NSW GOVERNMENT

TS 00008.2:1.0

Standard

Fire Life Safety

Part 2: Stations

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1.0	31/08/2022	First issue.

Preface

This document is the first issue as TS 00008.2 *Fire Life Safety – Part 2: Stations*.

This document forms part of TS 00008 suite of documents related to fire life safety.

This document sets the minimum fire life safety requirements for train stations and metro stations along with associated interchanges that service these facilities.

This document should be read in conjunction with TS00008.1.

The minimum fire life safety requirements for stations in this document are aligned with current industry good practice and provides guidance that drives greater consistency in the assessment and the management of fire safety risks in stations.

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1 Scope

This document specifies the minimum fire life safety requirements for above ground and underground train stations and metro stations (referred to as stations in this document) across NSW.

This document covers the following:

- specific principles applicable to fire safety system selection and design in stations
- minimum requirements for selected fire safety measures to protect occupants and allow for their safe evacuation in the event of an emergency
- minimum design allowances to allow for potential future changes and growth in patronage.

2 Application

This document applies to stations across NSW.

This document applies to new stations, and existing stations where fire systems are upgraded or modified.

This document should be read in conjunction with TS 00008.1.

This document applies to TAOs and TfNSW personnel involved in the assessment of fire safety risk and the development of performance-based asset fire life safety strategies and designs.

This document is intended for use by fire safety engineers and fire protection engineers with respect to specific design requirements for station fire systems.

This document can also apply to asset managers, project managers, rail operators and other disciplines as it provides guidance in understanding the fire safety risk in early feasibility stages and applying fire safety towards whole-of-life of the asset.

3 Referenced documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

Australian Standards

AS 1428.2 *Design for access and mobility – Part 2: Enhanced and additional requirements – Buildings and facilities*

AS 1530.4:2014 *Methods for fire tests on building materials, components and structures – Part 4: Fire resistance tests for elements of construction*

AS 1670.1 *Fire detection, warning, control and intercom systems – System design, installation, and commissioning – Part 1: Fire*

AS 1670.4 *Fire detection, warning, control and intercom systems – System design, installation, and commissioning – Part 4: Emergency warning and intercom systems*

AS 2118.1 *Automatic fire sprinkler systems – Part 1: General systems*

AS 2419.1 *Fire hydrant installations – Part 1: System design, installation, and commissioning*

AS 2441 *Installation of fire hose reels*

AS 2444 *Portable fire extinguishers and fire blankets – Selection and location*

AS 3745 *Planning for emergencies in facilities*

AS 3772 *Pre-engineered fire protection systems for cooking equipment*

AS 4214 *Gaseous fire-extinguishing systems*

AS 5100.2 *Bridge design – Part 2: Design loads*

AS/NZS 2293.1 *Emergency lighting and exit signs for buildings – Part 1: System design, installation, and operation*

AS/NZS 2293.3 *Emergency lighting and exit signs for buildings – Part 3: Emergency luminaires and exit signs*

AS/NZS 60950.1 *Information technology equipment – Safety – Part 1: General requirements (IEC 60950-1, Ed. 2.2 (2013), MOD)*

Transport for NSW standards

T HR SS 80003 ST *Infrastructure Emergency Lighting*

T MU MD 20001 ST *System Safety Standard for New or Altered Assets*

T MU MD 20002 ST *Risk Criteria for Use by Organisations Providing Engineering Services*

T MU MD 20003 GU *Quantified Safety Risk Assessment*

T MU SY 10001 ST *Public Transport Closed Circuit Television (CCTV) Functional Requirements Standard* (This document is not publicly available; to obtain access email standards@transport.nsw.gov.au)

T MU SY 20001 ST *Surface Transport Fixed Infrastructure Physical Security Standard* (This document is not publicly available; to obtain access email standards@transport.nsw.gov.au)

T MU TE 61005 ST *Customer Information Systems for Public Transport Buildings and Conveyances*

TS 00008.1 *Fire Life Safety – Part 1: Principles*

TS 03954 *Low Voltage Electrical Installations*

TS 04951.2 *Functional Spaces – Part 2: Stations*

TS 04955.2 *Services, Systems and Equipment – Part 2: Stations*

TS 04955.3 *Services, Systems and Equipment – Part 3: Lifts*

TS 04955.4 *Services, Systems and Equipment – Part 4: Escalators and Moving Walks*

Legislation

Rail Safety National Law (NSW)

Transport Administration Act (NSW)

Other referenced documents

EFNARC *Specification and Guidelines for Testing of Passive Fire Protection for Concrete Tunnels Linings*

Fire and Rescue NSW, Fire safety guideline, *Emergency services information package and tactical fire plans*

NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems

Sydney Trains, *Guide for Emergency Services access to the Rail Corridor*

The Australian Building Codes Board, *National Construction Code, Volume 1*

4 Terms, definitions and abbreviations

The following terms, definitions and abbreviations apply in this document:

AMB Asset Management Branch

asset steward the entity given the responsibility by an asset custodian to oversee part of the life cycle process for an asset

CCTV closed circuit television

Crown certifier an appropriately competent person who:

a. acts on behalf of the Crown to confirm Building Code of Australia compliance of building works under Clause 6.28 of the Environmental Planning and Assessment Act 1979

b. has been endorsed (approved) by the TAO that holds authorisation to issue Crown Certificates.

DTS deemed-to-satisfy

ECS environment control system

ESIP emergency services information package

EWIS emergency warning intercom system

FCR fire control room

FDCIE fire detection control and indicating equipment

FREIK first responder emergency information kits

metro station a place to get on and off metro services

ONRSR Office of the National Rail Safety Regulator

performance solution means a method of complying with the performance requirements other than by a deemed-to-satisfy solution (Source: NCC, Volume 1, Sch 3 Definitions © Commonwealth of Australia and the States and Territories 2020, published by the Australian Building Codes Board)

PIDs passenger information displays

refuge a place of safety within a building, structure or workplace which is not under threat from an emergency and from which people are able to disperse after escaping the effect of an emergency to a road or open space

SCR station control room

SECP secondary evacuation control panel

SFAIRP so far as is reasonably practicable

SIMP station incident management plan

SMO station mangers office

station includes train station and metro station

OSD over station development

OTE over track exhaust

PSD power shutdown device

TAO Technically Assured Organisation

TfNSW Transport for NSW

VAD visual alarm device

WIP warden intercom point

train station a place to get on and off trains

5 Application of NCC to stations

The Crown certifier is responsible for the interpretation of NCC classification of a station, and its ancillary structures associated with the station environment. When works do not warrant the need for a Crown certifier, the classification of the station shall remain in accordance with the original classification of the station (Class 9b). Works shall be carried out in compliance with these classifications and nominated standards.

Interchanges that interconnect other modes of transport to stations shall have their systems designed in accordance with their applicable building classification. The impacts of fires within these structures shall be independently assessed through a risk analysis report with required measures adopted in SFAIRP.

6 Station principles

6.1 General

The principles in TS 00008.1 shall apply to stations and all interchanges that are associated with the station. In addition, the principles in Section 6.2 to Section 6.8 shall apply.

