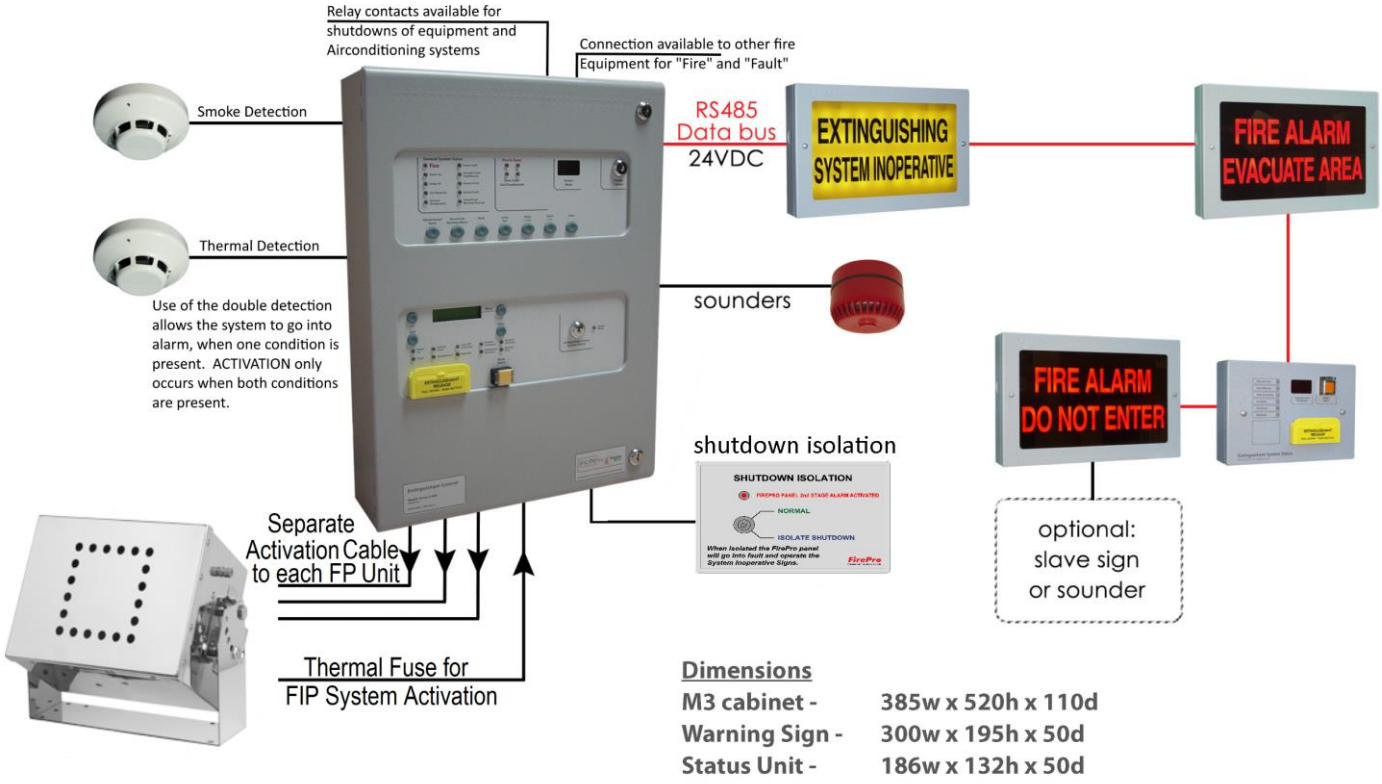
SCHEMATIC OVERVIEW OF SYSTEM



SIGMA XT Panel is the only FIP that is currently approved BY FirePro, this panel and ancillary equipment will properly monitor the FirePro aerosol generators in accordance with the requirements of AS 4487. The Sigma XT series can be used as a main FIP or slave panel from other FIP manufacturers.

Notes: (References to specific clauses in AS 4487 are shown in brackets)

1. FIP is Sigma XT series panel, can be used as main FIP or slave controller to other FIP units.
   - Sigma XT fully compliant to AS(A4)
   - Main Panel includes
     - programmable time delay(A3)
     - Single or double nock detection(7.7.2)
     - manual activation switch(7.7.3.1)
     - Isolation switch (7.7.3.6)
     - Power to AS (A5)
     - Shutdown devices(7.2.3)
     - System monitoring for all components(A6.4)
2. Signage all to AS(7.7.3.4) and Alarm Siren(7.7.3.5)
3. Remote status unit = local control station(7.7.2.3), manual call points are also available(7.7.3.1)
4. Separate cable from Panel to each FirePro Generator.
5. Thermal Fuse to be connected 1st FP unit for system activation advice(A4(b))
6. Cable to FP units all to be shielded Fire Rated
7. Systems installed in electrical substations or switch rooms require all components including FirePro generators to be separated earthed.
8. Airconditioning and any ventilation in risk areas must be shutdown before system activation(7.2.3)

NOTE MUST USE COMPATIBLE ELECTRONICS

1 SCOPE

This Standard specifies requirements for the design, installation, testing, commissioning and safety requirements for aerosol firefighting systems in buildings or plant. Local applications of aerosol extinguishing systems are not covered by this Standard.

