

The Installation of Emergency Telephone and In-Building Communication Systems

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1. PURPOSE

This guideline has been developed to provide designers and installers with a detailed specification of the Emergency Telephone System (ETS) requirements and the requirement to install an in-building emergency radio communications system (Leaky Cable) to provide effective radio communications to firefighters in and around buildings, including major community infrastructure.

An ETS should be provided where emergency warning systems are proposed without warden intercommunication points or where the emergency services radio communications network is likely to experience difficulties. The provision of an ETS ensures that an appropriate level of redundancy exists for emergency services communications throughout a building where current Fire Rescue Victoria (FRV) or Country Fire Authority (CFA) radios may be ineffective.

Note: FRV's preference is for an in-building radio coverage solution to be considered ahead of the installation of an emergency telephone system.

2. SCOPE

This guideline applies to all building solutions, including major community infrastructure, which are proposed to be constructed that will utilise an ETS or a Leaky Cable Communication System.

3. EMERGENCY TELEPHONE SYSTEMS

The ETS shall be self-contained and independent from all other systems and shall be provided for the exclusive use of fire fighters. It shall operate with a battery back-up and be capable of functioning if all other telephone systems or electrical services fail.

3.1 MONITOR PANEL

A suitable supervisory monitor panel clearly labelled "**Fire Services Telephone System**" shall be provided. The monitor panel shall supervise the battery and give a visible and audible fault indication in the event of the battery voltage falling below the operating voltage of the ETS.

The monitor panel shall:

- be located in either the fire control room or fire control centre, or where a fire control room is not required, adjacent to the fire indicator panel or other position approved by the Fire Rescue Commissioner of FRV or Chief Officer of the CFA
- supervise the loop system and give a separate visible and audible fault indication in the event of loss of continuity or short circuit in the loop
- include two 3-conductor 6.35mm diameter stereo panel sockets
- be designed so that a single short circuit or a single open circuit condition shall not prevent more than one telephone point from not operating.

A list of all installed telephone points and their locations shall be provided adjacent to the ETS monitor panel.

3.2 POWER SUPPLY

The ETS shall be energised from a reliable source of power supply and shall be connected in accordance with the requirements for Fire and Smoke Control Equipment and Lifts as detailed in AS 3000. A separate fuse or circuit breaker shall be clearly and permanently marked:

Emergency Telephone System

The power supply shall have a sufficient rating to provide a continuous output power at least equal to operate the monitor panel and ten telephones.

A visual green "power on" indicator connected to the secondary side of the power supply transformer shall be provided on the monitor panel.

A multi-pole isolating switch appropriately labelled and within the monitor panel enclosure shall be provided to isolate all active and neutral conductors of the power source from the permanently connected power supply and battery charger. Operation of this switch shall not disconnect the battery circuit from the power supply.

The capacity of the battery shall be such that in the event of mains input power failure the battery is capable of maintaining the ETS in normal working (quiescent) condition for at least 24 hours, after which sufficient capacity shall remain to operate ten telephones for 30 minutes. Sealed batteries designed for continuous float charging conditions shall be used. Batteries shall be secured from unauthorised persons by a locked door keyed to a standard 003 code.

3.3 SYSTEM WIRING

The wiring system shall be of the 3-conductor type and be adequately protected against mechanical damage and fire. Insulated and sheathed cable complying with AS 3013 and designated as WS2XW is deemed to comply with this requirement. Wiring of the ETS shall be kept separate and distinct from all other systems except for the lift trailer cables.

A return loop system of wiring shall be used with parallel connections at each telephone point. Each incoming and outgoing conductor of the same potential shall be twisted together and clamped under the one terminal. The loop route shall be wired in separate paths to improve the system integrity. Both the telephone speech wiring and associated battery wiring shall be wired in a return loop to a suitable supervisory monitor panel.

