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|---|---|
| Snowy Technical Standards | |
| **SHL-MEC-125** | **Fire Protection Systems** |
| **Asset Engineer**<br>*Duncan Murdoch*<br>*Mechanical Asset Engineer* | Version Date: 24/05/2023<br>Review cycle = 10 years |
| | Revision: *A* |

## Executive Summary

This standard sets out the requirements for fire protection systems and passive fire rating. The standard sets out minimum prescriptive requirements and a methodology for a risk-based approach to the selection of systems.

Whilst minimum standards are specified, engineering review is required in many instances because minimum requirements specified by the National Construction Codes (NCC, formerly Building Codes of Australia (formerly BCA)) are not appropriate or beneficial in power stations. Constraints of existing plants such as water supplies and access prevent some solutions, which if constructed from new would be viable. Therefore, these require engineering review.

Clarification of terms:

- Engineering review - review by the asset engineering team accountable for fire protection, and the asset presenting the fire risk.

- Engineering judgement - balanced judgement made by the delegated responsible SHL personnel taking into account the risk and the cost benefit of mitigating that risk

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# 1. Scope

This standard applies to all assets operated and maintained by Snowy Hydro Limited (SHL) including hydro, gas and diesel generation facilities, and generation support facilities.

This standard does not cover fire risk protection for bush or wildland fires and the control of vegetation.

## 1.1. Applicable Standards and Legislation

### 1.1.1. General

At time of preparation of this standard, the date edition referenced is current. In preparing documents and tenders refer to the current edition of the standards in all specifications. Contract documents will refer to standards and these are the ones in place referenced by the date of signing contract documents.

Generally, refer to the relevant Australian Standard for design and installation. Not all systems and situations are covered by Australian Standards. Where appropriate to design, refer to other fire standards such as NFPA and Factory Mutual for additional information as is best industry practice.

New construction will be required to comply as far as practical, thus for any new station or building, the provisions for fire resistance, evacuation, fire fighting equipment and smoke hazard management must comply with the requirements of the NCC. This will require either meeting deemed to satisfy provisions, or a performance solution achieving an equivalent safety outcome.

For existing assets, the installation of replacement infrastructure and equipment, including; fire alarms systems, emergency lighting, exit identification, sprinklers, fire pumps, or hydrants shall conform to the latest applicable standards wherever practicable.

Comply in all respects with the requirements of the current standards applicable to the works in respect to design, equipment, material, workmanship and installation techniques.

Metropolitan and country fire and rescue services published safety guidelines, policies, specifications, and position statements are to be complied with where applicable in conjunction with other guidelines and technical information. Engagement with the local fire and rescue responder shall be carried out for both new construction and significant replacement or upgrade works for their comment and endorsement.

### 1.1.2. Legislation

Generation plant is regulated by the Environmental Planning and Assessment Regulation 2000 (EP&A Act and Regulations), plus the Crown Land Management Act.

Refer and comply with the applicable State based Work, Health and Safety Acts and Regulations.

Refer and comply with the applicable local government Planning Development and Infrastructure Acts and Regulations.

## 2. Abbreviations / Definitions

| Abbreviations and/or Word | Definition |
|---|---|
| **Shall** | Items noted as “shall” are mandatory. |
| **Should** | Items noted as “should” are mandatory unless a written application has been approved by Snowy Hydro. |
| **ESOER** | Executive Safety Operations and Environment Risk – Fire Investment |
| **ALARP** | As low as reasonably practicable |
| **SMCC** | Snowy Mountains Control Centre |
| **SCADA** | Supervisory control and data acquisition |
| **FRL** | Fire Resistance Level |
| **ASE** | Alarm signalling equipment |
| **DBEP** | Designated building entry point |
| **DSEP** | Designated site entry point |
| **FDCIE** | Fire detection control and indicating equipment |
| **FFCP** | Fire fan control panel |
| **FDAS** | Fire detection and alarm system |
| **FBP** | Fire brigade panel |
| **EWCIE** | Emergency warning control and indicating equipment |
| **EICIE** | Emergency intercom control and indicating equipment |

# 3. Fire Protection Selection Methodology

## 3.1. Prescriptive Design

A NCC (formerly BCA) assessment shall be undertaken to specify the minimum performance requirements associated with fire and life safety for buildings and their associated structures. Compliance with the performance requirements can be achieved from either a deemed to satisfy solution and/or performance solution as detailed within the NCC. Whilst minimum standards are specified from the NCC and referenced Standards, an engineering and risk review should be completed to ensure the requirements are either appropriate or beneficial.

