initiatives aimed at achieving more sustainable energy use, particularly in relation to the residential, commercial and transport sectors.
- CCO6: To promote the concept of sustainable communities throughout the city and to seek to initiate and support carbon neutral demonstration projects in conjunction with local communities.
- CCO7: To actively promote and facilitate the growth of the new emerging green industries to contribute both to the reduction of the city's energy consumption levels and to the role of the city as a leader in environmental sustainability.
- CCO8: In conjunction with Codema, to complete a comprehensive spatial energy demand analysis to help align the future energy demands of the city with sustainable energy solutions
- CCO9: To encourage the production of energy from renewable sources, such as from BioEnergy, Solar Energy, Hydro Energy, Wave/Tidal Energy, Geothermal, Wind Energy, Combined Heat and Power (CHP), Heat Energy Distribution such as District Heating/Cooling Systems, and any other renewable energy sources, subject to normal planning considerations, including in particular, the potential impact on areas of environmental sensitivity including Natura 2000 sites
- CCO10: To support renewable energy pilot projects which aim to incorporate renewable energy into schemes where feasible
- CCO11: To support and seek that the review of the National Building Regulations be expedited with
 a view to ensuring that they meet or exceed the passive house standard or equivalent, with
 particular regard to energy performance and other sustainability considerations, to alleviate
 poverty and reduce carbon reduction targets

Sustainable Building Design/Quality

It is the **policy** of Dublin City Council:

 QH12: To promote more sustainable development through energy end-use efficiency, increasing the use of renewable energy, and improved energy performance of all new development throughout the city by requiring planning applications to be supported by information indicating how the proposal has been designed in accordance with the development standards set out in the development plan.

Energy Efficiency and the Built Environment

It is the **policy** of Dublin City Council:

- CC3: To promote energy efficiency, energy conservation, and the increased use of renewable energy in existing and new developments.
- CC4: To encourage building layout and design which maximises daylight, natural ventilation, active transport and public transport use.



It is an **<u>objective</u>** of Dublin City Council:

- CCO12: To ensure high standards of energy efficiency in existing and new developments in line with good architectural conservation practice and to promote energy efficiency and conservation in the design and development of all new buildings in the city, encouraging improved environmental performance of building stock.
- CCO13: To support and encourage pilot schemes which promote innovative ways to incorporate energy efficiency into new developments.

3. Part L Compliance

The proposed development will meet or exceed where feasible the requirements of Part L. Apartments have been assessed using the Sustainable Energy Authority of Ireland (SEAI) DEAP 4.1 (beta) software which demonstrates Part L compliance. Software inputs and outputs are summarised in section 5 of this report.

3.1. Building Fabric

In order to limit the heat loss through the building fabric of the proposed apartments the thermal insulation for each of the plane elements of the development will meet or better the area weighted average elemental U-Values (Um) as specified by Part L. Table 1 lists the Part L area weighted average elemental U-Values and the targeted U-Values of the proposed design.

Element	U value (U value (W/m ² .K)			
	Draft Part L 2018 (NZEB)	Targeted			
Pitched Roof	0.16	0.16			
Flat Roof	0.20	0.15			
Walls	0.18	0.18			
Ground Floors	0.18	0.15			
Exposed floors	0.18	0.15			
External doors, windows and roof lights	1.40	1.30			
Glazing gv (EN410)		*0.4-0.6			

Table 2: Fabric U Values (Apartments and Houses)

* pending overheating calculation

3.2. Thermal Bridging

To avoid excessive heat losses and local condensation problems, consideration will be given to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations.

Acceptable Construction Details will be adopted for all key junctions where appropriate (i.e. typical/standard junctions). For all bespoke key junctions certified details which have been certified by a third party certification body (such as Agrément or equivalent) will be used or calculated by an NSAI registered thermal modeller.

Heat loss associated with thermal bridges is taken into account in the DEAP methodology and can heavily impact the calculated energy use and CO_2 emissions. In general this is done by including an allowance for additional heat loss due to thermal bridging, expressed as a multiplier (Ψ , psi) applied to the total exposed surface area or by the calculation of the transmission heat loss coefficient H_{TB}. A default Ψ value of 0.15 is applied in DEAP; the proposed design is targeting a Ψ value of at least 0.08 or equivalent H_{TB} value.

3.3. Building Envelope Air Permeability

In addition to fabric heat loss/gain, considerable care will be taken during the design and construction to limit the air permeability (Infiltration). High levels of infiltration can contribute to uncontrolled ventilation.

Part L requires an air permeability level no greater than $5m^3/m^2/hr$ @ 50Pa for a new dwelling; which represents a reasonable upper limit of air tightness. The design intent for the proposed apartments and houses will be to target an air permeability of $2m^3/m^2/hr$ @ 50Pa.

Air permeability testing will be carried out by a person certified by an independent third party (National Standards Authority of Ireland or equivalent certification body) in accordance with I.S. EN 13829: 2000 "Thermal performance of buildings: determination of air permeability of buildings: fan pressurisation method". All apartments will be tested in this way.

3.4. Building Services

3.4.1. Heating Appliance Efficiency

Regulation L3 (d) requires that space heating and water heating systems in dwellings are energy efficient, with efficient heat sources and effective controls. More specifically, Regulation L3 (e) provides that oil and gas fired boilers must achieve a minimum seasonal efficiency of 90%.

The proposed design for the apartments are to generate heat for space heating and domestic hot water (DHW) by using a centralised, group heating system with heat pump technology, delivering heat via heat interface units (HIUs). The design for houses intends to generate heat for space heating and domestic hot water (DHW) by using a central heating system.

In relation to apartments and houses, heating will be provided to the space by appropriately sized radiators or low temperature radiators which operate at lower flow and return temperature.

3.4.2. Space Heating and Hot Water Supply System Control

Space and water heating systems should be effectively controlled so as to ensure the efficient use of energy by limiting the provision of heat to that required to satisfy the user requirements.

The design intent is to provide the following minimum level of control;

- Automatic control of space heating on the basis of room temperature
- Automatic control of heat input to stored hot water on the basis of stored water temperature
- Separate and independent automatic time control of space heating and hot water
- Shut down of boiler or other heat source when there is no demand for either space or water heating from that source

We propose to use a control system with full time and temperature control in each occupied room

3.4.3. Insulation of Hot Water Storage Vessels, Pipes and Ducts

All hot water storage vessels, pipes and ducts (where applicable) will be insulated to prevent heat loss. Adequate insulation of hot water storage vessels will be achieved by the use of a storage vessel with factory applied insulation tested to BS 1566, part 1:2002 Appendix B. Water pipes and storage vessels in unheated areas will be insulated for the purpose of protecting against freezing. Technical Guidance Document G and Risk report BR 262, Thermal insulation avoiding risks, published by the BRE will be followed.



3.4.4. Low Flow Sanitary Ware

At the time of writing the official DEAP4 software is yet to be made available. It is expected that this updated version for assessing the building energy rating will give credit for water efficient showers, taps, wash hand basins and baths. The installation of flow restrictors is recommended. Good practice would include:

- Shower 6L/min
- Bath Volumes Can vary but 175-130 L would be usual. 150L would be a recommended design target.

These figures will be confirmed when the software officially becomes available.

3.4.5. Lighting Design

A focus on lighting design will be another new aspect of the DEAP4 software where it is expected that credit will be given for an appropriate LED lighting design in relation to the dwelling. In the case of a deprived or over-elaborated lighting design spec, there will be a penalty for the building energy rating. A full lighting design analysis using appropriate software i.e. Dialux or Relux can help create a balanced lighting design.

3.4.6. User Information

After the completion of the proposed Development the end user(s) will be provided with sufficient information about the building, its installed services and their maintenance requirements so that the Apartments can be operated in line with their optimum operation for energy efficiency.

3.5. Use of Renewable Energy Sources

The following low & zero carbon technologies were reviewed in terms of their applicability for this development;

- Wind Power
- Photovoltaic Cells (PV)
- Solar Thermal Collectors
- Biomass Heating
- Ground Source Heat Pumps (GSHPs)
- Air Source Heat Pumps (ASHPs)
- Exhaust Air Heat Pumps (EAHPs)
- Combined Heat & Power (CHP)

Technology	Feasibility			Comments
rechnology	High	Medium	Low	Comments
Micro Wind			V	Technology Description: Micro wind turbines can be fitted to the roof of a building but would contribute a negligible amount of energy to the development. Applicability to this Development: Due to the suburban nature of the development site, this renewable has not been deemed viable. Vertical axis wind turbines may be more suited to this building, but there would still be the obvious aesthetic and potential noise issues.

Technology	Feasibility			Comments	
	High	Medium	Low	Comments	
Wind Power			V	Technology Description: Mast-mounted wind turbines can be located in an open area away from obstructions such as buildings and tall trees. Applicability to this Development: Due to the suburban location of the site and its location close to other residential buildings it is deemed that a large wind turbine installation is not feasible.	
Solar Photovoltaic (roof mounted)	\checkmark			Technology Description: Photovoltaic (PV) Cell technology involves the conversion of the sun's energy into electricity. PV panels can be discrete roof-mounted units or embedded in conventional windows, skylights, atrium glazing, façade cladding etc. Applicability to this Development: Residential developments can be suitable locations for the installation of PV depending on orientation roof pitch and over-shading while also being virtually maintenance free. PV should be included for this development and assessed further at detailed design.	
Solar hot water systems			V	Technology Description: Active solar hot water technology uses the sun's thermal radiation energy to heat fluid through a collector in an active process. Applicability to this Development: Due to the maintenance factor surrounding solar panels a solar hot water system is not considered feasible at this site.	