3 DEFINITIONS

3.2 **Aggressive Environment** including the following or as defined by the authority having jurisdiction:
- (a) Exterior situations exposed to the sun, ultraviolet radiation, wind, rain, or salt spray.
- (b) Corrosive atmospheres.
- (c) Abnormally dusty or moisture-laden atmospheres.
- (d) Extreme temperature.
- (e) Vibrations and shocks.

3.4 **Authority having jurisdiction** is a government department, or regulation, or the owner.

3.7 **Competent person** is a person who has acquired through training, qualification, experience, or a combination of these, the knowledge and skill enabling him/her to correctly perform the required task.

4 USE AND LIMITATIONS

4.2.2 Aerosols are electrically non-conductive three dimensional media. Being a dispersion of fine solid particles in gas, the aerosol is not a clean agent. Following actuation of an aerosol generator there is a period of time during which the aerosol particles remains in suspension within the enclosure. The aerosol particles will eventually settle, forming a dust-like residue.

4.3 Aerosols referred to in this Standard shall not be used on fires involving the following fuels unless relevant testing has been carried:
- (a) Chemicals containing their own supply of oxygen, such as cellulose nitrate.
- (b) Mixtures containing oxidizing materials, such as sodium chlorate or sodium nitrate.
- (c) Chemicals capable auto-thermal decomposition, such as some organic peroxides.
- (d) Reactive metals (such as sodium, potassium, magnesium, titanium and zirconium), reactive hydrides, or metal amides, some of which may react violently with some aerosol extinguishing agents.
- (e) Oxidizing agents such as nitric oxides and fluorine.
- (f) Pyrophoric materials such as white phosphorus or metallo-organic compounds.

4.5 **Temperature limitations** - All devices shall be designed for the conditions they will encounter and shall not readily be rendered inoperative or susceptible to accidental operation. Devices shall be designed to function properly from −20°C to +75°C, or marked to indicate temperature limitations.

4.6 Systems with the simultaneous discharge of aerosols and other extinguishing agents to protect the same enclosed space shall not be permitted unless approved.

5 SAFETY

5.1 Any hazard to personnel created by the actuation and discharge of the aerosol system should be considered in the design of the system

5.2 No aerosol shall be used that is carcinogenic, mutagenic or teratogenic at the design application density expected during use.

5.3 Reduced visibility - All aerosols reduce visibility during discharge, some more than others.

5.6 An open flame or exposure to high temperatures may cause activation of the aerosol generators.

5.7.3 Aerosol generators must be installed using minimum thermal clearances as specified.

5.8 Where electrical conductors are present, clearances specified by safety regulations need to be observed.

5.9 Systems within **electrical substations or switch rooms shall be earthed**, where required to prevent metalwork from becoming electrically charged.

6 AEROSOL GENERATORS

6.1 Testing and listing - Aerosol generators shall be tested.

6.2.4 Higher Hazard fires - It is recognized aerosol standard design concentrations tests may not adequately indicate extinguishing concentrations suitable for the protection of certain plastic fuel hazards. Design Concentrations should be increased for these risks. These include:

(a) Cable bundles greater than 100 mm in diameter.
(b) Cable trays with a fill density greater than 20% of the tray cross-section.
(c) Horizontal or vertical stacks of cable trays (closer than 250 mm).
(d) Equipment energized during the collective power consumption exceeds 5 kW.

6.3.3 **Discharge times** for each size aerosol generator shall be specified by the manufacturer.

Aerosol generators shall not cause fire or explosion during actuation and discharge.

6.3.5 The service life of aerosol generators for typical applications shall be specified by the manufacturer and listed by a listing organization.

6.4 Manufacturers shall put a permanent marking specifying the following on each aerosol generator:

(a) Aerosol trade name.
(b) Manufacturer.
(c) Date of manufacture.
(d) Serial number.
(e) Mass of aerosol forming compound.
(f) Each aerosol generator shall be marked indicating the installation date, and the expiration date.