Engineering review is required for new power station plants, works involving water supply changes of significance and removal of systems where the system is not being replaced.

As each facility has different needs due to its age, location and generation type, the prescriptive approach is still seen as a general guide. Many systems or fire protection recommendations simply cannot be implemented because of the practicalities of existing plant and cost constraints.

The fire protection prescriptive requirements are nominated within Section 4 of this document.

## 3.2. Risk Based Fire Protection Design Process

Fire risk design process is not necessarily about adding fire protection systems. It is to consider a holistic approach where stakeholders provide input from their respective interests to resolve the best approach to fire risk reduction.

The risk based approach shall utilise the process outlined within QP19-01 ‘Risk Identification, Analysis and Control’. Snowy Hydro Corporate Risk Rating Criteria (G19-01-A) shall be utilised in this process. This is to ensure the minimum requirements for identifying, analysing, controlling, and accepting risks in a manner that is consistent, transparent and repeatable across Snowy Hydro Limited

The risk-based approach shall use the prescriptive requirements outlined above in 3.1 Prescriptive Design as the starting point.

The fire life safety requirements specified from a NCC (formerly BCA) assessment are generally not subject to a risk review process as these are considered the minimum standards for construction. Where the Deemed-to-Satisfy life safety provisions aren’t considered appropriate, compliance with the NCC can be achieved through alternative measures through a Performance Solution. Further details pertaining to the Performance Solution method are outlined within Section A2.2 of the NCC 2019 Volume One Amendment 1.

All risk based fire protection measures shall be subject to an engineering design and review prior to implementation to ensure an appropriate solution has been chosen.

Redundancy of fire protection systems are fundamental of all risk control programs and should be considered in risk decisions and selection of systems.

New power stations should initiate the fire protection design process as early in the plant design process as practical to ensure that the fire prevention and fire protection recommendations are suitable.

### 3.3. Acceptable Risk Criteria

Snowy Hydro Corporate Risk Rating Criteria (G19-01-A) shall be used to determine the residual risk. Risk escalation and notification shall be in accordance with QP19-01 procedure. Generally, a risk rating of ‘Medium’ and above requires review and approval.

### 3.4. Impairment Notices

All project works shall comply with Snowy Hydro Fire Impairment and Notification Procedure QP24-40.

# 4. Technical Requirements

## 4.1. Access to Fire Fighting Water for Community Use

SHL has no policy to provide specific fire-fighting water supply for other users.

## 4.2. Existing Infrastructure and Systems

Refer to the FIRE PROTECTION SYSTEMS - Fire Protection Systems Condition Assessment Scores Spreadsheet here for each site and the associated fire and life safety systems installed.

## 4.3. Fire Protection Prescriptive Requirements

### 4.3.1. Fire Detection and Alarm Systems

The Fire Detection and Alarm Systems shall be installed in accordance with the NCC Section E2.2a, AS1670.1 and AS1670.4 where practical, unless conditions exist which require an alternative solution.

A fire alarm system with manual call points is required as a minimum in all buildings and facilities where it is required to facilitate a building evacuation, where the space is more than a single zone, and where detection systems are installed.

Detection systems shall be installed in buildings / structures where there is a meaningful benefit to do so. A meaningful benefit includes considering the following factors:

- Detection of fire results in a useful action, such as a response to attend and investigate, and reduce the risk of a fire further developing.
- Initiates evacuation for life safety.
- Initiates auxiliary systems actions such as activating smoke control, smoke dampers, isolating ventilation systems, use in smoke control systems.
- If the space has no fire load or risk of fire, or smoke cannot travel into the space, do not generally install detection – unless through actions such as inadvertent, or lazy storage of combustibles occurs.
- NCC (formerly BCA) assessment requires the system.

Given the egress challenges in many hydro stations, early detection is paramount and an Aspirating Smoke Detection (ASD), e.g. VESDA-type system shall be integrated with the fire alarm system and installed to monitor air from critical areas, including as a minimum:

- Alternator Enclosures
- Communications and control rooms
- Protection or control panels/enclosures including governors and AVRs
- Main AC or DC electrical distribution boards
- Switchrooms
- Critical DC equipment, e.g. battery chargers, inverters

### 4.3.2. Water Supplies

Fire fighting water supplies are provided and maintained for the fixed fire suppression systems and the fire brigade to use upon their arrival.