The *Rail Safety National Law (NSW)* and the *Transport Administration Act* contains safety obligations relevant to the management of safety risks in a station environment.

The design of all fire systems in a station shall take into account the whole-of-life of the asset. Proposed design solutions shall incorporate the access requirements for repair and maintenance of critical fire systems. The key control equipment for fire systems shall be installed in locations that enable repair and ongoing maintenance activities to be carried out without the need for a possession or other activity that would affect normal operations in a station. Where this cannot be achieved, alternate design approaches shall be identified, evaluated and consulted with the operator and maintainer for formal acceptance and final handover. All performance solutions provided to address noncompliance with NCC DTS requirements shall assess the failure of fire systems on other elements of the station structure. These failures shall minimise impacts, SFAIRP.

6.2 Structural fire safety measures requirements

Requirements for construction of all new station buildings and modifications or alterations to existing station buildings are contained in the NCC.

Building construction materials shall be non-combustible, non-toxic and have low smoke production when subjected to fire, to allow for the safe evacuation of all patrons and staff. These shall be demonstrated through a testing certification issued by an accredited laboratory.

The type of fire-resisting construction may be determined by conducting a fire analysis and providing a performance solution.

The fire rating of existing structures shall not be degraded as a result of modifications, alterations, or extensions except where a performance solution can demonstrate that the lower fire rating is justified and is accompanied with the following:

- certification by an independent certifier
- endorsement by the asset steward and AMB

- documented analysis of the impacts on people, property, and processes as a result of operational downtime and financial changes
- evidence of compliance with all relevant legislation, standards, and codes
- demonstrable proof that risk is managed SFAIRP.

Where any TfNSW standard specifies a higher structural requirement than that set out in the NCC, then the higher of the two requirements shall take precedence. However, where it can be demonstrated that the lesser of the two structural measures can be implemented with no detriment to future transport assets and operations and the required assurance is provided, then the lower structural requirements may be used.

6.3 Egress analysis

6.3.1 General

The NCC contains requirements for safe egress. All station spaces shall be designed to have paths of travel to enable safe egress. This can be achieved by either satisfying the NCC DTS provisions or through performance-based fire engineering.

Where it is demonstrated through reports and design process that it is impractical for the station design to comply with the DTS provisions of the NCC due to physical limitations, the *NFPA 130 – Standard for Fixed Guideway Transit and Passenger Rail Systems* shall be referenced in the development of a performance-based fire engineering solution to address noncompliances to the DTS requirements of the NCC.

Compliance with the requirements of NFPA 130, or demonstration of equivalence with the requirements of NFPA 130 does not, by itself, demonstrate that the risk to life is reduced SFAIRP.

Refer to TS 04951.2 for further requirements around designing of egress in a station environment.

6.3.2 Populations for analysis

The determination of occupant numbers for the purposes of egress analysis shall take into account the expected population on the trains at capacity and public on the platform waiting to board the train. The TAO shall consult with TfNSW (the model planning team or equivalent) to determine the type of analysis or modelling that is appropriate. In addition to the data provided by TfNSW, the analysis shall be conducted in accordance with the following criteria:

- maximum patronage levels forecast to occur at any time during a future period of not less than 30 years

- train frequency forecast to occur at any time during a future period of not less than 30 years
- assessment of train populations in combination with station populations for:
    - AM peak
    - PM peak
    - off-peak (all other times outside of AM peak and PM peak)
    - special events.

If only the AM peak data is available, then the population analysis shall take the following into account:

- the PM peak population shall be assumed to be not less than 92% of the AM peak
- off-peak population for analysis shall be assumed to be not less than 25% of the AM peak
- PM peak station entry and exit forecasts shall be assumed to be the reverse of AM peak
- apply a peak-on-peak factor of not less than 1.2 to the peak hour station entry and interchange patronage forecasts

  For example, the population is calculated as follows:

  AM peak data:

  Station entries: 5000/hr

  Station exits: 10000/hr

  20 trains per hour

  AM peak detraining load for FLS = Peak on peak factor x No. of exits / trains per hour

  = 1.2 x 10000 / 20

  = 600 people

  PM peak detraining load for FLS = PM peak multiplier x peak on peak factor x AM peak number of entries / trains per hour

  = 0.92 x 1.2 x 5,000 / 20

  = 276 people
- include not less than 5% of occupants to have a mobility impairment that prevents them from using stairs or a stopped escalator for self-evacuation
- include not less than 0.03% of occupants to be wheelchair bound.

The train capacity shall be based on the expected rolling stock capacity that services the station. This data can be obtained from the operator and maintainer. For stations servicing

venues associated with exhibition centres and sporting facilities or other facilities where large public gatherings are observed, the peak population numbers shall take into account the patronage for these events which can be more than the regular patronage observed during the peak hours.

6.3.3 Shared egress paths

All egress paths from a station shall be exclusively used as that station's egress such that they are not shared with any other developments over, connected to or surrounding that station. If a common egress path cannot be avoided, the TAO shall have provisions in place to enable the operator and maintainer to be able to provide an annual assurance that the egress path is still viable for use. This shall be validated annually by the operator and maintainer and available for review and interrogation through a report format. Where population numbers change, a new assessment shall be conducted by a certifier and fire safety engineer about the viability of this egress passage. Alternative egress routes shall be provided where the assessment determines that the egress passage is not viable, or a performance solution report shall be prepared to address the noncompliances.

6.4 Other systems

Station design elements can be utilised to reduce fire safety risks and shall be documented in a performance solution. Where this is the case the performance solution report shall nominate the required testing and certification intervals to ensure solutions are still compliant to original design.

Some of the systems that can contribute to fire safety in performance solutions include:

- non-fire exits and walkways
- escalators and non-fire lifts
- help points
- mobile phone systems
- operator radio
- customer information systems
- hazardous energy system isolation such as high voltage, low voltage, solar
- drainage
- ECS
- CCTV
- gate lines and fare gates

- running capability of trains.

6.5 Controls on design elements

Some elements in stations create a fire hazard, such as providing an ignition source, fire load, or posing a potential obstruction to evacuation. All reasonable care shall be taken in the design phase to ensure that these elements do not pose a risk to any occupants accessing emergency egress stairs. These elements include, but are not limited to, the following:

- cladding, linings, finishes and materials in stations and on trains
- fixed furnishings
- digital and illuminated advertising
- platform screen doors (if present)
- general storage
- rubbish bins and rubbish storage
- vending machines
- public artwork
- retail furnishings and shop fittings
- kiosks and pop-up vending machines
- cabling and conduit
- security shutters
- open voids between levels.

6.6 Operations

Fire safety measures within stations shall demonstrate that the following operational and management controls have been taken into account through a formal consultation process:

- emergency organisation in accordance with AS 3745
- incident management plans and procedures (including communication protocols)
- management of train movements
- FREIK (see Section 8.8 for specific requirements for underground stations)
- staff training.

6.7 Hazard identification and scenario generation

Refer to TS 00008.1 for information on hazard identification and scenario generation. Fire systems design that are in accordance with a performance solution to address noncompliances to the NCC shall apply the minimum scenarios specified in Section 6.7.1.

