MetroLink - Audibility of Alarms in Stations

1. Introduction

The following note is in response to the question raised during Inspectorate Questions on 22nd February 2024 regarding how TII will ensure passengers and staff can hear the alarm, including spoken alarms, in the operational station.

2. Audible Messages in Stations

The Public Address and Voice Alarm (PAVA) system and the fire alarm system are distributed throughout the metro via the Multiservice Communication Network (MSN) system and will have a centralised system topology, to ensure the efficient and reliant broadcasting of audio messages in real time or pre-recorded. The Operational Control Centre (OCC) and Backup Operational Control Centre (BOCC) will be able to broadcast one or more messages simultaneously to all areas, or to specific zones within the metro.
The system shall have PAVA Servers and control equipment located in the OCC and BOCC to provide the required functionalities. The PAVA System shall consist of the following subsystems:

- OCC/BOCC central PAVA (Servers and control equipment)
- **Speakers**
- **Noise sensors**
- **Power amplifiers**
- Local PA (Public Address) Microphones and headsets
- PAVA software

Coder/decoder The PAVA and fire alarm systems will be installed in:
- **Stations**
- Depots/workshops
- Substations
- Tunnels (only PAVA)
- Rolling Stock

Mechanical, Electrical and Plumbing (MEP) systems are designed to ensure they don't interfere with speech intelligibility and performance of the PAVA and fire alarm systems. To this effect, noise levels from equipment will be attenuated to meet the above functions. For example, silencers will be placed within the air stream to achieve the appropriate noise requirements.

3. Basic General Requirements

- All systems to be installed shall comply with:
    - • EN 54-16:2008 *Fire Detection and Fire Alarm Systems - Part 16: Voice Alarm Control And Indicating Equipment for control and signaling*
    - • EN 54-24:2008 *Fire Detection And Fire Alarm Systems -* Part 24: *Components of Voice Alarm Systems - Loudspeakers.*
    - EN 60849:1998 *Sound systems for emergency purposes.*
    - NFPA 130:2023 *Standard for Fixed Guideway Transit and Passenger Rail Systems*, B.3.6. Noise Levels.

- Audio levels shall be simulated to ensure correct intelligibility criteria and audio distribution throughout the stations prior to commencement of the system operation to comply with the standards and criteria set out above.

- Platform Screen Doors (PSD) isolation allowance will be taken account of in terms of mitigating the noise of trains in operation.

- The PAVA system shall be designed to minimise noise disturbance to the surrounding environments in accordance with the EIAR.

4. Locations in Stations

The system shall be able to broadcast the desired message to the following locations:

- SIR (Station Incident Room)
- Emergency exits
- Elevators
- Corridors and lobbies
- Technical rooms
- Each platform

5. System Components

Speakers

Speakers shall broadcast clear and comprehensible messages, the level of which shall be sufficient to be audible and intelligible over ambient noise within the station in line with the standards and guidelines above. Prior to commencement of operation, an acoustic study will determine the location and type of speaker required to comply with the operational requirements for normal and emergency operations, and to ensure suitable controls are in place to prevent any PAVA noise breakout to nearby receptors surrounding the station.

Noise Sensor

To ensure that the audio messages are always intelligible to users, noise sensors are connected to the Audio Matrix to dynamically adjust the audio levels of the amplifiers that serves each PAVA zone.

Power Amplifier

Amplifiers will be rated to ensure the broadcast of messages with the appropriate levels of intelligibility and sound power in stations, the depot, the workshop and in the rolling stock. Prior to commencement of operation, an electro-acoustic study will determine the dimensioning of the amplifiers.

6. Conclusion

Soundscape and audibility of alarms in stations is effective, reliable and has been thoroughly tested in compliance with European and international standards.

MEP systems are designed to ensure they don't interfere with speech intelligibility and performance of the PAVA and fire alarm system, and to prevent any breakout of sound to the receptors surrounding the station.