Water supply for permanent fire protection installations shall be based on the largest fixed fire suppression system demand plus the maximum fire hydrant demand. Storage tanks should not be of less than 24,000 litres in accordance with AS2419.1.

Where the water supply for fire systems is sourced from penstocks, consider loss of service and how penstock dewatering is managed to best maintain supply continuity. Penstock supplies are not generally required to be supplemented by water storage tanks, unless clear evidence of issues with penstock water quality or availability, e.g., weed affecting systems, or isolation periods of sufficient duration to be a loss risk issue. Where a loss risk issue is evident, consider a dual water supply arrangement from an acceptable source as outlined within AS2419.1 for where hydrants are installed and AS21128.1 for where automatic sprinkler systems are installed.

#### 4.3.3. Fire Hose Reels

Fire hose reels shall not be provided for use in power stations unless by specific engineering design as being appropriate and a function that has a purposeful use. Generally, portable fire extinguishers can be used to replace or supplement fire hose reels. These systems are specified within NCC Part E1.4 and AS2441.

#### 4.3.4. Fire Hydrant System

Fire hydrant systems are to be in accordance with NCC Part E1.3, AS2419 and local fire brigade requirements. Seek engineering review of the design concept to ensure site suitability, compliance, and that it provides a function which would have purposeful use.

#### 4.3.5. Portable Extinguishers and Fire Blankets

Portable fire extinguishers and fire blankets to all areas appropriate to the risk and likelihood of use in accordance with NCC Part E1.6 and AS2444.

#### 4.3.6. SCADA

SCADA can only be used in a fire system health monitoring role, meaning that there is no functional dependency between fire protection systems and SCADA. The SCADA system shall have the capability of monitoring the main FDCIE to improve how SMCC responds to alarms.

#### 4.3.7. Fire Ratings – Fire Resistance Level (FRL)

Fire rating should be applied where practical to do so for asset protection to prevent fire spread between critical plant areas. NCC stipulates the locations and associated fire ratings for life safety purposes. Seek engineering review and undertake a risk assessment to establish the minimum acceptable fire rating requirements of the building construction. Where asset protection is imperative then the highest fire rating shall apply.

#### 4.3.8. Passive Fire Suitable Systems

Only use passive fire products and systems tested and approved in accordance with AS1530.4. Installations shall be in accordance with the manufacturers methodology. Oil fires and outdoor applications cannot use standard building products for passive fire rating. Use products such as those used in oil industry fire protection.

#### 4.3.9. Fire / Smoke Dampers

Generally, all fire dampers in power stations should be motorised fire and smoke dampers. Dampers should be fitted with microswitches to allow testers to view the damper open or closed position without opening the damper access panel, and to send a fault signal to a supervisory system should a fire damper be in the incorrect position. Dampers in power stations may require specification of high velocity dampers as opposed to typical building systems which are low pressure.

#### 4.3.10. Penetrations

The filling of penetrations is governed by AS4072.1. The intended fire rating for all penetrations shall be -/120/120 unless specified higher based on FRL.

#### 4.3.11. Smoke Control Systems

This covers a multitude of systems using fans and ductwork configurations to control the movement of smoke. The systems included smoke exhaust, zone pressurisation, hot layer smoke control, air purge, and lift shaft pressurisation.

These systems are specified by AS 1668.1.

# 5. Maintenance

## 5.1. Routine Maintenance

Fire protection system maintenance is regulatory driven and shall be completed in accordance with EMS Fire Protection Systems - Maintenance here.