6.7.1 Minimum scenarios

The performance solution shall assess train fire scenarios for all types of rolling stock that operates in a station. If there are any changes to the type of rolling stock using the station, the performance solution shall be revisited and updated accordingly, in case of any changes to the type of rolling stock.

Train fire scenarios shall include the following emergency mode scenarios as a minimum. Additional scenarios shall apply to sites based on specific constraints:

- when assessing rolling stock, a fire starting on the train while in motion and the train continuing to the next station
- when assessing underground stations:
    - a fire starting on the train while in motion and the train continuing to the station from either direction and stopping wholly within the station
    - a fire starting on the train while in motion and the train stopping partly in the station and partly within the tunnel if attached to an underground station on either side of the station
    - a fire on a train stopping in the tunnel on either side of the station, requiring passengers to detrain and evacuate through the station.

The performance solution shall address train fires in the following locations:

- a train stopped directly under an overhead structure or footbridge affecting the main exit stairs
- fire in the equipment on the roof of a train that cascades up
- fire beneath the floor of a train that cascades up the train into the passenger compartment
- fire within the passenger area of a train, including fire within the train car immediately adjacent to each exit from the platform.

When assessing underground stations, the performance solution shall, at a minimum, assess the most onerous fire scenarios within the station including fire on or in:

- underground platforms
- any surface platforms within the underground station or an above ground station connected to it

- concourses
- passenger tunnels and passages that are part of the station used for passenger circulation and interchange assuming failure of ventilation systems, if present
- Where these systems are not present, then a documented analysis demonstrating that any fires in these areas will not impact normal station operations shall be provided.
- station entrances, including the road corridor and light rail corridor and associated interchanges
- escalator pits
- back-of-house areas including:
    - any underfloor, sub-floor or mezzanine spaces
    - any unused underground platforms and trackways
    - plant rooms and operational rooms that do not have public access
    - any retail tenancies back of house storage that is not public facing and is connected to public access areas.

The asset fire life safety strategy shall take into account both train and station fires that are located in the worst possible position with regard to smoke conditions produced, and impact on egress, noting that these may be different locations. Where fire conditions render an exit unusable, that exit shall be modelled as a blocked exit, forcing occupants to seek an alternative exit.

Arson fires shall be assessed both on trains and in the station.

In some scenarios, non-incident trains cannot be stopped from entering a station and detraining passengers, particularly in existing underground stations. The egress analysis shall incorporate a reasonable allowance for additional trains, which may be different for different stations.

6.7.2 Risk criteria

For all scenarios, including extreme event scenarios, the asset fire life safety system design shall demonstrate the following:

- all reasonably practicable fire safety measures have been adopted to minimise the fire safety risk
- fire safety risk has been reduced to at least a tolerable level when assessed against the risk matrix defined in T MU MD 20002 ST.

6.8 Fire risk assessment criteria

6.8.1 Applicable areas

The fire safety risk requirements in this document apply to the following:

- stations and associated operations
- areas used as an emergency egress path from, and assembly areas for, stations and rolling stock
- areas used as an emergency access path to stations and rolling stock
- areas outside of TfNSW owned stations and tunnels, where a fire can create a hazard, such as the spread of heat or smoke, to the station
- areas outside stations and tunnels where fire safety measures are shared or integrated with those for a station or tunnel.

All fire safety hazards shall be recorded in a hazard log in accordance with T MU MD 20001 ST.

6.8.2 Parameters for consideration

The asset fire life safety strategy for stations shall take into account all reasonable fire safety measures that have the potential to reduce the fire safety risk.

Where a fire safety measure is determined as not reasonably practicable to be adopted, then the asset fire life safety strategy shall include a justification for not being implemented. The determination shall be based on the published guidance from ONRSR and TfNSW, which takes into account the following:

- likelihood of the hazard
- consequence of the hazard
- knowledge about the hazard or risk and ways of eliminating or minimising the risk
- availability and suitability of ways to eliminate or minimise the risk
- cost, in the context of the safety benefit.

6.8.3 Balance of benefits

A fire safety measure may be discounted as not reasonably practicable if the fire safety benefit is outweighed by the overall safety benefit when considered in the context of all safety risks as part of an integrated safety argument in accordance with T MU MD 20001 ST.

If cost is used as the basis for discounting a control, then this shall be relative to the potential safety benefit. This cost-benefit analysis does not always need to be quantified where the outcome is overwhelmingly obvious. Records shall be kept of all determinations that a control

has been discounted, with reasons, and be available for review. Costs shall include whole-of-life costs.

A quantitative cost-benefit analysis is insufficient as the sole justification that a design is safe with regard to fire risk. Fire safety shall take into account the following and find a reasonable balance of benefits:

- the duty of care of all stakeholders
- community expectations
- legislated requirements
- political risk appetite
- quantitative risk assessment
- local and international precedence
- the desires of key stakeholders.

Each step of the fire risk assessment shall be documented in a fire safety hazard log for audit purpose and provide a transparent record of the assumptions made and fire safety measures that have been discounted.

Estimations of the overall fire safety risk for an asset shall use the risk criteria and matrix described in T MU MD 20002 ST.

T MU MD 20003 GU provides information on carrying out quality safety risk analysis.

7 Fire safety systems in above-ground stations

The fire safety systems explained in Section 7.1 to Section 7.5 apply to all above-ground stations that consist of platforms.

7.1 Fire extinguishers

Fire extinguishers shall be provided within any staff offices, electrical switch room and plant rooms. The selection of type of extinguishers and their location shall be in accordance with AS 2444. Extinguishers shall be positioned to enable easy access for emergency use and maintenance by trained staff.

NCC contains requirements for the provision of fire extinguishers. Fire extinguishers can be removed from public areas on platforms to deter vandalism and prevent misuse. A performance solution shall be provided based for the removal, based on a risk analysis in consultation with the stakeholders.

7.2 Fire hydrant systems

Fire hydrant systems in stations where mandated by the NCC shall be in accordance with AS 2419 requirements. Location of hydrants shall be discussed with the fire brigade and agreed upon. Where there is a proposal to use street hydrants for coverage in lieu of a hydrant system, compliance shall be provided for required pressures, flows and coverage in accordance with AS 2419 requirements and signed off by the fire brigade.

In addition, all fire services pump rooms shall have a compliant key lock in accordance with the operator and maintainer facilities management requirements.

Performance solutions shall be provided for removal of fire hydrants from platforms only when written consent is obtained from the fire brigade and a certifier.

7.3 Fire hose reels

Where fire hose reel systems in stations are mandated by the NCC, the fire hose reel systems shall be provided in accordance with AS 2441.

The placement of fire hose reels shall prevent accidental spray from the hose reels interfering with the live overhead lines. Fire hose reels shall be contained in cabinets and provided with means to deter misuse and vandalism. Cabinets shall have plastic security seals attached.

Performance solutions shall be required for the removal of hose reels within a new or existing platform if the placement of hose reels does not allow for the following:

- adequate coverage of the platform
- possible interference with live overhead lines
- potential obstruction or trip hazard impacting public egress caused by the drawn-out hose.