Tachnalagy	F	easibility		Commonts	
Technology	High	Medium	Low	Comments	
Biomass Heating			V	 Technology Description: Biomass boilers work on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water loads. Applicability to this Development: This technology requires substantial space allowance in a boiler room, access for delivery trucks, a thermal accumulator tank and considerable space for fuel storage of wood chips or pellets. The system also requires regular maintenance to remove ash etc. The use of biomass calls for a continuous local supply of suitable fuel to be truly sustainable. Concerns exist over the level of NOx and particulate emissions from biomass boiler installations, particularly in urban areas. 	
Ground source heat pump (GSHP)			V	 Technology Description: GSHP technologies exploit seasonal temperature differences between ground and air temperatures to provide heating in the winter and cooling in the summer. GSHP systems use some electricity to run the heat pump, but as most of the energy is taken from the ground, they produce less greenhouse gas than conventional heating systems. Ground source heat systems deliver low temperature heat and high temperature cooling, suitable for underfloor heating or chilled beams. Applicability to this Development: Site restrictions would require the use of vertical boreholes as opposed to horizontal ground loops. GSHP technology would need further investigation during detailed design and will depend on a favourable ground Thermal Response Test. Additionally capital costs are high and ideally, there should be a good balance between heating and cooling loads to allow for high COPs and reasonable capital payback. While a well-designed GSHP system operating under favourable conditions can achieve good efficiencies, the capital cost difference may still outweigh potential energy savings. As there is no cooling load, this investment is not deemed viable 	

Tachaology	Feasibility			Commonts	
Technology	High	Medium	Low	Comments	
Air source heat pump (ASHP)	✓			 Technology Description: ASHP technologies exploit seasonal temperature differences between external air and refrigerant temperatures to provide heating in the winter and cooling in the summer. ASHP systems use more electricity to run the heat pump when compared to GSHP, but as most of the energy is taken from the air, they produce less greenhouse gas than conventional heating systems over the heating season. Their COP can reduce to below 2.0 when outside air temperatures are ≤0°C and they can require additional energy for a defrost cycle. Applicability to this Development: Heat pumps are generally safer than the combustible based heating systems and have a relatively low carbon footprint. Heat pumps can deliver heat at low outside temperatures which can be considered suited to the Irish climate. For this reason ASHP has been deemed suitable for the 	
<section-header></section-header>	√			proposed development for the provision of space heating and/or DHW demand. Technology Description: The exhaust air heat pump uses otherwise wasted heat in the warm air areas of your home (bathrooms, kitchen, utility) and transfers that heat to hot water using the same principles as air source and ground source heat pumps. An Exhaust Air Heat Pump (EAHP) extracts heat from the exhaust air and transfers the heat to domestic hot water and/or hydronic heating system (underfloor heating, radiators). This type of heat pump requires a certain air exchange rate to maintain its output power. Since the inside air is approximately 20-22 degrees Celsius all year round, the maximum output power of the heat pump is not varying with the seasons and outdoor temperature Applicability to this Development: Exhaust Air Heat Pumps are best suited to apartments which will have low fabric heat losses. The latest units with inverter controlled compressor also have a ducted outside air supply which means the unit can draw on outside air when extract rates are low but without the need for an external condenser unit.	

Technology	Feasibility			Comments	
rechnology	High	Medium	Low	Comments	
Combined Heat and Power (CHP)	V			Technology Description: Combined heat and power (CHP), also known as co-generation, is the simultaneous generation of both useable heat and electrical power from the same source. A CHP unit comprises of an engine (referred to as the prime mover) in which fuel is combusted. The mechanical power produced by the engine is used to generate electricity using an integral electrical generator. The heat emitted from the engine (waste heat) is used to provide space heating and domestic hot water Applicability to this Development: CHP systems can be used in applications where there is a significant year-round demand for heating in addition to the electricity generated. CHP has been deemed suitable for the proposed development for the provision of space heating and/or DHW demand due to annual hours of operation considering the nature of the development.	

4. Passive Design

A focus for this project is to operate the building with low energy consumption. The building will be designed to minimise/avoid the requirements for mechanical ventilation and/or air conditioning. This will be done with the use of passive systems to control the internal environment, where possible.

This will be further developed with the client, architect, structural engineer and cost consultant as the scheme develops. The passive systems will aim to reduce external noise and pollution, reduce heat loss (in winter), reduce solar gains (in summer), and maximum daylight while maintaining comfort conditions.

4.1. Natural Ventilation

Natural ventilation will be incorporated wherever possible via either single sided or cross ventilation. Where natural ventilation cannot provide the comfort and air quality needs of the occupants or the space and mechanical ventilation cannot be avoided, these systems will incorporate energy efficient solutions to maximise the efficiency of the systems through the use of heat recovery and the efficient controls. This will be fully assessed during detailed design in accordance with procedures in CIBSE TM59 – 'Design methodology for the assessment of overheating risk in homes'.

For dwellings that incorporate mechanical solutions as in paragraph 4.2 below, it should be noted that these systems will not be sufficient to prevent summertime overheating alone. CIBSE TM59 states that 'homes that are predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method'. This will involve detailed consideration of openable windows and doors and testing the design for a number of typical worst case apartments using dynamic simulation software.

4.2. Balanced Whole House Mechanical Ventilation with Heat Recovery

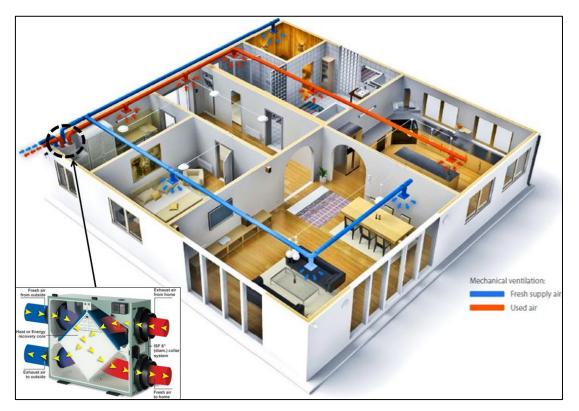


Figure 3: Balanced Whole house Mechanical Ventilation with heat recovery

The proposed system for apartments will use mechanical ventilation with heat recovery (MVHR), which is a whole-house ventilation system that generally supplies fresh air to dry rooms and extracts stale air from wet rooms.

Both air flows are to be ducted and driven by two fans, one on the supply side and one on the extract side. This will provide whole building ventilation as the mechanical extract fan will remove odours and excessive humidity to maintain a good air quality. A key component of the system is that a heat recovery unit is utilised to transfer heat from the warm exhaust air to the fresh air, achieving heat recovery.

The ventilation system should be listed on SAP appendix Q which ensures a suitable method of testing procedure for Irish use.

4.3. Passive Solar

Daylight in buildings creates a positive environment by providing connectivity with the outside world and assisting in the wellbeing of the building inhabitants. Daylight also represents an energy source; it reduces the need for artificial lighting, particularly in dwellings where natural light alone is often sufficient throughout the day. The design intent is to maximise the use of natural daylight to enhance visual comfort and not compromise thermal performance. The proposed development will have glazing specified that will minimise thermal conduction (u-value) while allowing for sufficient daylight levels and the maximisation of solar gain. Maximising solar gain within the limitations of thermal comfort will allow for a portion of the space heating load to be met passively during the day.

4.4. Water Conservation

Fabric II Values

During the detailed design stage for the proposed development the consumption of potable water in sanitary applications will be strongly considered and where possible low water use fittings and dual flush WCs will be specified.

A rainwater harvesting system will also be considered for this project and during the detailed design stage; calculations will be carried out to evaluate the suitability of this type of system. Reclaimed rainwater can be used for a range of applications such as toilet flushing, washing machines and irrigation. There are three main types of rainwater recovery systems: indirectly pumped, directly pumped, and gravity fed. The benefits of rain water harvesting is twofold as not only does it help to reduce the use of treated mains water for non-potable use, it can also help reduce water run –off and risk of flooding.

5. DEAP Calculation Summary

DEAP calculations have been carried out using SEAI DEAP 4.1 (beta) software in order to demonstrate compliance with Part L 2018 on a sample of 2-bed apartments. The DEAP calculations are based on the following provisional inputs:

5.1. SEAI DEAP 4.1 (beta) Inputs – Apartment (Centralised System)

	Fabric U Values					
	 Wall U value 	$= 0.18 \text{ W/m}^2\text{K}$				
	 Semi exposed walls 	= 0.23 W/m ² K (walls to unheated voids)				
	• Floor	$= 0.15 \text{ W/m}^2\text{K}$				
	 Flat Roof 	$= 0.15 \text{ W/m}^2\text{K}$				
	• Doors	$= 1.40 \text{ W/m}^2\text{K}$				
	 Glazing/Balcony door 	= 1.30 W/m ² K (whole window unit inclusive of frame)				
	 Glazing gv (EN410) 	= 0.4-0.6 (subject to overheating study)				
	 Frame Factor 	= 0.7 (i.e. 30% frame)				
•	Air permeability	$= 2 \text{ m}^3/\text{m}^2/\text{hr}$ at 50 Pa				
•	Thermal bridging	$= 0.08 \text{ W/m}^2.\text{K}$				
•	Ventilation	= MVHR				
•	Specific Fan Power	= 0.38 W/I/s				
•	Heat Exchanger Efficiency	= 93%				
•	Lighting	= 100% Low energy				
•	Heating system	= Community Heating				
•	Distribution system loss and gains	;				
	 Heating system category: Group heating schemes 					
	 Heating system: Group he 	ating boilers				
	- ,	Full time and temperature zone control				
		Yes				
•	Distribution loss factor =	1.05				
	Heating system: Air-Water heat pu	ump (electric)				
	 Heat Pump efficiency 	= 273%				
		il/low temperature radiators only				
•	Sub-category: Boiler					
	 Heating fuel 	= Mains gas				
	 Boiler efficiency 	= 91%				
•	Space heating system also supplie	s DHW = Yes				
•	Heat Interface Unit Loss Factor	= 0.364 kWh/day				
•	Heat Interface Unit Water Storage	Volume = 3.4L				
•	Renewable Sources	= 1no. PV Panel/Apt				

5.2. SEAI DEAP 4.2(beta) Outputs – Apartments

Table 4 summaries the results of the preliminary DEAP calculations carried out for a representative 2bed apartment using the energy strategy detailed in this report. Appendix 1 contains the DEAP output which demonstrates draft Part L 2018 (NZEB) compliance.