7 SPECIFICATIONS, PLANS AND APPROVALS

7.1 Specifications for aerosol fire extinguishing systems shall be prepared by a person fully experienced in the design of aerosol systems and, where appropriate, with the advice of the authority having jurisdiction. The specification shall include all pertinent items necessary for the proper design of the system, variances from this Standard, design criteria, system sequence of operations, owner training requirements and working documents.

7.2.1 The protected enclosure shall have sufficient **structural strength** and integrity to contain the aerosol discharge.

7.2.2 To prevent **loss of aerosol through openings** to adjacent areas, openings shall be permanently sealed or equipped with automatic closures.

7.2.3 **Forced-air ventilating systems shall be shut down** or closed automatically where their continued operation would adversely affect the performance of the fire-extinguishing system or result in propagation of the fire.

Other services within the protected enclosure that are likely to affect the performance of the extinguishing system shall be shut down prior to, or simultaneously with, the discharge of the aerosol.

7.3.1 The design application density is to be specified. In addition to the calculated total flooding quantities, **additional aerosol may be required to compensate for any special conditions** that would adversely affect the extinguishing efficiency or, the physical characteristics of the aerosol.

(a) Where leakage occurs from a non-tight enclosure.
(b) Where leakage occurs due to doors being opened during or immediately after discharge. This should be covered by operational protocols for individual risks.

(d) Where metal surfaces, heated by the fire, may act as an ignition source if not adequately cooled during aerosol discharge and hold time.

7.4.1 **Altitude** has no effect on aerosol design calculations, but it affects the aerosols spatial distribution.

7.4.2 **Temperature**, as with altitude, has no effect on aerosol design application density calculations, but it affects the aerosols spatial distribution.

7.5.1 The selected generator sizes shall comply with the maximum distance and area coverage and maximum or minimum protected height limitations as specified for each generator.

7.6 **Duration of protection** - suppression must not only be achieved, but be maintained for a sufficient period of time to allow effective emergency action. Since it is possible a persistent ignition source can cause reignition of the fire event once the aerosol has dissipated.

Due to the characteristics of aerosols, no method is known to evaluate the hold time in real installations. To ensure the protection is adequate in terms of hold time, the following calculation shall be completed and compared to the original designs:

$$\frac{\text{Estimated Leakage Area(ELA)}}{\text{Volume of Room}} = \text{Leakage Area to Volume Ratio}$$

The hold time shall be not less than 10 min, unless otherwise specified.

7.7.1 Systems may be configured for automatic detection with automatic and /or manual actuation. Detection, actuation and control systems shall be independent from any general building fire detection and alarm system.

7.7.2 Except where the potential exists for a very rapidly developing fire, detection should be configured for dual detector automatic **actuation of the system**.

7.7.3.1 Automatic systems shall be controlled by automatic fire detection and actuation systems suitable for the system and hazard, and must have a manual activation switch.

Automatic systems shall perform all functions necessary for the successful operation of the system, including time delay and ancillary functions (e.g. equipment shutdown). All ancillary equipment shall incorporate manual reset facilities.

7.7.3.2 Manual operation of the system by means of a control situated outside the protected space or inside adjacent to the main exit from the space. Unless specified, manual operation shall initiate the normal discharge sequence of the system. The manual operation device shall incorporate a safety device to restrict accidental operation.

7.7.3.3 **Local control station (LCS)**, situated outside the protected space or inside adjacent to the main exit from the space. The LCS may be incorporated within the FIP equipment when the FIP is located either within or adjacent to the protected area. Access to the LCS shall not require the opening of any equipment door, and operation of the LCS controls shall not require the use of any key.

7.7.3.4 **Visual Warning Signs**, except for systems protecting unoccupiable areas, signs shall be provided, sign Specifications are shown in A6,:

(a) FIRE ALARM readily visible to all occupants of the area.
(b) DO NOT ENTER above each access door and visible to persons having access to the protected area.
(c) EVACUATE AREA readily visible to all occupants of the area.
(d) EXTINGUISHING SYSTEM INOPERATIVE located at the principle entry. Readily visible to all persons having access to the protected area.

7.7.3.5 **Aural Alarms**, shall be provided within the protected area.

7.7.3.6 **System Isolating Switch** - The discharge of electrically operated aerosol generators in total flooding applications in areas where people may be present MUST have a system isolating switch. The switch shall be situated outside the protected area or inside adjacent to the main exit from the area and protected from an accidental operation.

While the system isolate switch is active and the discharge of the system is inhibited, the fire detection and alarm systems shall continue to function and the system shall return to its operation control when the device is reactivated. The operation of the system isolate switch shall activate an indicator at the fire panel.