7.4 Automatic suppression

Automatic suppression systems cover sprinkler suppression, gaseous suppression and cooking equipment suppression (commercial cooking areas).

7.4.1 Sprinkler suppression systems

Automatic sprinkler suppression systems shall not be installed in above-ground stations unless they form part of another building, interchange or structure. This shall be determined based on site location for new sites and in consultation with the Crown certifier and asset steward.

In addition, all fire services pump rooms shall have a compliant key lock in accordance with the operator and maintainer facilities management requirements.

7.4.2 Gaseous suppression systems

Gaseous suppression systems are an alternate to automatic sprinkler systems and are used in areas of sensitive electronics and communication equipment. Use of gaseous suppression systems in lieu of required sprinkler systems shall be documented in the fire engineering report. Agent containers and associated control equipment shall be placed to addresses the following:

- ease of servicing
- non-impedance of the public space
- minimise risks posed to essential services
- minimise risks posed by vandalism
- minimise risks posed by unauthorised access and theft.

7.4.3 Cooking equipment suppression in stations

Station concourses may include retail tenancies that include commercial cooking facilities, where specialised pre-engineered suppression systems are warranted. The design of cooking equipment suppression systems shall be in accordance with AS 3772.

7.5 Automatic detection and emergency warning systems

The design of fire detection systems in stations shall be in accordance with AS 1670.1 and AS 1670.4 where applicable for the emergency warning systems.

The following additional fire safety requirements apply to smoke detection systems in above-ground stations that shall be addressed within a performance solution:

- All detectors and devices monitored and controlled shall have evidence of suitability to confirm compatibility with the fire detection control and indicating equipment.
- Smoke detection in canopy areas shall be reviewed for effectiveness as to whether they can be removed based on analysis through a performance solution.
- Location of alarm mimic panels at station entrances shall be evaluated for its effectiveness through a performance solution as to whether it is required. This is because, a majority of the stations are permanently staffed and attending fire brigade will be guided by station staff who are familiar with the layout of the station.

8 Fire safety systems in underground stations

The fire safety systems explained in Section 8.1 to Section 8.8 apply to all below-ground stations that consist of platforms.

8.1 Automatic suppression

Automatic suppression systems cover sprinkler suppression and gaseous suppression.

8.1.1 Sprinkler suppression systems

Sprinkler suppression systems in underground stations, including pre-action systems, are effective in minimising fire size and spread, and reducing the volume and temperature of smoke produced by a fire. Sprinkler suppression systems shall be evaluated as an option when designing fire services.

All fire services pump rooms shall have a compliant key lock in accordance with the facilities management requirements of the operator and maintainer.

Water mist and specialised systems such as early suppression fast response, and wall-wetting systems are not covered in this document as they are not typically appropriate for train and metro stations.

The design of sprinkler suppression systems shall be in accordance with AS 2118.1.

The provision of sprinkler systems shall take into account the proximity of water spray to high voltage systems in accordance with defined safe approach distances. This reduces the risk of sprinkler spray adversely impacting high voltage equipment by either creating an electrocution hazard or causing water damage.

The following shall apply to sprinkler suppression systems in underground stations, for further fire safety risk reduction:

- Sprinkler protection shall not be provided in trackways. They shall be addressed by the performance solution for their removal.
- Sprinkler protection shall not be provided in substations and high voltage equipment rooms as it can introduce an electrocution hazard. Alternative means of protection through a performance solution should be considered in such scenarios.
- If the activation of sprinkler suppression in station operations areas that contain electrical or communications equipment can cause additional damage and operational interruption, an alternate suppression medium through a performance solution may be considered.
- Each level within the underground station shall be separated into sprinkler zones in accordance with AS 2118.1. Each sprinkler zone shall be monitored by the station FDCIE and be able to be independently isolated. Isolation valves shall be monitored and accessible while standing at floor level to reduce the risk of full system isolation.

If an underground station contains areas that are not enclosed and naturally ventilated, or open air, such as above-ground platforms, sprinkler suppression systems may be omitted from these areas, subject to stakeholder agreement and documentation through a performance solution.

If the risk of total loss of all equipment due to a fire in a fire compartment within the station operations areas is accepted by the operator and maintainer, sprinkler suppression systems may be omitted from that fire compartment. The sprinkler suppression systems may be omitted subject to stakeholder agreement and performance solutions that document required alternative means of fire protection.

8.1.2 Gaseous suppression systems

Gaseous suppression systems are an alternative to water-based sprinkler systems and include the following:

- total room flooding systems
- local application such as in-cabinet protection.

The design of gaseous suppression systems shall be in accordance with AS 4214.

Back-of-house rooms protected with gaseous suppression systems shall be provided with double-knock activation system. The suppression system shall typically activate based on activation of two independent detection systems present in the room. This reduces the risk of unwanted discharge.

Agent containers storage should be located such that replacement can be undertaken from on-grade access or by lifts and away from public access. This is to reduce safety in design risks and to avoid carrying large gas bottles up or down stairs.

8.2 Detection systems

8.2.1 Automatic detection

All fire detection systems where required by NCC shall be addressable type, providing the location of individual activated detectors as an input to the FDCIE. This will enable the fire brigade to quickly identify the location of fire.

An alarm mimic panel providing alarm information for all station areas shall be provided at a station entrance as agreed with the fire brigade. The alarm mimic panel shall be in a weatherproof location or enclosure, on the unpaid side of the fare barriers and in a location readily accessible to attending fire brigade to support fire brigade intervention, particularly if a station has multiple entries.

If an underground station contains areas that are not enclosed and naturally ventilated, or open air, such as above-ground platforms, automatic fire detection may be omitted from these areas, subject to stakeholder agreement and documented as a performance solution.

8.2.2 Smoke detection

The following fire safety requirements apply to smoke detection systems in addition to the requirements set out in the NCC:

- Where fire shutters are provided, detection spacing shall be in accordance with the performance solution. Signalling and programming of the detection shall be in line with the performance solution's operational specification of the shutter.
- To address the safety-in-design maintenance risk and avoid the likelihood of false alarms, point type smoke detection shall not be used over the trackway.

The following shall be evaluated for smoke detection systems in underground stations as options:

- Double knock smoke detection systems or thermal detection systems shall be evaluated for effectiveness inside commercial kitchen retail tenancies and areas prone to dust build up to reduce the risk of false alarms. Locations of detectors shall be chosen based on minimising the risk of false alarms.
- Areas where maintenance testing of point type smoke detection devices would require working at height (such as access from a ladder, elevated work platform, scissor-lift and so on) shall be subject to a safety-in-design risk assessment.
- Detectors located near areas that are subject to dust shall be further evaluated for provision of measures to reduce false alarms and noted within the design documentation.

8.2.3 Heat detection

The following fire safety measure requirements apply to heat detection systems and are in addition to the requirements set out in the NCC:

- Heat detectors typically have a slower response time than smoke detectors. Heat detectors shall only be used as an alternative to smoke detection where there is a risk of a smoke detector going off because of a false alarm (for example, plant rooms).
- Rate-of-rise heat detectors with a temperature rating appropriate to the application shall be used where heat detection is adopted. Rate-of-rise heat detectors provide the timely response to real fires.
- Sprinklers shall not be used as an alternative to heat detection as they are not sufficiently addressable and have longer activation times.