		Sammary Aparen	ent central			= =010)
	Apartmer	nt	Energy Rating	EPC	CPC	RER
	Top Floor - Block A22-Bed apartmentMid Floor - Block A22-Bed apartmentGround Floor - Block A22-Bed apartment		A2	0.298	0.276	0.250
			A2	0.244	0.230	0.260
			A2	0.265	0.246	0.260

Table 3: DEAP Output Summary - Apartment - Centralised Sys (Draft Part L 2018)

5.3. Conclusions

5.3.1. Draft Part L 2018 - Apartment compliance (Centralised):

This report confirms that the proposed East Road apartments will comply with Part L regulations (NZEB). The report highlights that Part L will be achieved if applied as the report suggests. The strategies adopted for the East Road apartments are outlined here:

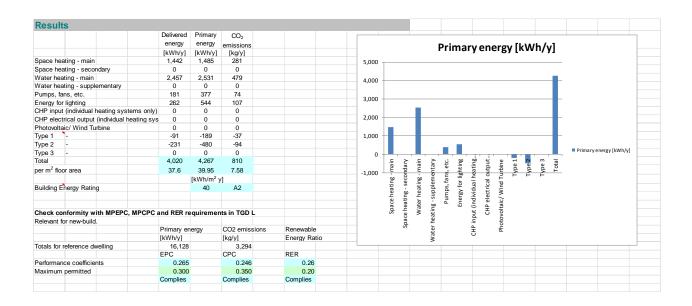
- U-values for floor and roof will exceed the building regulation backstops
- Using Glazing U-Value target outlined in this report
- Better performance air permeability than the backstop, adding to building air tightness and ventilation effectiveness
- Balanced whole house mechanical ventilation with heat recovery
- High performance thermal bridging
- Air source heat pump (ASHP) to provide space Heating (via radiators) and domestic hot water
- Renewable Sources 1 no. PV Panel per apartment

Appendix 1: DEAP Part L Compliance Report

DEAP F	Report												
DEAP Wor		Aligned to	DEAP soft	ware versio	n 3.2 (plus	draft chang	es for NZEE	3 part L)					
			intermediat		hown in <i>ita</i>	lics							
			elling are gr										
Print out 'P	roj' worksh	eet separat	ely if requir	ed.									
		_			TODI		0040						
weiling d	dimension				TGD L ve	rsion	2018						
			Height [m]									_	
Ground floo	r	107	2.6										
First floor	~~	0	0.0										
Second floo Third and of		0	0.0										
			0.0										
Total floor a		107											
	olume [m ³]												
iving area	[m²]	49.2											
/entilatior					0								
Number of	-				0								
	open flues	t fana and r	bassive vent	•	1								
	flueless ga			5	0								
	•		ontronoo?		Yes								
		by on main the dwelling			1								
			a n carried out	2	Yes	1							
	Not applica	-	. samoa ou		100								
-							1						
f yes	:												
	Air permea	ability [m3/h	n.m2 at 50 l	Pa]		0.1							
End if													
Number of s	sides shelt	ered			3								
/entilation	method				Balanced	whole-hous	e mechanic	al ventilatio	on with heat	recovery		6	
Effective ai	ir change r	ate [ac/h]			0.15								
Ventilation	heat loss [[W/K]			13								
			meets guid										
			than positiv		tilation fron	n loft:	:						
			ix Q" data a	available?				Yes					
		rer and mod				`	Vent Axia S		etic Advanc	e			
		n power [W						0.42				_	
	Heat excha	anger efficie	ency [%]					92					
Ninder													
Nindows				NI- 1	F = = + 0.44	NL 1	05/014/	0- "	Nie d	NI- 11	NI- 11	L La stra a state d	
Drientation				North	East/West		SE/SW	South	North	North	North	Horizontal	
	טו			1	3	1	4	5	1	1	1	6	
Area [m ²]	, 2			11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
J-value [W/				1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	a manufact	urer's certifi	ied value?	Yes	Yes	-	-	-	-	-	-	-	
f yes:	Man. 6 6-												
		rer and mod		-	-	-	-	-	-	-	-	-	
End if	Solar energ	gy transmit	tance	0.4	0.4	-	•	-	-	-	-	-	
	for roof win	dow ond/or	motol from	a if applical	hla (Tabla 6	c notes 1	and 0)						
Jonection	IOU TOOL WIN	uuw and/or	metal fram	e if applical 0	0 0 0 0 0 0 0 0 0	a, notes 1	and 2).	0	0	0	0	0	
Overshadin				2	3	0	0	0	0	0	0	0	
	or (Table 6	c) [_]		2 0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Vindow typ		∽/ [⁻]		4	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	JG ID			4	4	U	U	U	U	U	U	U	
abric													
	lement type	e	Area	U-value	AU	Comment	(optional)		Element ty	pe			
		-	[m ²]	[W/m ² K]			(ing TGD L	conformity	()	
Vindows/ro	oofliahts		20.0	1.24	24.7	-			101 000000		somorrinty	,	
Doors			0.0	0.00	0.0	-							
Floor			106.8	0.15	16.0	Floor over	Office		No underflo	or heating			
Floor (type	2)		0.0	0.00	0.0	-			-				
Floor (type			0.0	0.00	0.0	-			-				
Valls	,		33.8	0.18	6.1	Wall Type	1		Wall releva	nt for TGD	L fabric co	ompliance ch	eck
Valls (type	e 2)		0.0	0.00	0.0	-						ompliance ch	
Valls (type	,		0.0	0.00	0.0	-						ompliance ch	
Valls (type			0.0	0.00	0.0	-						ompliance ch	
Valls (type			0.0	0.00	0.0	-						ompliance ch	
Roof			0.0	0.00	0.0	-			-				
Roof (type 2	2)		0.0	0.00	0.0	-			-				
Roof (type 3			0.0	0.00	0.0	-			-				
vooi (type v			0.0	0.00	0.0	-			-				
			0.0	0.00	0.0	-			-				
Roof (type 4	5)	s [m ²]	160.62										
Roof (type 4 Roof (type 5		s [iii]			47								
Roof (type 4 Roof (type 5 <i>Total area 6</i>	of element	ements [W			-1								
Roof (type 4 Roof (type 5 Total area 6 Heat loss v	of element via plane el	ements [W	/K]		0.08								
Roof (type 4 Roof (type 5 Total area 6 Heat loss v Factor for tl	of element via plane el hermal bric	ements [W	/K]										
Roof (type 4 Roof (type 5 Total area 6 Heat loss v Factor for tl	of element via plane el hermal bric	ements [W	/K]		0.08								
Roof (type 4 Roof (type 5 Fotal area 6 Heat loss v Factor for the fabric heat	of element via plane el hermal bric t loss [W/k	ements [W	/K] ² K]		0.08								
Roof (type 4 Roof (type 4 Total area of Heat loss v Factor for th Fabric heat	of elements via plane el hermal bric t loss [W/k eat loss coe	ements [W, Iging [W/m ² {]	/K] ² K] //K]		0.08 60								
Roof (type 4 Roof (type 5 Total area of Heat loss v Factor for th Fabric heat	of elements via plane el hermal bric t loss [W/k eat loss coe	ements [W, lging [W/m ² (] efficient [W.	/K] ² K] //K]		0.08 60 73								