3.4 FIRE TELEPHONE JACK POINTS

Each telephone point shall consist of a 3-conductor 6.35 mm diameter stereo panel socket mounted in a 'pyrotenax' type junction box or other similar metal enclosure.

Each telephone jack point shall be labelled "Fire Telephone" in 15 mm lettering contrasting to the surrounding background. In lift cars, smaller lettering may be used in accordance with current lift standards. Where lettering colour is not important to the aesthetics of the building, white letters on red background is preferred.

Telephone jack points shall be installed in locations to avoid direct sound from emergency warning speakers or noisy plant/equipment.

Telephone jack points shall be located in the following positions:

- adjacent to the Fire Indicator Panel (FIP) and/or mimic panel
- adjacent to the Emergency Warning and Intercommunication System (if FIP is some distance away)
- outside pump rooms and sprinkler valve rooms (where sprinkler and hydrant pumps are remote from each other, one point is to be located outside each room)
- booster connections
- lift lobby of each level
- each major plant room where a firefighter may need to be in attendance
- roof level
- points nominated by the Victorian Lift Regulations
- any additional locations as reasonably determined by the Commissioner of Fire Rescue Victoria or the Chief Officer of the CFA.

3.5 FIRE TELEPHONES

The ETS shall be provided with ten portable plug-in telephone sets placed in a locked cabinet adjacent to the FIP or other position approved by the Commissioner of Fire Rescue Victoria or the Chief Officer of the CFA. The locking system shall use a standard 003 code key.

All telephone handsets shall be fitted with a 6.3 mm diameter ring-tip-sleeve stereo jack plugs.

The portable telephones shall be housed in a metal carry case with shoulder strap and labelled "Fire Telephone" in 15 mm lettering.

3.6 MAINTENANCE AND TESTING

The owner shall be responsible for the regular maintenance / testing of the Emergency Telephone System, in accordance with the frequency and requirements of AS 1851- 2005 Section 10.

Tests and associated maintenance shall be recorded and available on site (either in log book or electronic format) and form part of the Essential Safety Measures Maintenance regime for the building and be referenced as a condition on the building's Occupancy Permit or Certificate of Final Inspection.

4. IN-BUILDING EMERGENCY RADIO COVERAGE

Firefighters and first responders use portable radios as a critical communication tool to ensure effective fireground command and control, for personnel accountability, and to improve firefighter safety when operating within buildings during a fire or other emergency.

FRV located in Metropolitan Melbourne uses the Metropolitan Mobile Radio (MMR) Network for its emergency radio communications. **FRV and CFA in regional areas use the Regional Mobile Radio (RMR) Network.**

Given the importance of portable radios to firefighter safety and ultimately occupant safety, it is essential for these radios to operate reliably anywhere within a building or major community infrastructure.

Modern construction techniques mean that communication for firefighters may not only be impaired in high rise buildings or tunnels but in smaller commercial, residential or retail developments.

This guideline provides the technical requirements of an in-building two-frequency radio repeater system, known as a leaky cable system that enhances the efficiency of hand held portable radios in buildings and major community infrastructure.

Designers should seek advice from FRV Fire Safety Department whether a leaky cable system may be required in a building or major community infrastructure, regardless of whether a report and consent is required from the FRV Commissioner or the CFA Chief Officer.

The following are examples where an in-building emergency radio communications system may be required:

- buildings with basements
- alterations or additions to existing buildings where fire control rooms or fire control centres located in basements
- shopping centres with mall areas
- retail, commercial or residential buildings over two storeys in height
- buildings with many rooms resulting in many walls that the radio signal needs to penetrate
- buildings incorporating glazing with metallic elements
- extensions or alterations to existing buildings may also require the installation of a leaky cable to the entire building
- subterranean rail terminals and platforms
- other major community infrastructures such as road tunnels.

The in-building coverage capability must be provided via a Bi Directional Amplifier (BDA) system connected to appropriate in-building leaky feeder coaxial cables, and/or distributed internal antennas.