# APPENDIX A - Referenced Documents, Standards, and Legislation

### Australian Standards

| Item | Description |
|---|---|
| National Construction Code | 2019 Volume 1 Amendment 1 - Building Code of Australia |
| National Construction Code | 2019 Volumes 2 Amendment 1 - Building Code of Australia |
| AS 1530 Part 1: 1994 | Methods for fire tests on building materials, components and structures – combustibility test for materials |
| AS1530 Part 2: 1993 | Methods for fire tests on building materials, components and structures – Test for flammability of materials (incorporating amendment 1) |
| AS 1530 Part 3: 1999 | Methods for fire tests on building materials, components and structures – Simultaneous determination of ignitability, flame propagation, heat release and smoke release |
| AS 1530 Part 4: 2014 | Methods for fire tests on building materials, components and structures – Fire resistance tests for elements of construction |
| AS 1668 Part 1: 2015 | The use of ventilation and air conditionings in buildings – Fire and smoke control in buildings (incorporating amendment 1) |
| AS 1670 Part 1: 2018 | Fire detection, warning, control and intercom systems – System design, installation, and commissioning |
| AS 1670 Part 3: 2018 | Fire detection, warning, control and intercom systems - System design, installation, and commissioning – Fire alarm monitoring |
| AS 1670 Part 4: 2018 | Fire detection, warning, control and intercom systems – Emergency warning and intercom systems |
| AS 1851: 2012 | Routine service of fire protection systems and equipment |
| AS 1905 Part 1: 2015 | Components for the protection of openings in fire-resistant walls – Fire-resistant doorsets (incorporating amendment 1) |
| AS 1905 Part 2: 2005 | Components for the protection of openings in fire-resistant walls – Fire-resistant doorsets (incorporating amendment 1) |
| AS 1940: 2017 | Storage of flammable and combustible liquids |
| AS 2067: 2016 | Substations and high voltage installations exceeding 1kV a.c |
| AS 2118 Part 1: 2017 | Automatic fire sprinkler systems – General systems (incorporating amendment 1) |
| AS 2118 Part 4: 2012 | Automatic fire sprinkler systems – Sprinkler protection for accommodation buildings not exceeding four storeys in height. |

| | |
|---|---|
| AS 2118 Part 6: 2012 | Automatic fire sprinkler systems – Combined sprinkler and hydrant systems in multistorey buildings |
| AS/NZS 2293 Part 1: 2018 | Emergency lighting and exit signs for buildings – System design, installation and operation. |
| AS 2304: 2019 | Water storage tanks for fire protection systems. |
| AS 2337.1: 2004 | Gas cylinder test stations general requirements, inspections and tests – Gas Cylinders |
| AS 2419 Part 1: 2005 | Fire Hydrant installations - System design, installation and commissioning (incorporating amendment 1) |
| AS 2441 Part 1: 2005 | Installation of fire hose reels (incorporating amendment 1) |
| AS 2444: 2001 | Portable fire extinguishers and fire blankets, Selection and location |
| AS 2665: 2001 | Smoke/heat venting systems – Design installation and commissioning |
| AS 2914: 2013 | Fixed fire protection installations – Pumpset systems |
| AS/NZS 3000: 2018 | Electrical installations: known as the Australian/New Zealand Wiring Regulations |
| AS/NZS 3013: 2005 | Electrical installations – Classification of the fire and mechanical performance of wiring system elements |
| AS/NZS 3500.1 | Plumbing and drainage Water Services |
| AS 3780 | The storage and handling of corrosive substances – West Australia (referenced by the Worksafe code of practice in Victoria) |
| AS 3786: 2014 | Smoke alarms using scattered light, transmitted light, or ionization (incorporating amendment 1 and 2) |
| AS/NZS 3833: 2007 | The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers |
| AS 3859: 2018 | Construction of buildings in bushfire-prone areas. |
| AS 4072 Part 1: 2005 | Components for the protection of openings in fire-resistant separating elements – Service penetrations and control joints (incorporating amendment 1) |
| AS 4214: 2018 | Gaseous fire-extinguishing systems |
| AS 4285: 2011 | Tunnel Fire Safety (subject to engineering review only and informative document) |
| AS 4332 | The storage and handling of gases in cylinders |
| AS 4487: 2013 | Condensed aerosol fire extinguishing systems – requirements for system design, installation and commissioning and test methods for components. |
| AS 4587: 1999 | Water mist fire protection systems – System design, installation, and commissioning |

| | |
|---|---|
| AS/NZS 5601: 2013 | Gas installations Part 1 General Installations |
| AS60076.5 | Power transformers - Ability to withstand short circuit |
| AS/NZS 60079.10.1: 2009 | Explosive atmospheres Part 10.1: Classification of areas - Explosive gas atmospheres |
| FPAA101D: 2018 | Automatic Fire Sprinkler Systems Design and Installation – Drinking Water Supply |
| FPAA101H: 2018 | Automatic Fire Sprinkler Systems Design and Installation – Hydrant Water Supply |