ting istribution loss [kWh torage loss			Yes										
loss [kWł			165										
	vyj		301										
torage loss			301										
lorage loss	002		Yes	1									
	ies :		res	I									
: Wotor otor	age volume	litrool				3.4							
vvater stor	age volume	[intres]				3.4							
				1.0		N/							
	turer's decla	ared loss ta	actor availat	DIE?		Yes	1						
lf yes						-C-LEM							
							Instant 5/80	J					
16			eu ioss iact		iyj	0.304							
if no	Not applica	bie											
Endif							_						
		P											
				ataa)									
remperatu	re ractor mu	itiplier (fror	n rable 2 h	utes)	1								
alar watar	haating area				No	0							
		em?			INO	U							
пот арриса	aule					· ~	lor fra -ti-	F0/ 1					
						S	biar traction	[%]	0				
						1							
) // L / .] / T- L I	- 0)					200						
					[KVVN/y] (I	able 4f)							
			is used in	summer?	0457		NO						
					-								
				0									
r storage ir	adoors or in g	group neat	ing scheme) <i>?</i>	res								
- f f	4	41		1									
ergy used to	or lighting, E	L [K VV N/Y]			262								
•													
					400								
i gains [vv]					489								
fac 6			0.404000										
	ry or aweiling	9											
、 <i>vv i v y</i> j			1442										
ting													
-	ivonocc												
) whore a	pproprioto F	Cl	0								
			ippropriate [U]									
			able de er d	(d)									
	Insiveness C	alegory (1	able 4a of 4	iu)	1	Enter	lf proport		lf propert				
3								ntrollad					
ting room	(aunalisian l	ot wet '	o rodict	، ہے۔ ام میں س	r ovotaan'		by room th		aweiling?				
					n system)								
			nue ian)					-	-				
					NI-	0							
	aung systen	present?			INO								
	ovotere''	hin or		m+2 (ndorfl	oting in	ound flees	N	0				
					naemoor he	eating in gr	ouna floor)		U				
		ope eleme			<u> </u>			0.15					
in heating	system		Group / co	mmunity h	eating sche	eme	2						
	If no End if Temperatu Temperatu olar water Not applica cuit loss [k oss for cor- consumptiti- entary elec- n main water r storage ir of fixed ligh- rgy used for ting <i>d</i> respons s catego <i>kW/y</i>] ting d respons te adjustme stem contri- stem respons s ting pump pump (sup flue fan (if rarm air he afficiency t emission	Manufacture If no Not applical End if Image: Construction of the sector of the sect	Manufacturer's declar If no Not applicable End if Image: Construct the second secon	If no Not applicable End if Temperature factor unadjusted (Table 2) Temperature factor multiplier (from Table 2 n olar water heating system? Not applicable cuit loss [kWh/y] (Table 3) coss for combi boiler [kWh/y] (Table 3a) consumption of electric keep-hot facility of consumption of electric keep-hot facility of consumption of electric keep-hot facility of consumption and electric immersion heating is used in a main water heater [kWh/y] from water heating system [W] r storage indoors or in group heating scheme of fixed lighting outlets that are low-energy [-rgy used for lighting, EL [kWh/y] fraction [-] 0.461086 ass category of dwelling Medium Wh/y] 1442 tting Medium twh/y] 1442 tting Immediate (radium and the set or radiators of pound set or adiators of pound set or adiators of pound (radius set or adiators of pound (radius fully) iting pump (supplying hot water to radiators of pound (radius fully) Immediate fully if ice fac (if fan assisted flue) Immediate fully ram air heating system present? Immediate fully optime (supplying oil to boiler and flue fan) Immediate fully it emission system within an en	Manufacturer's declared loss factor [kWh/da If no Not applicable End if	Manufacturer's declared loss factor [kWh/day] If no Not applicable End if Image: State of the sta	Manufacturer's declared loss factor [kWh/day] 0.364 If no Not applicable 0 End if 1 1 Temperature factor unadjusted (Table 2) 1 1 Image: State of the	Manufacturer's declared loss factor [kWh/day] 0.364 If no Not applicable End if 1 Temperature factor unadjusted (Table 2) 1 Image: Temperature factor unadjusted (Table 3) 0 Image: Temperature factor una	Manufacturer's declared loss factor [kWh/day] 0.364 If no Not applicable End if 1 Temperature factor unadjusted (Table 2) 1 Itemperature factor multiplier (from Table 2 notes) 1 olar water heating system? No Not applicable Solar fraction [%] cuit loss [kWh/y] (Table 3) 360 coss for combi boiler [kWh/y] (Table 3a) 0 consumption of electric keep-hot facility of combi boiler [kWh/y] (Table 4f) 0 entary electric immersion heating is used in summer? No n main water heater [kWh/y] 2457 n supplementary heater [kWh/y] 0 fraction or or in group heating scheme? Yes of fixed lighting outlets that are low-energy [-] #REF! gains [W] 489 fraction [-] 0.461086 uss category of dwelling Medium wWh/y] 1442 ting a gains [W] 489 fraction [-] 0.461086 uss category of dwelling Medium wWh/y] 1442 ting Enter	Manufacturer's declared loss factor [kWh/day] 0.364 If no Not applicable End if Image: Construction of the program of	Manufacturer's declared loss factor [kWh/day] 0.364 Not applicable	Manufacturer's declared loss factor (WW/day) 0.364 Not applicable	Manufacturer's declared loss factor [kWh/day] 0.364 Not applicable

	y space he			heating schem	·							
						Table 7 Te	bla 40 an A			0		
					n (use value from					-		
Generation	n efficiency	of seconda	ary / supplem	entary neating s	system [%] (use	value from	Table 4a or	Appendix E)		0		
Main (ara	oup heating) svetom										
	a based on		imed?			Yes						
	n loss facto					1.05						
				eat recoverd fro	m power station							
Boilers			in naction of h	eat recoveru no		0						
Doners	(If the freet	ion of hoot	from boilors	ic zoro thic cor	ction is irrelevant	\ \						
	(II LITE ITACI	ion or near	ITOTT DOILETS	is zelo, this sec	JUON IS INCIEVANI,).						
	Heat source	e type	Fuel			Efficiency	Percent of					
						[%]	heat [%]					
	Boiler type	1	mains gas			91	49					
	Boiler type		-			0	0					
	Heat pump		electricity			273	51					
	Solar heati						0				1	
CHP or w	aste heat fr											
				aste heat is zer	o, this section is	irrelevant).						
	System ty				-				2			
	If CHP								_			
	-	Electrical	efficiency of (CHP unit (e.a. C	0.3) from operatio	nal records	or the CHP	o desian speci	fication [0.28		
					rom operational r					0.57		
		Fuel type			mains gas			J				
		. doi type			indino guo							
Fuel data			Fuel									
	ating - seco	ndarv	-									
						Primary	CO2	D	elivered			
Renewable	and energ	v-saving te	chnologies			energy	factor		energy			
Type 1	Description		-				[kg/kWh]		kWh/y]			
	Energy pro		saved			2.08	0.409		91			
	Energy col					0.00	0.000		0			
Type 2	Description		-						-			
21 -	Energy pro		saved			2.08	0.409		231			
	Energy co					0.00	0.000		0			
	Description		-						-			
Type 3												
Туре 3	Energy pro	duced or s	saved			0.00	0.000		0			