8 COMMISSIONING

8.2.2 The risk area volume and dimensions shall be checked against the protected volume calculations specified in the system design. Fan rundown and damper closure time shall be taken into consideration.

All total flooding systems shall have the enclosure checked to locate and then effectively seal any significant air leaks that could result in a failure of the enclosure to hold the specified aerosol extinguishing application density for the specified holding period.

8.2.3 **Operation temperature range**, humidity and other expected ambient conditions shall be checked for compliance with those specified by the manufacturer.

8.2.4 Review of the mechanical components of aerosol generators - Specifically:

(a) The number and size(s) of the aerosol generators shall be checked to the design. The generators are to be appropriate in relation to maximum height limitations.
(b) Check orientation of generators to ensure aerosol dispersal and containment is achieved.
(d) Minimum thermal clearances from the discharge outlet(s) shall be checked against those specified in the design for the risk, occupancy, equipment and materials present in the risk.
(e) Aerosol generators and mounting brackets shall be securely fastened.

8.2.5 All wiring systems shall be properly installed in compliance with the relevant part of AS 1670. Check all electrical components are installed and in accordance with the system design.

8.2.6 **System test** - in accordance with AS 1670.1 and shall include all the following tests to design specifications:

(a) Operate the detection initiating circuit(s).
(b) Operate the necessary circuit to initiate a second alarm circuit if present.
(c) Operate the manual release device.
(d) Test all system interfaces and shutdowns e.g. air conditioning systems shutdown.
(e) Where appropriate, operate the system isolate switch.

8.2.8 The installer shall provide the owner with a completion certificate, a complete set of instructions, calculations and drawings showing the system as-installed, and a statement that the system complies with all the appropriate requirements of this Standard, providing details of any deviations from appropriate recommendations.

9 MAINTENANCE

Maintenance of aerosol systems shall be in accordance with the Special Hazard Systems section of AS 1851.

APPENDIX A - ELECTRICAL DETECTION, ACTUATION AND CONTROL SYSTEMS

A1 GENERAL – Special hazards pose challenges to the design, operation and effectiveness of fire protection systems. These may include the intensity or speed of fire development, materials involved, configuration of equipment to be protected, air flows or environments, etc.

The requirements specified in the relevant parts of AS 1670 shall also apply. Where any conflict occurs; the requirements of this standard shall take precedence.

Special hazards detection, actuation and control systems shall be separate from any general building fire detection and alarm system. The special hazard system fire detectors may be used to satisfy the requirements of the building fire detection system for that area provided the special hazards control and indicating equipment FIP is monitored by the building fire detection and alarm system.

A3 **Discharge time Delay**, if required, the period shall be specified by the special hazard designer.

A4 ELECTRICAL CONTROL EQUIPMENT – the Fire Indicator Panel FIP shall comply with this Standard and AS 7240.2 or the relevant parts of AS 4428. Specific requirements include the following:

(b) A visual indicator shall be provided to confirm discharge has occurred. An indication that a signal has been sent to initiate the aerosol generator does not satisfy this requirement.

A5 POWER SUPPLY - In addition to the requirements of AS 1670.1,:

(b) The secondary power supply, shall be capable of maintaining the system in stand-by mode for a minimum period of 96 h and be capable of complete system operation for a minimum period of 30 min.

A6.3 Initiation of the extinguishing agent discharge by any method shall cause the alarm DO NOT ENTER and EVACUATE AREA visual warning devices to illuminate and the 'Evacuate' tone to sound. These devices shall continue to operate until the protected area is made safe.

A6.5 Visual warning devices shall comply with relevant requirements of AS 1603.11:

Signs are available in indoor & weather proof versions

A8 WIRING - All wiring shall comply with the requirements of other sections of this Standard except that the extinguishing agent actuator circuit shall have a minimum rating of WS51W, in accordance with AS 1670.1, with the mechanical rating upgraded dependent upon the hazard as defined in AS/NZS 3013.

DOCUMENTATION REQUIREMENTS

B2 WORKING DOCUMENTS - shall include at least the following items:

(a) Location drawings. (b) Name of owner and occupant. (c) Location of building in which hazard is located. (d) Location and construction of protected enclosure walls and partitions. (e) Enclosure cross-section, full height or schematic diagram, incl raised access floor and suspended ceiling. (f) Type of aerosol generators being used. (g) Design application density. (h) Description of occupancies and hazards to be protected against.	(i) Specification of aerosol generators used. (j) Equipment schedule or list of materials for each piece of equipment or device, showing device name. (k) Manufacturer, model or part number, quantity and description. (l) System calculation. (m) Enclosure pressurization and venting calculations. (n) Description of fire detection, actuation and control systems.