### NFPA and Factory Mutual

| Item | Description |
|---|---|
| NFPA 1 | Fire Code: Chapter 52 Energy Storage Systems 2021 Edition |
| NFPA 11 | Standard for Low-, Medium–, and High Expansion Foam 2016 Edition [1] |
| NFPA 15 | Standard for Water Spray Fixed Systems for Fire Protection 2017 Edition [1] |
| NFPA 16 | Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems [1] |
| NFPA 25 | Inspection, Testing, and Maintenance of water-based fire protection systems [1] |
| NFPA 750 | Standard on Water Mist Fire Protection Systems 2019 Edition |
| NFPA 770 | Standard on Hybrid (Water and Inert Gas) Fire-Extinguishing Systems 2021 Edition |
| NFPA 850 | Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter standards 2020 Edition |
| NFPA 855 | Standard for the Installation of Stationary Energy Storage Systems 2020 Edition |
| Data Sheets 1-44 | Factory Mutual Global Property Loss Prevention - Damage-Limiting Construction |

*Note [1] These standards are required to be reviewed in conjunction with Australian Standards for the design, installation and maintenance of these systems.*

### Snowy Hydro Standards

| Item | Description |
|---|---|
| SHL-ELE-128 | Earthing |
| SHL-ELE-103 | Pipe Fittings and Supports |
| SHL-GEN-123 | Protective Coatings |
| SHL-MEC-102 | Welding |
| SHL-MEC-104 | Valves |
| | Draft maintenance standards in progress |

### Fire Rescue Documents

The following tables and associated documents should be referred to where appropriate, in particular for fire-fighting response where Fire and Rescue is the responder. Where additional documents are made available from the below list they should also be referred to where appropriate.

| **Fire Rescue Victoria (FRV) Guideline Documents** | |
|---|---|
| GL-04 | Street Hydrants |
| GL-06 | Tactical Fire Plans and ‘As Installed’ Drawings |
| GL-11 | Fluorinated Fire Fighting Foams |
| GL-12 | Control of Fire Water Run-off |
| GL-30 | The Application of AS 1940-2004: Storage and Handling of Flammable and Combustible Liquids |
| GL-35 | Hydrostatic Testing and Maintenance of Fire Hydrant Systems |
| GL-38 | Decommissioning of Fire Hydrant and Sprinkler Systems |

| **Fire Rescue New South Wales (FRNSW) -<br>Fire Safety Guidelines, Technical Information Sheets and Position Statements** |
|---|
| Access for fire brigade vehicles and fire fighters. |
| Emergency services information package and tactical fire plans. |
| Fire brigade booster connection with inlet insert. |
| FRNSW compatible Storz hose connection. |

| **South Australian Metropolitan Fire Service (SAMFS)**<br>**Equipment Specifications, Fire Safety Policies & Position** | |
|---|---|
| Equipment Specification 001 | Storz Couplings, Adaptors & Reducers |
| Policy 006 | Control and Indication for Diesel & Electric Fire Pumps |
| Policy 014 | Above Ground Water Storage Tanks for Firefighting |
| Policy 037 | Fire Alarm Conditions of Connection (2.0) |

| **Australian Fire and Emergency Service Authority Council** |
|---|
| Fire Safety for Road Tunnels |

# APPENDIX B - Definitions

**Fire Detection Systems**

**Aspirating smoke detection (ASD) / VESDA**

VESDA® - very early smoke detection apparatus is a product name from Xtralis, but also the generic name used for most smoke detection air sampling applications. It uses an aspirating pipe and samples the quality of air passing through the VESDA detection chamber.

Due to cost, aspirating smoke detection systems are generally reserved to enhance smoke detection risk protection. They are also used to substitute point type smoke detection in wet areas, as they can be operated in damp environments, if the sampling unit is in dry location. When used like this the sensitivity of detection is calibrated to that of point smoke detection.

**Beam detection**

General use is to substitute point detection in spaces that are high to access and service such as Machine Halls and Warehouses. It can be more cost-effective that aspirating smoke detection in these types of spaces. Specification consideration should include requirements around stability effects of structure, as shaking of the detector can affect reliability. Natural light control can be an issue, and remote test switches should be specified.

**Fire Alarm Panels**

All fire panels should be of an addressable type. Panels, when used at the same site or campus, groups of power stations, should generally be the same manufacturer type where practicable. Panel manufacturer standardisation is not mandatory.

**Commentary:**

Procurement costs and contractor availability will inevitably drive fire panel manufacturer selection. No policy exists in SHL regarding the standardisation of supplier brand fire panels.