DEAP R	Domort													
DEAP Work	-	Aligned to			2 2 (plup	droft obong		P nort I)						
DEAP Work						draft change	es for NZEE	s part L)						
	,		elling are gr		iowir in <i>n</i> a	103								
			ely if requir											
	-													
Dwelling d	limension				TGD L ve	rsion	2018							
			Height [m]											
Ground floor	r	107	2.6											
First floor		0	0.0											
Second floo		0	0.0											
Third and ot		0	0.0											
Total floor a		107												
Dwelling vol														
_iving area [[m-]	49.2												
Ventilation	1													
Number of c					0									
Number of o					0									
Number of in	ntermitten	t fans and p	bassive vent	S	1									
Number of fl	lueless ga	s fires			0									
s there a dr	raught lobl	by on main			Yes									
Number of s	storeys in	the dwelling	9		1									
			a carried out	?	Yes	1								
fno M	Not applica	able												
							ļ		-					
f yes :	A := = = = = =	bility for 0."	m0 -+ 50 5			0.4								
	HI permea	wiiity [m3/h	n.m2 at 50 F	-aj		0.1	ļ							
End if	ideo oboli	arad			2									
Number of s /entilation r		ered			3 Balanced y	whole-bourse	e mechania	al ventilati	on with heat	10000001		6		
Effective air		ate [ac/h]			0.15	wildle-House		a veritiidti	on with heat	recovery		0		
Ventilation I					13									
			meets guid	lelines in T(
			than positiv			n loft:								
			ix Q" data a			i ioit.	·	Yes						
		rer and mod				V	/ent Axia S		letic Advanc	e				
		n power [W						0.42	1	-				
		anger efficie						92						
		J												
Nindows														
Orientation				North	East/West	North	SE/SW	South	North	North	North	Horizontal		
Orientation I	ID			1	3	1	4	5	1	1	1	6		
Area [m ²]				11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
J-value [W/ı	'm² K]			1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
s U-value a	manufact	urer's certifi	ied value?	Yes	Yes	-			-	-	-	-		
If yes:							-	-						
M							-	-						
	Manufactu	rer and mo	del	-	-	-	-	-	-	-	-	-		
		rer and moo gy transmit		- 0.4	- 0.4	-				-	-	- -		
End if	Solar ener	gy transmit	tance	0.4	0.4	-	-	-				-		
End if	Solar ener	gy transmit	tance	0.4 e if applicat	0.4 ble (Table 6	- ia, notes 1 a	- - and 2).	-	- -	-	-	-		
End if Correction fo	Solar ener	gy transmit	tance	0.4 e if applicat 0	0.4 ble (Table 6 0	- ia, notes 1 a 0	- - and 2). 0	- - 0	- 0	- 0	- 0	- 0		
End if Correction fo Overshading	Solar ener for roof win g ID	gy transmit dow and/or	tance	0.4 e if applicat 0 3	0.4 ble (Table 6 0 3	- ia, notes 1 a 0 0	- - and 2). 0 0	- - 0 0	- 0 0	- 0 0	- 0 0	- 0 0		
End if Correction fo Overshading Frame facto	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	0.4 e if applicat 0 3 0.70	0.4 ble (Table 6 0 3 0.70	- a, notes 1 a 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0 0.00		
End if Correction fo Dvershading Frame facto	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	0.4 e if applicat 0 3	0.4 ble (Table 6 0 3	- ia, notes 1 a 0 0	- - and 2). 0 0	- - 0 0	- 0 0	- 0 0	- 0 0	- 0 0		
End if Correction fo Overshading Frame facto Window typ	Solar ener for roof win g ID or (Table 6	gy transmit dow and/or	tance	0.4 e if applicat 0 3 0.70	0.4 ble (Table 6 0 3 0.70	- a, notes 1 a 0 0 0.00	- - 0 0 0.00	- - 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0 0.00	- 0 0 0.00		
End if Correction fo Dvershading Frame facto Window typ Fabric	Solar ener or roof win g ID or (Table 6 oe ID	gy transmit dow and/or c) [-]	tance metal fram	0.4 e if applicat 0 3 0.70 4	0.4 ble (Table 6 0 3 0.70 4	- ia, notes 1 a 0 0 0.00 0	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0	- 0 0.00 0	- 0 0 0.00	- 0 0 0.00		
End if Correction fo Dvershading Frame facto Window typ Fabric	Solar ener or roof win g ID or (Table 6 oe ID	gy transmit dow and/or c) [-]	tance metal fram Area	0.4 e if applicat 0 3 0.70 4 U-value	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i>	- a, notes 1 a 0 0 0.00	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0 Element ty	- 0 0.00 0	- 0 0.00 0	- 0 0.00 0		
End if Correction fr Dvershading Frame facto Window typ Fabric Exposed ele	Solar ener or roof win g ID or (Table 6 be ID ement type	gy transmit dow and/or c) [-]	tance metal fram Area [m ²]	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K]	0.4 ble (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>]	- a, notes 1 a 0 0 0.00 0 Comment	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0 Element ty	- 0 0.00 0	- 0 0.00 0	- 0 0.00 0		
End if Correction fr Dvershading Frame facto Nindow typ Fabric Exposed ele Windows/roo	Solar ener or roof win g ID or (Table 6 be ID ement type	gy transmit dow and/or c) [-]	metal fram Metal fram Area [m ²] 20.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24	0.4 ble (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7	- a, notes 1 a 0 0.00 0 Comment	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0 Element ty	- 0 0.00 0	- 0 0.00 0	- 0 0.00 0		
End if Correction for Prame facto Window typ Fabric Exposed ele Windows/roo Doors	Solar ener or roof win g ID or (Table 6 be ID ement type	gy transmit dow and/or c) [-]	metal fram Metal fram Area [m ²] 20.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0	- a, notes 1 a 0 0.00 0 Comment o	- - 0 0 0.00 0	- - 0 0 0.00	0 0.00 0 Element ty (for assess	- 0 0.00 0 pe ing TGD L	- 0 0.00 0	- 0 0.00 0		
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor	Solar ener or roof win g ID or (Table 6 be ID ement typ poflights	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0	- a, notes 1 a 0 0.00 0 Comment - -	- - 0 0 0.00 0	- - 0 0 0.00	- 0 0.00 0 Element ty	- 0 0.00 0 pe ing TGD L	- 0 0.00 0	- 0 0.00 0		
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor Floor (type 2	Solar ener or roof win g ID or (Table 6 be ID ement typ poflights 2)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00	0.4 ole (Table 6 0 3 0.70 4 [W/K] 24.7 0.0 0.0 0.0 0.0	- a, notes 1 a 0 0.00 0 Comment o	- - 0 0 0.00 0	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess	- 0 0.00 0 pe ing TGD L	- 0 0.00 0	- 0 0.00 0		
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor Floor (type 2 Floor (type 2	Solar ener or roof win g ID or (Table 6 be ID ement typ poflights 2)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 0.0 0.0	- a, notes 1 a 0 0.00 0 Comment - - -	- and 2). 0 0 0.00 0 (optional)	- - 0 0 0.00	- 0 0.00 0 Element ty (for assess No underfid	- 0 0.00 0 pe ing TGD L	- 0 0.00 0	- 0 0.00 0		
End if Correction for Divershading Frame facto Nindow typ Fabric Exposed ele Windows/roo Doors Floor (type 2 Floor (type 2 Nalls	Solar ener for roof win g ID or (Table 6 be ID ement typ woflights 2) 3)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.18	0.4 0 (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 0.0 6.1	- a, notes 1 a 0 0 0 0 0 Comment Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfite - Wall releva	- 0 0.00 0 pe ing TGD L oor heating	- 0 0.00 0 conformity	- 0 0 0.00 0 0.00		
End if Correction for Divershading Frame factor Vindow typ Fabric Exposed ele Windows/ro Doors Floor Floor (type 2 Floor (type 2 Valls Valls	Solar ener for roof win g ID or (Table 6 be ID ement type poflights 2) 3) 2)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 33.8 6.8	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23	0.4 0 (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 6.1 1.6	- a, notes 1 a 0 0.00 0 Comment - - -	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfit - - Wall releva Wall not re	- 0 0.00 0 pe ing TGD L por heating nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric	- 0 0.00 0)) mpliance ch	e check	
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/ro Doors Floor Floor Floor (type 2 Floor (type 2 Valls Valls (type Valls (type	Solar ener or roof win g ID or (Table 6 be ID ement type ooflights 2) 3) 2) 3)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.23 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 0.0 6.1 1.6 0.0	- a, notes 1 a 0 0 0 0 0 Comment Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfid - - Wall releva Wall releva Wall releva	- 0 0.00 0 pe bor heating nt for TGD L levant for TGD levant for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co	0 0.00 0) mpliance ch c compliance ch	e check ieck	
End if Correction for Divershading frame facto Window typ Fabric Exposed ele Windows/ror Doors Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 2 Valls (type Valls (type Valls (type	Solar ener or roof win g ID or (Table 6 e ID ement type ooflights 2) 3) 2) 3) 4)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.3.8 6.8 0.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>KJ</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type -	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfic - - Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/ro Doors Floor Floor (type 2 Floor (type 2 Floor (type 2 Valls Valls (type Valls (type Valls (type Valls (type	Solar ener or roof win g ID or (Table 6 e ID ement type ooflights 2) 3) 2) 3) 4)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.23 0.00	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 0.0 6.1 1.6 0.0	- a, notes 1 a 0 0.00 0 Comment - - - - Wall Type Wall Type -	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfic - - Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0) mpliance ch c compliance ch	e check leck leck	
End if Correction for Divershading Frame factor Vindow typ Fabric Exposed ele Windows/ro Doors Floor Floor (type 2 Floor (type 2 Valls (type 2	Solar ener for roof win g ID or (Table 6 be ID ement type boflights 2) 3) 2) 3) 4) 5)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.00	0.4 ole (Table 6 0 3 0.70 4 [W/K] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0.00 0 Comment - - - - - - Wall Type Wall Type - -	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O O Element ty (for assess Vounderfie - Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Devershading Frame facto Nindow typ Fabric Exposed ele Windows/roo Doors Floor (type 2 Floor (type 2 Valls (type Valls (type Valls (type Valls (type Roof Roof (type 2	Solar ener for roof win g ID or (Table 6 be ID ement type boflights 2) 3) 2) 3) 4) 5)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.00 0.00	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 0.0 6.1 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfice - Wall releva Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor Coors Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 2 Valls (type Walls (type Walls (type Nalls (type Roof Roof (type 3	Solar ener for roof win g ID or (Table 6 be ID ement type boffights 2) 3) 2) 3) 4) 5) 2) 3) 4) 5)	gy transmit dow and/or c) [-]	tance metal fram [m ²] 20.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.00 0.00 0.00	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 6.1 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment - - - - - Wall Type Wall Type - - - -	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva -	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame factor Window typ Fabric Exposed ele Windows/roo Doors Floor Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 3 Walls (type Walls (type Walls (type Walls (type Roof (type 3 Roof (type 4	Solar ener or roof win g ID or (Table 6 be ID ement type ooflights 2) 3) 2) 3) 4) 5) 2) 3) 4) 5)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 ole (Table 6 0 3 0.70 4 [W/K] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O Element ty (for assess Vounderfid - Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Window typ Fabric Exposed ele Windows/ro- Doors Floor (type 2 Floor (type 2 Valls (type Valls (type 2 Roof (type 3 Roof (type 3 Roof (type 5	Solar ener for roof win g ID or (Table 6 be ID ement typ ooflights 2) 3) 2) 3) 4) 5) 2) 3) 4) 5) 2) 3) 4) 5)	gy transmit dow and/or c) [-]	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 ole (Table 6 0 3 0.70 4 <i>K</i> <i>K</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O Element ty (for assess Vounderfid Wall releva Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Nindow typ Fabric Exposed elector Nindows/roo Doors Floor (type 2 Nalls (type Nalls (type Nalls (type 3 Roof (type 3 Roof (type 5 Roof (type 5 Total area o	Solar ener for roof win g ID or (Table 6 be ID ement typ poflights 2) 3) 2) 3) 4) 5) 2) 3) 4) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5)	gy transmit dow and/or c) [-] e e	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 ole (Table 6 0 3 0.70 4 <i>K</i> <i>K</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O Element ty (for assess Vounderfid Wall releva Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Windows typ Fabric Exposed elector Windows/roo Doors Floor (type 2 Floor (type 2 Roof (type 3 Roof (type 3 Roof (type 4 Roof (type 5 Total area o Heat loss vi	Solar ener for roof win g ID or (Table 6 be ID ement typ coffights 2) 3) 2) 3) 4) 5) 5) 5) 5) 5) 5) 5) 5) 5)	gy transmit dow and/or c) [-] e e s s (m ²] ements [W.	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O Element ty (for assess Vounderfid Wall releva Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 eving TGD L bor heating nt for TGD elevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Overshading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor (type 2 Floor (type 2 Floor (type 2 Walls (type Walls (type Walls (type Walls (type 3 Roof (type 3 Roof (type 4 Roof (type 4 Roof (type 4 Roof (type 5 Roof (type 4 Roof (type 5 Roof (type 4 Roof (type 5 Roof (type 5) Roof (type 5 Roof (type 5) Roof (type	Solar ener for roof win g ID or (Table 6 be ID ement type boflights 2) 3) 2) 3) 4) 5) 5) 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 5) 6 element 4) 5) 5) 5) 6 element 4) 5) 5) 5) 6 element 4) 6 element 4) 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	gy transmit dow and/or c) [-] e e s (m ²] ements [W. Iging [W/m	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	O O O O O Element ty (for assess Vounderfid Wall releva Wall releva Wall releva Wall releva Wall releva	- 0 0.00 0 ing TGD L pe pe por heating nt for TGD ilevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Overshading Frame facto Window typ Fabric Exposed ele Windows/roo Doors Floor (type 2 Floor (type 2 Roof (type 3 Roof (type 3 Roof (type 4 Roof (type 5 Total area o Heat loss vi	Solar ener for roof win g ID or (Table 6 be ID ement type boflights 2) 3) 2) 3) 4) 5) 5) 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 5) 6 element 4) 5) 5) 6 element 4) 5) 5) 6 element 5) 6 element 4) 5) 5) 5) 6 element 4) 5) 5) 5) 6 element 4) 6 element 4) 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	gy transmit dow and/or c) [-] e e s (m ²] ements [W. Iging [W/m	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 33.8 6.8 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva - -	- 0 0.00 0 ing TGD L pe pe por heating nt for TGD ilevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame factor Window typ Fabric Exposed ele Windows/roo Doors Floor Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 3 Walls (type Walls (type Walls (type Walls (type Walls (type Coof (type 2 Roof (type 3 Roof (type 4 Roof (type 5 Total area o Heat loss vi Factor for th Fabric heat	Solar ener or roof win g ID or (Table 6 be ID ement type ooflights 2) 3) 4) 5) 2) 3) 4) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5)	gy transmit dow and/or c) [-] e e s [m ²] ements [W. Iging [W/mi	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 ole (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva - -	- 0 0.00 0 ing TGD L pe pe por heating nt for TGD ilevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	
End if Correction for Divershading Frame facto Window typ Fabric Exposed elector Doors Floor Coors Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 2 Floor (type 3 Roof (type 4 Roof (type 4 Roof (type 4 Roof (type 4 Roof (type 4 Roof (type 5 Roof (type 4 Roof (type 5 Roof (type 5) Roof (type 5 Roof (type 5) Roof (t	Solar ener for roof win g ID or (Table 6 be ID ement type ooflights 2) 3) 2) 3) 4) 5) 2) 3) 4) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5) 5)	gy transmit dow and/or c) [-] e e s [m ²] ements [W/m G] efficient [W/m	tance metal fram Area [m ²] 20.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.4 e if applicat 0 3 0.70 4 U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.4 0le (Table 6 0 3 0.70 4 <i>AU</i> <i>[W/K]</i> 24.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- a, notes 1 a 0 0 0.00 0 Comment Wall Type Wall Type	- - 0 0.00 0 (optional)	- - 0 0 0.00	0 0 0.00 0 Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva - -	- 0 0.00 0 ing TGD L pe pe por heating nt for TGD ilevant for TGD nt for TGD nt for TGD	- 0 0.00 0 conformity L fabric co GD L fabric L fabric co L fabric co	0 0.00 0)) mpliance ch c compliance mpliance ch	e check leck leck	