8.2.4 Manual call points

Manual call points shall be installed in accordance with AS 1670.1 and AS 1670.4.

To reduce the risk of false activation that can lead to unnecessary evacuations, any red or white MCPs located in areas accessible to the public should be provided with means to deter misuse.

8.3 Hydrants and fire hose reels

8.3.1 Hydrants

Fire Hydrant systems in stations where mandated by the NCC shall be in accordance with AS 2419 requirements. In addition, all fire services pump rooms shall have a compliant key lock in accordance with the facilities management requirements of the operator and maintainer. The following additional fire safety requirements shall apply to the fire hydrant system within underground stations:

- The station hydrant system at each station shall be provided with its own booster assembly that is independent of, but co-located with, booster assemblies for station sprinkler system.

  This allows different systems to be boosted separately to pressures appropriate to that system.

- Each booster assembly shall be provided with clear identification signage to differentiate each system to reduce the risk of confusion between the systems.

- To fight a train fire at the underground station, the underground station hydrant system shall be designed for not less than three hydrant outlets to flow simultaneously, in accordance with AS 2419.1.

- To enable the fire brigade to pre-charge the hydrant hose in a safe location, hydrant outlets shall be provided outside each station entrance and in the fire stair near the access doors at all levels where there is access to the floor plate.

For scissor stairs, the following requirements shall apply:

- Hydrant outlets shall be required at both doors serving the same level and face the door.
- The trackway within the station shall be covered by the station hydrant system from outlets on the platform.
- The fire hydrant reticulation pipework within each station shall be interconnected to form a ring main complete with cross-connections to provide alternative flow paths. This reduces the risk of loss of supply, improves hydraulic performance, and provides alternative water supply paths during maintenance.
- Hydrant outlets shall not intrude the clear path of travel in exit paths.
- To allow fire brigade access through the door with a charged hose, each hydrant outlet shall be readily accessible to firefighters and not be obstructed by doors (including fire stair doors) in the open or closed position.

- Hydrant outlet valves in publicly accessible areas shall be protected from vandalism and misuse by being enclosed in a metal cabinet secured with a key lock acceptable to the fire brigade.
- If a stair contains a central void, kick plates that are not less than 10 cm high shall be provided around the void at floor level to reduce the risk of a charged fire hose falling down the void.

The following should be considered for fire hydrant systems in underground stations as options:

- Isolation valves should be provided to allow isolation of a particular section under failure or for maintenance purposes, while still maintaining functionality to the remainder of the ring main. The number of isolation sections should be sufficient to avoid shutting off significant portions of the ring main.
- The hydrant system should be fitted with flow switch alarms monitored at the FDCIE as this can identify misuse or pipe-rupture.

8.3.2 Fire hose reels

Fire hose reels are provided in conjunction with fire hydrant systems; however, they require additional provisions in a station environment.

Legislative requirements for the fire hose reel system are set out in the NCC and the design requirements for fire hose reels are set out in the applicable Australian standard.

The following additional fire safety requirements shall apply to fire hose reels in underground stations:

- A fire hose reel system shall provide total coverage to all floor areas, as a means for authorised station personnel and attending fire brigade to extinguish a fire while it is still small, with the following exceptions:
    - Fire hose reels shall not be provided within the fire stairs and associated transfer corridors as this can be an obstruction to egress. A dropped hose can compromise compartmentation.
    - Fire hose reels shall not be provided in rooms containing high voltage equipment as it introduces an electrocution hazard. An appropriate portable fire extinguisher shall be provided as an alternative through a performance solution process.
    - Fire hose reel coverage shall not require the hose to be taken through a fire door as a dropped hose can prevent a fire door from closing properly and consequently compromise compartmentation.
- The fire hose reel system shall not use hoses longer than 36 m.

The following options should be considered for fire hose reels in underground stations for further fire safety risk reduction:

- Valves serving the fire hose reel system should be secured and padlocked in the open position to reduce the risk of accidental shut-off.
- Fire hose reels should be contained in cabinets and provided with means to deter misuse and vandalism. Cabinets should have plastic security seals attached.
- Fire hose reels should have flow switch alarms monitored at the FDCIE to reduce the risk of misuse.

8.4 Occupant warning

8.4.1 Emergency warning and intercom system

The design of EWIS shall be in accordance with the following:

- AS 1670.4
- AS 1428.2
- T MU TE 61005 ST.

The following additional fire safety requirements apply to EWIS in underground stations:

- A EWIS in accordance with AS 1670.4 shall be provided to all areas and meet the following requirements:
    - interface with the station FDCIE and PA system
    - include EWIS zones that are defined in the asset fire life safety strategy and agreed with the operator and maintainer
    - include a WIP phone and emergency call point and a SECP in the SMO
    - include the cascade sequence and cascade timing of EWIS zones, where required, in accordance with the asset fire life safety strategy and as agreed with the operator and maintainer
    - provide emergency audio message broadcasting coordinated with the station PA system using options of pre-recorded messages and live announcements
    - ensure emergency warning messages from the fire alarm system take priority over other station PA and long line PA announcements
    - include alarm systems that provide a means of alarm notification to the visually impaired and hearing impaired
    - include VADs

  - be able to override PIDs, through the FDCIE, and display emergency warning and evacuation instruction messages in accordance with the asset fire life safety strategy and as agreed with the operator and maintainer.

- All retail and commercial tenancies on station property shall be included in the station EWIS to support site-wide incident coordination.
- Emergency audio messages from the EWIS shall achieve the following:
  - compliance with AS 1670.4, under all conditions, including when:
    - ALERT and EVAC tones are being generated by the EWIS
    - active fire systems are in operation (for example, smoke exhaust fans or ventilation systems)
    - when a train is present at the station.
  - broadcast zones that align with EWIS emergency zones in accordance with AS 1670.4.
- PA voice messaging shall inform mobility-impaired occupants of the location of the protected refuge spaces and fire lifts. This is required as the travel path to the refuge may require travel in an unfamiliar direction.
- The EWIS shall be interfaced into the cascade sequences with adjacent EWIS, where required, including the following:
  - interchanges with stations and other transport modes
  - connected third party retail and commercial spaces
  - OSD.

  This enables the cascading of alarms between facilities in either direction.
- Fire alarm zones shall align with smoke management zones and fire or smoke separation zones. This enables the evacuation management of different fire compartments.
- Where maintenance personnel require entry to service areas including large service ducts and shafts, under-platform spaces, and lift shafts, a means for notifying maintenance workers in these locations of a fire alarm shall be provided.

To further reduce the fire safety risk, staff at the operations control centre for metro trains should be able to initiate the EWIS evacuation alarm at a station from the operations control centre. This enables the initiation of evacuation for the scenario of a train on fire approaching the station.

8.4.2 Visual alarm devices

The design of VADs shall be in accordance with AS 1670.4.

In addition, VADs shall be provided throughout all potentially occupied areas of underground stations as part of the EWIS.