4.1 EMERGENCY SERVICES IN-BUILDING RADIO COVERAGE (FRV-METROPOLITAN MELBOURNE)

4.1.1 DESIGN

The owner/developer must install an antenna system that is appropriate to the design of the building and the nature of its construction, to provide coverage in accordance with the requirements, as stated in Section 4.2.

FRV recommends that a suitably qualified communications consultant be engaged to produce a design for the in-building coverage system.

The BDA head end equipment is to be sourced from the FRV contractor via consultation with FRV.

The design will need to be produced in consultation with FRV, who will coordinate the involvement of the FRV contractor as required.

4.1.2 IMPLEMENTATION AND TESTING

The in-building coverage must be tested to demonstrate that it provides the required levels of performance suitable for operation, in conjunction with the MMR network. FRV will coordinate the involvement of the MMR contractor's participation in the in-building coverage tests as required.

4.1.3 SHARED USE OF THE INTERNAL ANTENNA SYSTEM

The internal antenna/distribution system may be shared with other communications services within the building. This may be advantageous in terms of cost saving, and/or providing additional services to the occupants of the building.

Appropriate filtering and multi-coupling would need to be provided and incorporated in the design of the internal distribution system.

4.1.4 INTERNAL DISTRIBUTION SYSTEM

The internal distribution system shall provide the following:

- minimum signal strength of -90 dBm
- minimum coverage area of 95% of the area of each floor of the building
- coverage reliability of 95%
- delivered audio quality of DAQ4
- signal to noise ratio of better than 20 dB(A).

The Metropolitan Mobile Radio Network (the MMR Network) providing emergency services' radio coverage to the metropolitan and surrounding area is a digital trunked APCO P25 system operating in the UHF radio BAND between 403 to 470 MHz. This network is subject to change without notice and it is the responsibility of the developer to determine the technical specifications of the emergency services' network prior to commencement of building works. In other parts of Victoria outside of the coverage area of the MMR Network, radio coverage is provided via the Regional Mobile Radio Network (the RMR Network) which operates between 160-180 MHz in the VHF radio band.

4.2 EMERGENCY SERVICES IN-BUILDING RADIO COVERAGE (FRV/CFA REGIONAL AREAS)

Systems must be installed to the CFA specification titled "FUNCTIONAL REQUIREMENTS FOR IN-BUILDING EMERGENCY RADIO COMMUNICATIONS SYSTEM" and the internal distribution shall provide the following:

- minimum signal strength of -85 dBm
- minimum coverage area of 95% of the area of each floor of the building
- coverage reliability of 95%
- delivered audio quality of DAQ4
- signal to noise ratio of better than 20 dB(A).

The State of Victoria, on behalf of FRV, shall be the radio licence holder for this repeater service and shall be responsible for obtaining the required licence. FRV will arrange the frequencies with their Victorian government representatives and appropriate providers. The repeater shall have a label attached in accordance with the requirements of the Australian Communications and Media Authority (ACMA) to indicate the approved operating frequencies and class of emission.

4.2.1 IMPLEMENTATION AND TESTING

A System Commissioning Report detailing radio coverage and a statement of compliance to this specification is required to be submitted to FRV and or CFA. FRV or CFA may organise on site testing by the responding fire station personnel to test the adequacy of the installed system.

In addition, the developer shall make space available of typically two racks with front and rear access, within a secure equipment room for the installation of emergency services equipment. These racks will have access to essential 240 volt power via a dedicated and exclusive circuit. In the event that GSM mobile telephone coverage is unavailable within the secure equipment room, the developer shall ensure that there is access to a telephone line for the remote monitoring of the emergency services' equipment.

5. FURTHER INFORMATION

Further information regarding the installation of the leaky cable system can be obtained from the Manager of the Building Codes and Audit Department on (03) 9665 4478.

Note: *This is a controlled document and may only be modified by authorised FRV personnel.*