Water h -	ating		1								
Water hea					-	-					
	distribution		Yes								
Distributio	n loss [kW	n/y]	301								
		-									
	storage los	ses?	Yes	s 1							
lf yes	:										
	Water sto	rage volume [li	tres]			3.4					
	ls manufa	cturer's declare	ed loss factor av	ailable?		Yes	1				
	lf yes	:					_				
		Manufacturer	and model nam	e	Heatrae Sa	adia Hi Ma	x Instant 5/8	0			
		Manufacturer	's declared loss	factor [kWh/	day]	0.364					
	lf no	Not applicabl	e				_				
	End if										
		ire factor unad	justed (Table 2)		1						
			plier (from Table		1						
End if	remperate			2 10(03)			-				
	e olar woter	heating syste	m2		No	0					
	Not applic				INU	U					
lf yes	NOL APPIIC	aule				-	olor froatic-	F0/ 1	0		
							olar fraction	[70]	0		
	L	r	ĩ			4	_				
End if			a)								
		(Wh/y] (Table					360				
			h/y] (Table 3a)				0				
			ceep-hot facility			Table 4f)	0				
Is supplem	nentary ele	ctric immersio	n heating is use	d in summer	?		No				
Output from	m main wa	er heater [kW	'h/y]		2457						
Output from	m supplem	entary heater [[kWh/y]		0						
Heat gains	s from wate	r heating syste	em [W]		109						
Is hot wate	er storage i	ndoors or in gr	oup heating sch	eme?	Yes						
Lighting											
	of fixed lia	nting outlets th	nat are low-energ	l-] vc	#REF!						
		or lighting, EL		57 []	268						
/ IIIIIddi Off		, ingriding, 22	[200						
Internal g	aine						_				
-	al gains [W	7			489						
Net Interne	ai yairis [vv				409						
114											
Heatuse	n fan este i f		0.101	200							
•	a fraction [-		0.4610								
		ry of dwelling	Mediu				_				
Heat use [[ĸWh/y]		435)		-					
_											
Space he											
	nd respons										
			where appropri	ate [C]	0						
Heating sy	stem conti	ol category (T	able 4e)		3						
Heating sy	stem resp	onsiveness cat	tegory (Table 4a	or 4d)	1						
Pumps/fai						Enter	If present,		If present,		
						number	is boiler co	ontrolled	inside		
						present		nermostat?	dwelling?		
Central he	ating nump	(supplying bo	t water to radiat	ors or underfl	OOr system)			Yes	an onling.		
			oiler and flue fan		set by storn)	0		-	-		
		f fan assisted		/		0		-	-		
		ating system			No	U					
		aung system	present?		INO						
	efficiency			1					0		
is main he			n an envelope e		underfloor h	eating in g	round floor)	No	0		
			e element [W/n					0.15			
Turne of me	ain heating	svstem	Group	/ community	heating sch	eme	2				

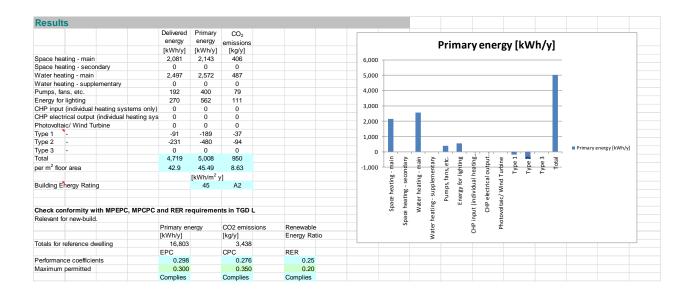
	y space heat		<u> </u>	ating scheme								
						T.11. 7 T				0		
				ntary system (us					-	0		
Generatior	n efficiency of	seconda	ry / supplemen	tary heating syst	em [%] (use	value from	Table 4a or	Appendix E	.)	0		
Main (aro	oup heating)	svstem			_							
	based on he		med?			Yes					1	
	n loss factor [1.05						
				t recoverd from p	ower station	0						
Boilers		in aniit oi										
Donero	(If the fraction	n of heat	from boilers is	zero, this sectior	is irrelevent)						
		in or near		2010, 1113 3001101	Tis melevant). 						
	Heat source	type	Fuel			Efficiency	Percent of					
						[%]	heat [%]					
	Boiler type 1		mains gas			91	49					
	Boiler type 2		-			0	0				1	
	Heat pump		electricity			273	51					
	Solar heating	system					0					
CHP or w	aste heat froi										1	
				e heat is zero, th	nis section is	irrelevant).					1	
	System type				-				2		1	
	If CHP											
	E	lectrical e	efficiencv of CH	P unit (e.g. 0.3)	from operatio	nal records	or the CHP	desian sp	ecification I	0.28		
				it (e.g. 0.5) from						0.57		
		uel type			mains gas			5 1				
		uor type			mane gao							
Fuel data			Fuel									
	ating - second	arv	-									
opuoo noo						Primary	CO2		Delivered			
Renewable	e and energy-	saving ter	chnologies			energy	factor		energy			
Type 1	Description		-				[kg/kWh]		[kWh/y]			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Energy produ	uced or s	aved			2.08	0.409		91		1	
	Energy cons					0.00	0.000		0			
Type 2	Description		-			0.00	0.000		Ű			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Energy produ	iced or s	aved			2.08	0.409		231			
	Energy cons					0.00	0.000		0		1	
Type 3	Description		-			0.00	0.000		5			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Energy produ	iced or s	aved		_	0.00	0.000		0			
	Energy cons				-	0.00	0.000		0			
	Linergy cons	uneu				0.00	0.000		U			