8.5 Fire extinguishers

The design of portable fire extinguishers and fire blankets in underground stations shall be in accordance with AS 2444.

The following additional fire safety requirements apply to portable fire extinguishers in underground stations:

- Portable fire extinguishers, appropriate to the hazard, shall be provided in the following locations in stations:
    - at normally staffed control points in public access areas such as platform control rooms, staff control kiosks and gate area control booths
    - staff access areas of all retail tenancies
    - fire hydrant or fire hose reel cupboards with provision for deterrence of antisocial behaviour and vandalism
    - all station operations rooms except for toilets, shower facilities, and fire stairs and associated refuges.

  This facilitates early staff intervention to extinguish fires while they are still small.
- Portable fire extinguishers shall not use water as the extinguishing agent unless they are located in an area that does not contain electrical hazards. This reduces the risk of electrocution while operating extinguishers. Other extinguishing agents are available that have a broader application, including where electrical hazards exist.

The following options should be considered for portable fire extinguishers in underground stations for further fire safety risk reduction:

- Within rooms, portable fire extinguishers should be located as follows:
    - near to room exits
    - inside fire hose reel cabinets (where hose reels are provided)
    - conspicuously located in positions where they are readily accessible and immediately available in the event of fire.

  This makes the extinguisher easier to locate, and if extinguishment is unsuccessful, the staff member is more likely to be between the fire and an exit.
- Any portable fire extinguishers located in areas accessible to the public should be contained in cabinets and provided with a means to deter misuse, vandalism and theft.

8.6 Drainage systems in underground stations

The following should be considered as options for the drainage systems in underground stations for further fire safety risk reduction:

- Drainage systems in underground stations should be provided to reduce the risk of flooding due to the discharge of firefighting water from sprinklers, fire hydrants or both. This reduces the hazard to the attending fire brigade.
- To reduce the risk of drainage piping contributing to fire spread, exposed drainage system pipework should be non-combustible.
- Drainage systems should limit potential sources of ignition, by exclusion of energised equipment from locations where flammable gas may accumulate.
- Drainage water from firefighting is likely to be contaminated and systems for storage and specialist treatment can be considered without incurring additional cost. This should be co-ordinated on a case-by-case basis.

8.7 Mechanical systems

Mechanical systems include the following for underground stations:

- mechanical smoke exhaust systems
- pressurisation systems
- natural ventilation
- ECS.

Refer to TS 04955.2 for further details.

8.8 Operations – Incident response in underground stations

8.8.1 Emergency planning

Emergency planning shall be in accordance with AS 3745.

Emergency planning shall incorporate the current protocols contained in the *Guide for emergency services access to the rail corridor*.

SIMPs and emergency response procedures shall be developed for each station and each tunnel attached to the station covering all credible fire scenarios. They shall:

- provide clear and simple procedural-based instructions that can be readily referred to in an incident

- nominate the chief warden to manage all fire incidents within an underground station or tunnel and provide a single point of overall leadership until the arrival of the fire brigade
- provide a clear hierarchy of control and associated role responsibilities for all operational staff during the initial phase prior to the arrival of the fire brigade and once the fire brigade arrives and assume control
- be tailored for each underground station or tunnel, accurately reflecting the available fire safety measures and specific site hazards and constraints, with clear instructions based on the systems provided at that station or tunnel
- provide guidance criteria to choose the appropriate response where options are available
- provide guidance on assisting evacuation
- provide guidance on the management of interfaces and third parties.

8.8.2 Staff training

All operational staff shall receive training in accordance with AS 3745 to enable them to fulfil the requirements of the roles defined in the SIMP and associated procedures. This includes:

- training in the use of first attack firefighting equipment
- training to support effective evacuation, for example, assisting wayfinding, assisting the mobility-impaired, reinforcing EWIS messages, guiding people to move all the way to the exit, operation of EWIS panel and WIPS, and discouraging delaying behaviours such as filming a fire on a phone.

Fire safety measures and emergency response procedures should be consistent, as far as constraints allow, between different stations to enable staff to work at different stations and only require limited additional training.

8.8.3 First responders' emergency information kit

All underground train stations currently have a system in place to provide for FREIKs. This system shall be adopted across all assets and contain the information in this section.

FRNSW have produced guidance on minimum information that is required on arrival at any site. For more information, refer to *FRNSW Fire safety guideline – Emergency services information package and tactical fire plans*. FRNSW refer to this as the ESIP. The information described in the FRNSW guideline shall be included in the FREIK where applicable.

The following additional fire safety requirements apply to the FREIK:

- A FREIK for each station and any adjoining tunnels shall be kept up-to-date and readily available in the FCR.

- The FREIK for each asset shall cover all operators, tenants and station interfaces. This provides complete information to inform incident management across the entire asset.
- The FREIK for each asset shall contain up-to-date information for that asset including the following:
    - rail network plan highlighting the asset and the adjacent tunnels, stations and rail corridors
    - rail operations plan identifying the lines served by the asset, and from which platform or platforms
    - site plans indicating:
        - access points
        - water supply points
        - town water mains and street hydrants
        - sprinkler and hydrant booster assemblies
        - emergency assembly points and any adjoining facilities that share exit paths with the station.
    - architectural plans and sections with all areas and rooms labelled to identify their use
    - station floor plans indicating where available
        - FCR, SCR and the rendezvous point agreed with the fire brigade, if not the FCR
        - sprinkler and hydrant system valve rooms, pump rooms and access paths to them
        - escalator, lift and open stair connections
        - fire exits and refuges
        - fire hydrant outlets and hose reel locations
        - portable fire extinguisher locations and types
        - sprinkler and hydrant isolation valves
        - gaseous suppression panels and isolation points
        - smoke exhaust points
        - major electrical hazards including substations, switchboards and distribution boards
        - electrical isolation points, including solar
        - gas isolation points, including natural gas, LPG and compressed air
        - EWIS zones

        - mimic repeater panels
        - WIP phones, emergency telephones and help points
        - access points to confined spaces and controlled areas such as sub-floors, lift shafts, sumps, under platform spaces, and large ducts and plenums
        - fire shutters and sliding fire doors
        - security shutters and gates and barriers
        - local control panels, such as for escalators or PSDs
        - tunnel access points
        - location of tunnel emergency response vehicles
        - CCTV camera locations
    - hazard log identifying hazards to fire brigade and the available fire safety measures.

9 Communications systems in stations

Fire safety measures for communications systems within stations shall comply with the requirements in Section 9.1 to Section 9.4.

9.1 Station control room communications

For the purposes of this document, the SCR and the SMO are considered equivalent. The fire safety requirements apply to either the SCR or SMO and are intended to support incident management in a fire.

The SCR at each underground station shall contain a phone link to the station FCR.

The viability of the following shall be assessed for the SCR and incorporated into the design:

- the SCR shall contain an internet protocol phone link to upstream and downstream station SCRs for metro stations.
- the SCR at each station shall monitor the following:
    - all fire alarm signals generated in the station, adjacent tunnel sections and associated cross passages
    - system faults from all active fire safety measures, generated in the station, adjacent tunnel sections and associated cross passages
    - fire lift locations in the station
    - escalator operating modes
    - train locations in the station and adjacent tunnels

- status of any access control systems within egress paths.