Conventional (not addressable), panels can be used in remote sites with single/limited zone manual call points and heat detection systems such as where a remote generator or hydraulic control room requires detection. Systems with smoke detection should generally be of an addressable type. One of the benefits is that smoke detector deterioration is monitored automatically. This reduces callouts for alarms that smoke detectors may generate as they age. Cost of callouts and contractor attendance can be significant. Addressable systems also offer flexibility to add devices to systems in the future.

**Fixed Heat (Point) Detection**

This is the most common type of heat detector. Fixed temperature detectors operate when the heat sensitive eutectic alloy reaches the eutectic point, changing its state from a solid to a liquid. Thermal lag delays the accumulation of heat at the sensitive element, so that a fixed-temperature device will reach its operating temperature sometime after the surrounding air temperature exceeds that temperature. The most common fixed temperature point for electrically connected heat detectors is 58°C. “Heat detection” refers to point type heat detectors that operate at a fixed temperature.

**Flame Detection**

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire.

**Linear heat detection (LHD)**

Linear heat detection (LHD) cable is a two-core cable terminated by an end-of-line resistor (resistance varies with application). The two cores are separated by a polymer plastic, designed to melt at a specific temperature (commonly 68 °C for building applications). In this event, the two cores short causing a change in resistance in the wire.

LHD is useful in open spaces such as workshops, and can be a cheaper option than point heat detection. It is robust to environmental conditions and needs little maintenance. Zoning is limited to the number of separate cables. It is also useful for detection of cable tray fires, though has limited application for early warning of fire from smoke.

Fibre optic linear heat detection cable is available, which allows the pinpointing of a fire location at the point of cable melting. It is significantly more expensive than standard systems. It is useful in road tunnels and applications involving heat detection over long distances where the specific location of the fire is required.

**Manual Call Point (MCP)**

A wall-mounted push button device with a frangible window, that, when activated, initiates an audible and visual alarm on a fire alarm system. They are used to allow building occupants to signal that a fire or other emergency exists within the building. They are usually connected to a central fire alarm panel which is in turn connected to an alarm system in the building, and to the local fire brigade where appropriate.

**Multicriteria smoke and heat detection**

These are combination smoke and heat detection.

**Commentar**y: Multicriteria detectors are a nominal cost difference to individual point smoke or heat detectors. Their benefits are:

- In areas that have no suppression systems, they provide detection coverage when smoke detection systems are isolated. Such areas might be switchboard rooms in an area that is generally sprinkled but the switchboard room is not. This provides greater reliability to determining a fire location at all times, and heat detection systems are rarely isolated.

- Engineering judgement regarding the selection of multicriteria detectors is a useful risk addition for nominal cost.

**Rate of Rise (ROR) Heat Detection**

Rate-of-Rise (ROR) heat detectors operate on a rapid rise in element temperature of 6.7° to 8.3°C increase per minute, irrespective of the starting temperature. This type of heat detector can operate at a lower temperature fire condition than would be possible if the threshold were fixed. It has two heat-sensitive thermocouples or thermistors. One thermocouple monitors heat transferred by convection or radiation, while the other responds to ambient temperature. The detector responds when the first sensing element's temperature increases relative to the other.

Rate of rise detectors may not respond to low energy release rates of slowly developing fires. To detect slowly developing fires combination detectors add a fixed temperature element that will ultimately respond when the fixed temperature element reaches the design threshold.

Typically, these are used around equipment such as thermal generator enclosures, transformers where operating conditions and heat output vary, and a fixed temperature detection is not appropriate.

### Smoke detection

A smoke detector is a device that senses smoke and is connected to a central alarm system.

### Video detection – flame, smoke, and oil mist

There are a range of options using video to detect flame, smoke, and oil mist.

## Fire Extinguishing Systems

### Automatic Fire Sprinkler Systems including deluge and foam

An automatic fire sprinkler system is an active fire protection method, consisting of a water supply system, providing adequate pressure and flow-rate to a water distribution piping system, onto which fire sprinklers are connected.

A deluge system uses open spray heads attached to a piping system that is connected to a water supply through a valve that is opened by means of a detection system installed in the same area as the spray heads.

Foam systems are a type of fire sprinkler or deluge system, for control of burning flammable liquids and natural gas using a mixture of foam and water. It also forms a blanket that prevents oxygen from getting to the fire and suppresses the release of flammable vapours that could ignite in the air. Note SHL does not permit the use of PFAS containing foam suppression agents.