Result	ts								
			Delivered energy	Primary energy	CO ₂ emissions			Primary energy [kWh/y]	
^ .			[kWh/y]	[kWh/y]	[kg/y]			/ 6/1 //	
	ating - main		435	448	85		3,500		
	ating - seco	idary	0	0	-		3,000		
	ating - main		2,457	2,531	479				
	ating - suppl	ementary	0	0	0		2,500		
Pumps, fa			171	356			2,000		
Energy fo			268	558	110		2,000		
		neating systems		0	0		1,500		
		(individual heati		0	0				
	aic/ Wind Tu	rbine	0	0	0		1,000		
	-		-91	-189	-37		500		
Type 2	-		-231	-480	-94			Primary energy [kWh/y]	
Туре 3	-		0	0	0		0		
Total			3,009	3,223	612		-500 -500	condary 8 - main 1015, str. 10 - loutput 17 - pre a 17 - pre a 17 - pre a	
per m ² flo	or area		28.2	30.17	5.73		-500 E	conda 8 - ma ans, e Type Type Type Type	
				[kWh/m ² y			-1,000 2		
Building E	hergy Ratin	g		30	A2		ati	vin tric ps, -s	
							e he	ee ting - see tter heatin g - suppler P umps, fa individual iaic/Wind iaic/Wind	
							-1,000 -1,000	Space heating - sec Water heating - sec Pumps, fai Energy for I CHP input (individual h CHP electrical Photovoltaic/ Wind T	
Check co	onformity w	ith MPEPC, MF	PCPC and RER re	equiremer	nts in TGD L		S ds	ਤੂ ਤੋਂ ਸ਼ੁੱਤ ਤੁ	
Relevant f	or new-build							oto oto	
			Primary en	nergy	CO2 emissions	Renewable		Ph H de s	
			[kWh/y]		[kg/y]	Energy Ratio		wa	
Totals for	reference du	velling	13,218		2,659				
			EPC		CPC	RER			
Performar	nce coefficie	nts	0.244		0.230	0.26			
Maximum	permitted		0.300		0.350	0.20			
			Complies		Complies	Complies			

DEAP F	Report												
		Aligned to	DEAP soft	vare version	3.2 (plus	draft chang	es for N7FF	B part ()					
		th selected						- port =)					
	,	for this dw											
		eet separat											
Owelling d	dimension				TGD L ve	rsion	2018						
			Height [m]										
Ground floo	or	110	2.6										
First floor		0	0.0										
Second floo		0	0.0										
Third and ot		0	0.0										
Total floor a		110											
Dwelling vol													
iving area	[m ²]	52.0											
/entilation					0								
Number of a					0								
Number of a		t fans and p		•	1								
Number of f				3	0								
		by on main	ontronoo?		Yes								
		the dwelling			1								
		the dwelling ty test beer		?	Yes	1							
	Not applica		. samea ou	•	103								
							1						
							1						
f yes :	:												
	Air permea	ability [m3/h	n.m2 at 50 F	Pa]		0.1							
nd if				-			ĺ						
Number of s	sides shel	tered			1								
/entilation	method				Balanced	whole-house	e mechanic	al ventilatio	on with heat	recovery		6	
Effective ail	ir change r	ate [ac/h]			0.16					·			
/entilation					16								
Permeability	ty test carr	ied out and	meets guid	lelines in T(GD L?								
For mechar	nical ventila	ation, other	than positiv	e input ven	tilation from	n loft:	:						
	Is measure	ed "Append	ix Q" data a	vailable?				Yes					
		rer and mo				V	/ent Axia S		etic Advanc	e			
		n power [W						0.42					
	Heat exch	anger efficie	ency [%]					92					
Vindows							05.5	6		• • •			
Drientation					East/West		SE/SW	South	North	North	North	Horizontal	
Drientation	ID			1	3	1	4	5	1	1	1	6	
Area [m ²]				11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
J-value [W/	-			1.30	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	a manufact	urer's certifi	ied value?	Yes	Yes	-	-	-	-	-	-	-	
f yes:													
		rer and mod		-	-	-	-	-	-	-	-	-	
	Solar ener	gy transmit	tance	0.4	0.4	-	-	-	-	-	-	-	
End if	f			. 16									
Correction f	for roof win	idow and/or	metal fram			a, notes 1 a				•	•		
Dume to "				0	0	0	0	0	0	0	0	0	
Overshading		a) []		2	3	0	0	0	0	0	0	0	
Frame facto		u) [-]		0.70	0.70 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Nindow typ	pe iD			4	4						0	0	
				•		0	0	0	0	0			
abric					•	0	0	0	0	0			
	lement tvp	e	Area					0					
	lement typ	e	Area	U-value	AU	Comment			Element ty	pe	conformiti-)		
xposed el		e	[m ²]	U-value [W/m ² K]	AU [W/K]	Comment			Element ty		conformity))	
Exposed ele Windows/ro		e	[m ²] 20.0	U-value [W/m ² K] 1.24	AU [W/K] 24.7	Comment			Element ty	pe	conformity))	
Exposed el Windows/ro Doors		e 	[m ²] 20.0 0.0	U-value [W/m ² K] 1.24 0.00	AU [W/K] 24.7 0.0	Comment - -			Element ty (for assess	rpe sing TGD L	conformity)	 	
Exposed ele <i>Windows/ro</i> Doors Floor	ooflights	e 	[m ²] 20.0 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00	AU [W/K] 24.7 0.0 0.0	Comment - -			Element ty (for assess	pe	conformity)		
Exposed ele Windows/ro Doors Floor Floor (type	2)	e 	[m ²] 20.0 0.0 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00	AU [W/K] 24.7 0.0 0.0 0.0	Comment - -			Element ty (for assess No underfle	rpe sing TGD L	conformity)	 	
Exposed ele Windows/ro Doors Floor Floor (type Floor (type	2)	e 	[m ²] 20.0 0.0 0.0 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00	AU [W/K] 24.7 0.0 0.0 0.0 0.0	Comment - - - -	(optional)		Element ty (for assess No underfle -	pe sing TGD L por heating	.,		eck
Exposed ele Windows/rc Doors Floor Floor (type Floor (type Valls	2) 3)	e 	[m ²] 20.0 0.0 0.0 0.0 0.0 63.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.18	AU [W/K] 24.7 0.0 0.0 0.0 0.0 0.0 11.3	Comment Wall Type	(optional)		Element ty (for assess No underfid - - Wall releva	rpe sing TGD L por heating int for TGD	L fabric coi	mpliance ch	
Exposed ele Windows/rc Doors Floor Floor (type Floor (type Valls Valls (type	2) 3) 2)	e 	[m ²] 20.0 0.0 0.0 0.0 63.0 6.8	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.18 0.23	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6	Comment - - - -	(optional)		Element ty (for assess No underfid - - Wall releva Wall not re	pe sing TGD L por heating int for TGD elevant for TG	L fabric coi GD L fabric	mpliance ch	e check
Exposed ele Windows/rco Doors Floor Floor (type Floor (type Valls Valls (type Valls (type	2) 3) 2) 3) 2) 3)	e 	[m ²] 20.0 0.0 0.0 0.0 0.0 63.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0	Comment Wall Type	(optional)		Element ty (for assess No underfin - - Wall releva Wall not re Wall releva	pe bor heating not for TGD L elevant for TGD not for TGD	L fabric coi GD L fabric L fabric coi	mpliance ch complianc mpliance ch	e check neck
Exposed ele Windows/ro Doors Floor Floor (type Floor (type Valls Valls (type Valls (type Valls (type	2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 4) 4) 4) 4) 4) 4) 4) 4) 4) 4	e 	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0	Comment Wall Type Wall semi	(optional)		Element ty (for assess No underfit - - Wall releva Wall releva Wall releva	pe bing TGD L por heating ant for TGD elevant for TGD ant for TGD ant for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ele Windows/ro Doors Floor Floor (type Valls Valls (type Valls (type Valls (type Valls (type Valls (type	2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 4) 4) 4) 4) 4) 4) 4) 4) 4) 4	e	[m ²] 20.0 0.0 0.0 0.0 63.0 6.8 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0	Comment Wall Type Wall semi	(optional)		Element ty (for assess No underfit - - Wall releva Wall releva Wall releva	pe bing TGD L por heating ant for TGD elevant for TGD ant for TGD ant for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch	e check neck neck
Exposed ele Windows/rco Doors Floor Cloor (type Valls Valls (type Valls (type Valls (type Valls (type Valls (type Valls (type	2) 3) 2) 3) 2) 3) 2) 2) 3) 2) 2) 3) 2) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 3) 2) 2) 3) 2) 2) 3) 2) 2) 3) 2) 2) 2) 2) 2) 2) 2) 2) 2) 2	e	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.00 0.15	AU [W/K] 24.7 0.0 0.0 0.0 0.0 111.3 1.6 0.0 0.0 0.0	Comment Wall Type Wall semi	(optional)		Element ty (for assess No underfit - - Wall releva Wall releva Wall releva Wall releva	pe bing TGD L por heating ant for TGD elevant for TGD ant for TGD ant for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ele Windows/ro Doors Floor (type Floor (type Valls (type Valls (type Valls (type Valls (type Valls (type Roof (type 2	2) 3) 22) 3) 22) 2) 2)	e 	[m ²] 20.0 0.0 0.0 63.0 63.0 6.8 0.0 0.0 0.0 0.0 110.1	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.00	<i>AU</i> [<i>W/K</i>] 24.7 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 16.5	Comment Wall Type Wall semi	(optional)		Element ty (for assess No underfle - - Wall releva Wall releva Wall releva Wall releva Wall releva Flat roof	pe bing TGD L por heating ant for TGD elevant for TGD ant for TGD ant for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed eli Windows/rc/ Doors Floor (type Toor (type Valls (type Valls (type Valls (type Valls (type Valls (type Roof Roof (type 2 Roof (type 2	2) 3) 2 2) 3) 2 2) 2 3) 2 4) 5 5) 2) 3)	e 	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.18 0.23 0.00 0.00 0.00 0.15 0.00	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Comment Wall Type Wall semi Roof -	(optional)		Element ty (for assess No underfld - - Wall releve Wall releve Wall releve Wall releve Flat roof -	pe bing TGD L por heating ant for TGD elevant for TGD ant for TGD ant for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed eli Windows/rc/ Doors Floor Floor (type Floor (type Valls (type Valls (type Valls (type Valls (type Valls (type Coof (type 2 Roof (type 2 Roof (type 2) Roof (type 2)	2) 3) 2 2) 3) 2 2) 3) 4) 5) 2) 3) 4)	e 	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 0.0 110.1 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 16.5 0.0 0.0 0.0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess - - Wall releve Wall releve Wall releve Wall releve Wall releve Flat roof -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Xindows/rc Doors Floor Cloor (type Floor (type Valls (type Valls (type Valls (type Valls (type Xoof (type 2 Roof (type 2 Roof (type 2 Roof (type 5	2) 3) 22) 3) 22) 2) 2) 2) 2) 3) 4) 5)		[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 16.5 0.0 0.0 0.0 0.0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ell Windows/rco Doors Floor Floor (type Floor (type Nalls (type Nalls (type Nalls (type Nalls (type Roof (type 2 Roof (type 2 Roof (type 5 Roof (type 5) Roof (type 5)	2) 3) 2) 3) 2) 3) 2) 2) 3) 4) 5) 50 of element	s [m ²]	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 110.1 0.0 0.0 0.0 0.0 0.0 0.0 0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 16.5 0.0 0.0 0.0 0.0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ell Windows/ro Doors Floor Floor (type Floor (type Nalls (type Nalls (type Nalls (type Nalls (type Roof (type 2 Roof (type 2 Roof (type 2 Roof (type 3 Roof (type 3 Ro	2) 3) 22) 3) 23) 23) 24) 55) 51) 51) 51) 51) 51) 51) 51	s [m²] Jements [W.	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 0.0 110.1 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ell Windows/rco Doors Floor Floor (type Floor (type Nalls (type Nalls (type Nalls (type Roof (type 2 Roof (type 2 Roof (type 4 Roof (type 4) Roof (type 4)	2) 3) 2) 3) 2) 3) 2) 3) 4) 5) 5) 6 element <i>ia</i> plane ei hermal brid	s [m ²] lements [W. dging [W/m	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 0.0 0.0 1199.80	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ell Windows/rco Doors Floor Floor (type Floor (type Nalls (type Nalls (type Nalls (type Roof (type 2 Roof (type 2 Roof (type 4 Roof (type 4) Roof (type 4)	2) 3) 2) 3) 2) 3) 2) 3) 4) 5) 5) 6 element <i>ia</i> plane ei hermal brid	s [m ²] lements [W. dging [W/m	[m ²] 20.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 0.0 0.0 1199.80	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Factor for th Fabric heat	2) 3) 2 2) 3 3) 2 2) 3 3) 4 4) 5 5) 2) 3) 4) 5) of element iria plane el hermal briot t loss [W/H	s [m²] lements [W] lging [W/m	[m ²] 20.0 0.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 110.1 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck
Exposed ell Windows/rc Doors Floor Floor (type Floor (type Valls (type Valls (type Valls (type Valls (type Valls (type Valls (type Roof (type 2 Roof (type 3 Roof (type 4 Roof (type 5 Roof (type 5	2) 3) 2 2) 3 3) 2 2) 3 3) 4 4) 5 5) of element via plane ei hermal bric t loss [W/H	s [m ²] lements [W. dging [W/m	[m ²] 20.0 0.0 0.0 0.0 63.0 6.8 0.0 0.0 0.0 110.1 0.0 0.0 110.1 0.0 0.0	U-value [W/m ² K] 1.24 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	AU [W/K] 24.7 0.0 0.0 0.0 0.0 0.0 0.0 11.3 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	Comment Wall Type Wall semi Roof	(optional)		Element ty (for assess No underfid - - Wall releva Wall releva Wall releva Wall releva Flat roof - -	pe bor heating not for TGD L elevant for TGD not for TGD not for TGD	L fabric coi GD L fabric L fabric coi L fabric coi	mpliance ch complianc mpliance ch mpliance ch	e check neck neck