This allows timely notification and response from the station manager to fulfil their role in fire incident management. It also allows the fire brigade to utilise the SCR for fire incident.

- fare gates and bypass gates shall be releasable from the SCR. These can serve as a backup in case auto-release fails or allow opening of the gates in the absence of a fire alarm signal.

9.2 Passenger information displays in stations

While PIDs are used to display messages that guide and inform passengers during normal operations, they can be used to improve the effectiveness of the system in reducing fire safety risks.

The design of PIDs in stations shall comply with the following:

- T MU TE 61005 ST
- AS/NZS 60950.1.

The following additional fire safety requirements shall apply to PIDs in stations:

- PIDs shall be used to provide instructions to evacuating occupants to complement the EWIS alarm tones and voice messages. Evacuation messages that are displayed on PIDs shall be pre-programmed and may vary, depending on the PID location. This reinforces evacuation, and the removal of next train arrival information reduces the risk of occupants wanting to continue their journey.
- PIDs shall be used to inform mobility impaired occupants of the location of the protected refuge spaces and fire lifts.

9.3 Public address systems

While not a dedicated fire protection system, the PA system may be used to complement the EWIS. The PA system shall not override the EWIS system.

The PA system shall be used as an additional aid only.

9.4 Controls on digital advertising

Controls shall be placed on commercial advertising screens as they can be a source of ignition or increase fire load, and the advertising itself may distract occupants from evacuating. Conversely, they provide an opportunity to enforce evacuation messaging as some occupants may already be looking at them.

Commercial advertising screens shall cease immediately at the initiation of an alert tone from the EWIS.

Commercial advertising screens can be used as an aid to display evacuation messages. Refer to TS 00008.1 for information on using these devices to compliment the asset fire life safety strategy.

The following options shall apply to digital advertising in underground stations for further fire safety risk reduction:

- Digital advertising screens shall be used to provide instruction to evacuating occupants to complement the EWIS alarm tones, voice messages and PIDs. Evacuation messages to be displayed on digital advertising screens shall be pre-programmed and may vary, depending on the advertising screen location. This reinforces evacuation messaging in prominent locations, particularly if people are already watching the screens.
- Spatial requirements shall be in accordance with TS 04951.2.

10 Electrical systems in stations

10.1 General

Electrical services at stations shall comply with TS 03954.

10.2 Emergency lighting

In an emergency evacuation, if mains power is lost, then the emergency lighting shall provide sufficient illuminance levels to facilitate egress and fire brigade activities. Emergency lighting is provided through dedicated luminaires and illuminated exit signs.

Emergency lighting within stations shall be in accordance with the following:

- AS/NZS 2293.1
- AS/NZS 2293.3
- T HR SS 80003 ST.

11 Security systems in stations

11.1 General

While security systems are not a dedicated fire protection system, the security system requirements and considerations in this document may be effective in reducing fire safety risks.

The design of security systems shall be in accordance with T MU SY 20001 ST.

11.2 Gate lines

Performance solutions shall be provided for the use of electric unlocking of barrier gates in required egress paths in lieu of push button devices. The following fire safety requirements shall apply to gate lines in stations:

- Station fare gates shall open on fire alarm and fail safe open. This prevents the fare gates impeding egress for those who evacuate through their familiar entry path.
- Fare gates and bypass gates shall have local push-button control to allow release by staff.
- Bypass gates through gate lines shall automatically release on fire alarm and be available for egress in an evacuation to provide additional egress capacity.

The following shall apply for gate lines in stations that do not always have staff present, such as metro stations, for further fire safety risk reduction:

- Fare gates and bypass gates shall be releasable from the operations control centre, SCR and FCR. This can serve as a backup in case auto-release fails, or to open the gates in the absence of a fire alarm and staff being unavailable.
- Other fire load shall not be located immediately adjacent to fare gates. Fare gates contain minimal fire load; however, they provide an ignition source. A separation distance to other fire load prevents a small fire in the fare gates from spreading and becoming larger.

11.3 Security shutters

The following fire safety requirements shall apply to security shutters in stations:

- Station entrances with security gates shall have the following to provide an egress path for occupants:
  - an adjacent pedestrian egress door not less than 0.82 m wide
  - an adjacent exit pathway using a protected fire stair exit.
- Security roller grilles or shutters shall not be made of combustible material as it prevents an arson fire at a station entrance, during after-hours, spreading to involve the security shutter and potential further spread into the station.

11.4 Access control

Any access control system within egress paths shall release on fire alarm and fail safe open. This includes the following:

- public access to fire stairs through back-of-house
- doors or gates from the platform to the tunnel walkway.

Any doors or gates in egress paths fitted with access control should provide a break-glass override adjacent to the door or gate to provide as a backup if the automatic alarm release fails.

11.5 Closed circuit television

CCTV can benefit the asset fire life safety strategy in supporting incident management. The CCTV should be interfaced with the fire panel to allow to bring up the area of fire alarm on the CCTV monitor.

Visible CCTV cameras can also be a deterrent to arson events or even other fire hazards such as unauthorised smoking.

The design of CCTV shall comply with T MU SY 10001 ST and be carried out by a competent engineer within that field.

12 Structural systems in stations

12.1 Load bearing structures

Load bearing structures include all structural elements carrying any load in addition to their self-weight.

The design of load bearing structures in stations shall comply with relevant TfNSW requirements. Additional legislative requirements apply.

Where the same structural element incurs multiple design standards, the more onerous shall apply.

For example, if a fire stair shaft at platform level can be exposed to direct flame impingement from a train fire, the analysis performed indicates that the structure shall achieve 170 minutes to the RABT-ZTV (rail) fire curve. This 170-minute requirement would be to provide the necessary level of safety as needed by TfNSW and be superior than the requirements set out in the NCC.

The following additional fire safety requirements apply to load bearing structures in stations:

- Station cavern linings, corbels, underground structural supports, and any other load-bearing structure in the stations that can be exposed to direct flame impingement from a rolling stock fire, shall maintain structural adequacy for a time duration of not less than 170 minutes when tested against the RABT-ZTV (railway) fire curve. This is in accordance with EFNARC Specification and Guidelines for Testing of Passive Fire Protection for Concrete Tunnels Linings. The criteria for failure shall be in accordance with Clause 2.13.1 of AS 1530.4:2014. This provides resilience against both structural failure for a range of fire scenarios (including maintenance vehicle fires) and limits potential damage that could cause significant operational delays and repairs.