Generally new and deluge and foam systems and alterations to existing systems should involve engineering review, given the specialist nature and risk issues for using these systems.

Note that AS 2118 does not include systems with foam. Automatic foam/water sprinkler systems shall comply with AS 2118.1 and their installation shall comply with NFPA 16. AS 1940 also refers to NFPA 11, 15 and 16 as design codes.

### Fire Hose Reels

A fire hose carries water to a fire to extinguish it with the hose installed in a fixed cabinet or wall location.

### Fire Hydrant systems

### External hydrants

A valved assembly either in a pit or below ground level box, or upright pipe, comprising a valve and outlet connection from a water supply mains, to permit the controlled supply of water for firefighting.

### Building hydrants

Piped valved assembly with valve connection and outlet within a building, normally permanently charged with water and connected to a water supply, or used to supply water via a pumped fire appliance (fire engine).

### Gaseous Fire Extinguishing Systems (Total Flooding System)

Systems are arranged to discharge extinguishing agent (inert gas or chemical), into an enclosed space to achieve appropriate design concentrations, and extinguish a fire. Common systems include $CO_2$, and trade names such as Inergen, Proinert, Argonite, Novec 1230, and Sapphire.

### Hybrid (Water and Inert Gas) Fire Extinguishing Systems

Systems that use a combination of atomised water and inert gas to extinguish a fire. They use a single hybrid nozzle specially developed to deliver the hybrid media to the fire. The most common trade name system is Victaulic Vortex, which uses Nitrogen as the inert gas.

### Multiple Jet Control (MJC) Sprinkler Systems

A multiple jet control senses heat from a fire and then releases water to a group of water spray open nozzles protecting a hazard. They are particularly used in applications where a small number of nozzles need to activate simultaneously and form a concentrated spray pattern over a defined area such as a small transformer.

### Water-mist Extinguishing Systems

A system with a connected water supply and nozzles to deliver a mist intended to control, suppress, or extinguish fires, and designed in accordance with the manufacturer's installation procedures. Normally installed in enclosed spaces and where the system listing has been tested.

## Passive Fire and Other Systems

### Fire / Smoke Dampers

Fire dampers are passive fire protection products used in heating, ventilation, and air conditioning (HVAC) ducts to prevent the spread of fire inside the ductwork through fire-resistance rated walls and floors. Fire/smoke dampers are like fire dampers in fire-resistance rating, and also prevent the spread of smoke inside the ducts. When a rise in temperature occurs, the fire damper closes, usually activated by a thermal element which melts at temperatures higher than ambient but low enough to indicate the presence of a fire, allowing springs to close the damper blades. Dampers may also close using motorised controllers. Fire dampers can also close following receipt of an electrical signal from a fire alarm system utilising detectors remote from the damper, indicating the sensing of heat or smoke in the building occupied spaces or in the HVAC duct system.

They include intumescent dampers, which, in the event of fire, activate a heat sensitive expanding fire proof medium to block a smaller duct opening.

### Fire Ratings – Fire Resistance Level (FRL)

Fire Resistance Level (FRL) ("Fire Rating"), as defined in the Building Code of Australia (NCC (formerly BCA)) is the grading period in minutes for three criteria: **structural adequacy, integrity, and insulation**, tested to AS 1530.4-1990: "Methods for fire tests on building materials, components and structures – Fire-resistance tests of elements of construction".

Typically, this is expressed as FRL xxx/xxx/xxx depending on the specification of passive system being specified.

Note that in an open generation plant, fire rating can be eliminated by distance separation. Consider fire radiation and smoke movement in the design if eliminating fire rating.

## APPENDIX C - Externals Parties

| Item / Description | Location | Name |
|---|---|---|
| Fire Maintenance Contractors | National | Chubb |
| | Colongra Power Station | Minimax (Dry fire system) |
| Water Authorities | New South Wales | Water NSW<br>Hunter Water Corporation<br>Central Coast City Council (Colongra) |
| | Victoria | Gippsland Water |
| | | Greater Western Water |
| | South Australia | South Australia Water Corporation (SAWC) |
| Fire Authorities | New South Wales | Fire and Rescue NSW<br>NSW Rural Fire Service |
| | Victoria | Fire Rescue Victoria (FRV) |
| | South Australia | South Australian Metropolitan Fire Service (SAMFS) |
| | | South Australian Country Fire Service (SACFS) |