Water he				Vc-			-						
	distribution			Yes									
Distributio	on loss [kW	h/y]		306									
	storage los	ses?		Yes	1								
lf yes	:												
	Water sto	rage volume [lit	tres]				3.4						
	ls manufa	cturer's declare	ed loss fa	actor availat	ole?		Yes	1					
	If yes	:											
		Manufacturer	and mod	lel name		Heatrae Sa	idia Hi Max	Instant 5/8	ò				
		Manufacturer'	s declare	ed loss fact			0.364						
	lf no	Not applicable			. [
		not applicable											
	End if						-						
	-	ure factor unadj	iuctod (Tr	oble 2)		1							
					otoo)	1							
End if	remperati	ure factor multip		n rable 2 h	ules)								
	a alar ···-t	heatingt	~ ²			N1-	^						
		heating syster	11?			No	0						
lf yes	Not applic	able							10/2				
							S	olar fraction	[%]	0			
		·	,				ļ						
End if													
		kWh/y] (Table 3						360					
		mbi boiler [kW						0					
Electricity	y consumpti	on of electric k	eep-hot f	facility of co	ombi boiler	[kWh/y] (T	able 4f)	0					
Is suppler	mentary ele	ctric immersior	n heating	is used in	summer?			No					
Output fro	om main wa	ter heater [kWi	h/y]			2497							
Output fro	om supplem	entary heater [kWh/y]			0							
Heat gain	ns from wate	r heating syste	em [W]			111							
		ndoors or in gro		ina scheme	?	Yes							
Lighting		J		3									
		hting outlets th	at are lo	w-enerav [-	1	#REF!							
		for lighting, EL		n onorgy [1	270							
i innaan or	longy about	or ngriting, EE	[[((((()))))]]			210							
Internal	aaine												
	nal gains [W	1				500							
Net milem	iai yairis [vv	1				500							
11													
Heatuse				0.470000									
	ea fraction [·			0.472298									
		ory of dwelling		Medium									
Heat use	[ĸWħ/y]	ļ		2081							-	-	
•													
Space he													
	and respon												
		ent (Table 4e),		ppropriate [C]	0							
		rol category (Ta				3							
Heating s	ystem resp	onsiveness cat	egory (Ta	able 4a or 4	ld)	1							
Pumps/fa	ans						Enter	If present,		If present,			
							number	is boiler co	ontrolled	inside			
							present	by room th	nermostat?	dwelling?			
Central he	eating pump	(supplying hot	t water to	o radiators	or underfloo	or system)	0	1	Yes				
		plying oil to bo				, ,	0		-	-			
		if fan assisted f		,			0						
		eating system p				No	Ŭ						
	n efficiency		p.000111 !			140							
		n system withir	n an enve	alona alema	ant? (e.c. i	nderfloor b	eating in g	round floor)	No	0			
							caring in gi			U			
10 11101111	16												
	If yes, U-v nain heating	alue of envelop				eating sche		2	0.15				

			community	nearing st	sheme	- i-	-	<u> </u>					
	y space he												
			dary / supple								0		
Generatior	n efficiency	of seconda	ary / supplem	entary hea	ting syste	em [%] (use	value from	Table 4a or	Appendix E)	0		
	oup heating												
	g based on						Yes						
	n loss facto						1.05						
	f heat from	CHP unit o	r fraction of h	neat recove	rd from po	ower station	0						
Boilers													
	(If the fract	ion of heat	from boilers	is zero, thi	is section	is irrelevant).						
	Heat source	e type	Fuel				Efficiency	Percent of					
							[%]	heat [%]					
	Boiler type	1	mains gas				91	49					
	Boiler type		-				0	0					
	Heat pump		electricity				273	51					
	Solar heat							0					
CHP or w	aste heat fr							-					
			from CHP/w	aste heat i	s zero th	is section is	irrelevant)						
	System ty			doto nodit i	0 2010, 11	-	in olo lant).			2		i	
	If CHP									-			
		Electrical	efficiency of	CHP unit (e a . 0.3) f	rom operatio	nal records	or the CHP	design sp	ecification [0.28		
			ency of CHP								0.20		
		Fuel type	ency of chir	unit (e.g. t	0.0) 110111	mains gas		le crir des	ign specific	auon [-]	0.57		
		Fuertype				mains yas							
Fuel data			Fuel										
		adon (Fuel										
space nea	ating - seco	luary	-				D :	000		D			
							Primary	CO2		Delivered			
	e and energ		cnnologies				energy	factor		energy			
Type 1	Description		-				factor [-]			[kWh/y]			
	Energy pro		aved				2.08	0.409		91			
	Energy co						0.00	0.000		0			
Type 2	Description		-										
	Energy pro		aved				2.08	0.409		231			
	Energy co						0.00	0.000		0			
	Description		-										
Туре 3													
Туре 3	Energy pro	duced or s	aved				0.00	0.000		0			





Penthouse Suite, Apex Business Centre, Blackthorn Road, Sandyford, Dublin 18, Ireland

Phone +353 (0) 1 293 2220 Web www.ethoseng.ie





OHSAS 18001:2007