- All structures designed to the RABT-ZTV (rail) fire curve shall account for all types of spalling to ensure that the function and structural integrity of the concrete linings in a fire is maintained. Where polypropylene fibres are used to mitigate spalling, these shall be short (6 mm) monofilament fibres of 32 µm diameter. The fibre dosage is subject to confirmation through testing; however, this should be within the range of 1.5 kg/m3 to 2.0 kg/m3. This provides resilience against fires that may involve hydrocarbons, such as a maintenance vehicle fire.
- All concrete structures designed to the RABT-ZTV (rail) fire curve shall have their fire rating confirmed through furnace testing in a NATA accredited facility with the testing conducted in compliance with the EFNARC Specification and Guidelines for Testing of Passive Fire Protection for Concrete Tunnels Linings, or equivalent.
- The NCC requirements for Type A construction apply to all station structures that are not potentially exposed to a train fire. The exception to this is when the required type of fire resisting construction under the NCC is a lower classification than Type A, then the minimum FRL shall be confirmed through fire engineering analysis. This provides resilience against typical station fires unless fire safety engineering can demonstrate that the lesser type is acceptable. Performance solution report shall document required maintenance regime to ensure FRL is checked and certified for any reduced FRL's specified.
- All structures supporting emergency vehicle access paths and hardstand areas shall be designed for SM1600 loads in accordance with AS 5100.2. Station structure may extend under roads and appliance hardstand areas. The structures shall be able to support the fire appliance vehicle loads.
- Fixings and supporting structures for systems, including the following, shall maintain structural adequacy when exposed to temperatures of 200° C for not less than 120 minutes when tested in accordance with Appendix B6 of AS 1530.4: 2014:
    - the overhead traction system in the station trackway
    - overhead tunnel ventilation fans, dampers and nozzles
    - heavy services mounted above the platform such as hydrant piping and cable trays.

  This reduces the risk of heavy equipment falling during egress and fire brigade intervention.

12.2 Non-load bearing structure and barriers

Within the context of this document, the requirements and considerations in this section apply to non-load bearing structures providing fire compartmentation.

The design of non-load bearing structures and barriers within stations shall comply with TfNSW requirements. Additional legislative requirements apply.

The following additional fire safety requirements apply to non-load bearing structures within stations:

- Non-load bearing structures that are required to provide fire compartmentation and can be exposed to direct flame impingement from a rolling stock fire, shall maintain integrity for a time duration of not less than 170 minutes when tested against the RABT-ZTV (railway) fire curve. This is in compliance with EFNARC Specification and Guidelines for Testing of Passive Fire Protection for Concrete Tunnels Linings. The criteria for failure shall be in accordance with AS 1530.4. This provides resilience against fires that may involve hydrocarbons, such as a maintenance vehicle fire.
- Back-of-house plant and storage areas shall be fire separated from public access areas with an FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4. All doors that form part of this separation line shall have an FRL of not less than -/120/30. This separates back-of-house areas with higher fire loads and more ignition sources from public areas with higher populations.
- Fire stairs and associated lobbies (excluding any airlocks), refuges, rest areas and transfer corridors shall achieve an FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4.
    - All doors to these spaces shall have an FRL of not less than -/120/30.
    - The requirements in relating to limiting services and access to service shafts within fire stairs, apply to fire stairs and associated lobbies (excluding any airlocks), refuges, rest areas and transfer corridors.
- If a corridor through station operational areas serves as an egress path from public areas to a fire stair, the corridor shall have an FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4. All doors to the corridor shall have an FRL of not less than -/120/30. All service penetrations to the corridor shall have an FRL of not less than -/120/-. This provides a protected path when occupants have crossed the horizontal exit between the public area and the station operational areas.
- The FCR and any stair or passage providing access to the FCR shall be fire separated to achieve an FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4. This provides a protected path and incident staging area for the fire brigade.
- Rooms containing the following shall be enclosed in construction with an FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance

with AS 1530.4, unless more onerous requirements are required by other transport standards or the NCC:

- distribution supply main switchboards
- installation main switchboards
- high voltage power supply equipment, low voltage power supply equipment or both
- high voltage equipment
- traction power supply equipment
- transformers
- batteries

Any penetrations shall be protected with the same integrity fire rating as the bounding construction. This facilitates the omission of sprinkler suppression to these rooms and contains any fire within these rooms thereby reducing the risk of significant operational impact.

- To reduce the risk of single point of failure due to a fire, substation equipment required for supply redundancy shall be located in separate rooms, each with an FRL of not less than -/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4.
- Additional compartmentation providing an FRL of not less than -/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4, including all penetrations, shall be provided to rooms containing the following:
  - rail signalling system equipment
  - PSD control equipment
  - emergency lighting control equipment
  - communications equipment (including radio)
  - telecommunications carrier equipment
  - passenger information display control equipment
  - security and surveillance control equipment
  - building management systems
  - tunnel ventilation fans
  - OTE fans
  - station smoke management fans
  - fire hydrant system pumps

- fire sprinkler system pumps and valves
- gaseous suppression system control equipment and gas cylinder storage.

This provides protection to equipment supporting fire safety and incident response.

- Compartmentation providing a FRL of not less than -/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4, including all penetrations, shall be provided to rubbish storage rooms to prevent fire spread from a significant fire in the rubbish storage as it can contain a high fire load.
- With the exception of, such as a concourse or public street, all bounding walls of fixed retail tenancies, with a total floor area of 10 m2 or greater, shall be fire rated to achieve an FRL of not less than 180/180/180 when tested against the standard time-temperature curve in accordance with AS 1530.4. This does not apply to any wall that serves as an open connection to publicly accessible circulation spaces. This separation wall shall have an FRL of not less than 120/120/120 if the retail tenancy is fully protected by an automatic sprinkler suppression system. This reduces the risk of fire spread through back-of-house.
- Where backup power supply or control system diversity is provided in close proximity that the backup power supply and control system could be affected by a single fire, then these systems shall be separated by a barrier achieving a FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4. This provides security of power and control by removing a single point of failure.
- Walls and floor slabs that form part of the boundary between the station and adjacent property shall be fire separated with a FRL of not less than 120/120/120 when tested against the standard time-temperature curve in accordance with AS 1530.4.
- Where station areas are shared with commercial areas such as commercial lobbies, separation may be achieved with glazing protected with wall wetting sprinklers on both sides and installed in accordance with the requirements of a proprietary system certified to achieve the required rating. Maintaining compartmentation reduces the risk of fire and smoke spread in either direction.
- The NCC contains requirements for lightweight construction. However, for the purpose of stations, walls shall comprise solid construction. Light weight construction shall not be accepted for any wall required to have a FRL due to its limited durability.

Construction hoarding separating a construction area from an operating part of a train station or metro station, shall be fire rated with a FRL of not less than -/60/60 when tested against the standard time-temperature curve in accordance with AS 1530.4. The omission of fire separation shall be justified through a risk assessment on the fire risk posed by the construction area, subject to acceptance by the operator and maintainer. This reduces the risk of a fire in the construction area spreading to the operating part of the station.

13 Vertical transportation systems

13.1 General

Vertical transportation systems include escalators and lifts.

Escalators, circulation lifts and maintenance lifts are not considered as dedicated fire protection systems; however, these systems may be designed to be used as part of the fire safety strategy for an asset through the performance solution process.

13.2 Lifts and escalators

Lift and escalator services at stations shall comply with TS 04955.3 and TS 04955.4, respectively. Lifts and escalators are only permissible as a means of egress in an emergency if this is documented in a performance solution report noting noncompliance with DTS requirements for egress provisions in the NCC and having measures for safe egress.