08 - Fire Protection Systems

Version	Date	Authors	Summary of Changes
2.0	28 February 2012	Mark Pritchard	
2.1	9 August 2012	Mark Pritchard	rewrite some sections
3.0	05 February 2016	Mark Pritchard	General Revision
4.0	27 March 2020	Adam Agius / Mark Pritchard	General Revision
4.1	08 October 2021	Mark Pritchard	General Revision

Introduction

08.01 The Australian National University (ANU or the University) has set minimum requirements for essential fire safety measures for use in new and refurbished buildings at all Campus's. The Campus and Building Requirements Manual (the CBRM, Requirements or the Manual) may exceed the minimum requirements of the Australian Standards.

08.02 The Consultant shall refer to the relevant Australian Standard and the National Construction Code (NCC) and consult with local Fire and Rescue Authorities and the Principal's Representative (the Principal or the Principal's Project Manager) at the earliest possible stage in the design process. This will ensure that both local Fire and Rescue Authorities and the ANU Requirements are met and delays avoided at the building occupation stage.

08.03 The Consultant shall consider Safety in Design principles for maintenance of all essential fire safety measures, including the position of smoke detectors on ceilings.

08.04 The CBRM is intended to be read and distributed electronically. This does not preclude printing sections of the Requirements; however, the University takes no responsibility for the completeness and currency of printed/hard copy material distributed amongst the Consultant team. Notwithstanding any Consultant's particular discipline or area of responsibility, each Consultant and/or designer shall consider the document in its entirety.

08.05 The complete CBRM consists of the following Sections which may be referred to within this Section:

Campus and Building Requirements Manual	
Section 01	General Requirements
Section 02	Architectural Requirements
Section 03	Roads, Car Parking & Civil Works
Section 04	Soft Landscaping
Section 05	Roofing, Roof Fabric & Roof Safety
Section 06	Building Management Systems
Section 07	Electrical Services
Section 08	Fire Protection Systems
Section 09	Hydraulic Systems
Section 10	Mechanical Services
Section 11	Lifts, Cranes & Vertical Transportation Systems
Section 12	Security, CCTV & Access Control

Overview of Design Principles

Australian Standards and Statutory Requirements

08.06 All works shall comply with the relevant Australian Standards, National Constriction Code (NCC) and Local Fire and Rescue Authorities policies. Where a standard or code referenced is superseded the new standard or code shall be adopted.

Definition of Essential Fire Safety Measures

08.07 Design and installation of essential fire safety measures shall include all subjects / aspects pertaining, but not restricted to the following:

- automatic fire detection and alarm systems;
- automatic fire sprinkler systems;
- access panels, doors and hoppers to fire resisting shafts;
- automatic fail safe devices;
- Emergency Warning and Intercommunication Systems (EWIS);
- smoke and heat alarm systems;
- emergency evacuation plans;
- Emergency and exit lighting (refer to Section.07 Electrical Services);
- fire doors;
- smoke doors;
- fire hose reel systems;
- fire hydrant systems;
- fire seals protecting openings in fire resisting component;
- fire shutters;
- gaseous fire suppression systems;
- mechanical air handling system shutdown;
- portable fire extinguishers and fire blankets;
- pressurising systems;
- fire dampers;
- smoke and heat vents;
- smoke dampers;
- standby power systems;
- required power operated exit doors;
- wall wetting sprinkler and drencher systems; and
- warning and operational signs.

08.08 The classification of a building will determine the essential fire safety measures. The proposed essential fire safety measures shall be submitted to the Principal's Representative by the Consultant team during initial design development, for review and comment.

08.09 Several buildings at the ANU contain increased risks for health and safety hazards in excess of those normally found in typical Class 9b buildings. The essential fire safety measures may need to be increased in these buildings.

08.010 The Requirements be in addition to, but not in substitution of legislation.

Specific Design Requirements

Fire Monitoring Provider

08.011 The ANU uses an external service provider to monitor fire systems in its buildings. The Principal's Representative will arrange the application process for the facility to be connected to the service provider.

Tender Packages for Fire Systems

08.012 All fire system packages must be separately tendered and not be incorporated into another trade package. For example, a dry fire system must not form part of an electrical tender package.

Major Refurbishments

08.013 Major refurbishments of buildings will be required to meet the most recent CBRM at time of design. Advice on the scope and inclusions for systems in major refurbishment projects can be sought from the Associate Director, Infrastructure and Planning with input from the Technical team.

08.014 When replacing Conventional FIP's with new Fusion AU5000 addressable systems a LVM-100 short circuit isolator must be installed and configured to allow fully addressable functionality.

Block Plans

08.015 FIP block plans shall indicate all detectors in the building

08.016 Block plans shall be installed in aluminium frames for easy replacement.

08.017 A DWG of the block plan shall be provide in the WAE package

08.018 Block plans shall be submitted to the Principal's Representative to review prior to final installation.

Fire Systems Interface Matrix

08.019 A Fire systems interface matrix shall be prepared and installed as part of the deliverables. The ANU reserves the right to undertake witness testing to ensure its consistency with actual operation.

Evacuation Diagrams

08.020 The ANU's service provider shall be engaged to design, supply and install evacuation diagrams

08.021 The responsibility and cost of updating the diagrams will remain with the Project.

08.022 New evacuation diagrams shall be installed as part of any refurbishment project for existing buildings.

08.023 The evacuation diagrams shall be installed in an A3 brushed aluminium frame and installed in accordance with *AS 3745 Planning for emergencies in facilities*.

08.024 A master PDF Evacuation Diagram per level shall be forwarded to Facilities and Services for review before production and Installation. CAD and PDF copies of all Evacuation Diagrams shall be supplied as part of WAE documentation.

Fire Protection and Fire Protection Systems

Standardised Equipment

08.025 The ANU has standardised the type/brand of equipment. Any equivalent technologies must be submitted as an alternative solution in the tender.

Analogue/Addressable Fire Panel	:	Fusion Advanced AU5000 complete with BACnet card
Detectors	:	Fusion Advanced Smoke, Thermal or Multi criteria
Aspirated Detectors	:	Xtralis VESDA
Warning System EWS	:	Simplex T-Gen 50
Warning System EWIS	:	Fusion Advanced VIGIL 2 EWIS
Sprinkler Systems	:	Any SSL approved

Sprinkler (Wet) Systems

08.026 For sprinkler systems, the Consultant shall prepare plans, specifications and tender documents for the installation of the system as part of the design and documentation procedure.

08.027 Plans and specifications shall conform to the ANZ/ISO Standards for Automatic Sprinkler Installations, supplemented by the Additional Requirements outlined in this section.

08.028 The wet system shall meet the requirements of the Australian Standards and comply with the requirements of the NCC and the Chief Officer, local Fire and Rescue Authority.

08.029 **Additional Requirements**

1. The ANU has a preference for automatic sprinkler systems in all new general type buildings greater than two storeys high. If for any reason a dispensation from this rule is sought, the application must go to the Associate Director, Infrastructure and Planning, Facilities and Services.
2. The ANU has a preference for quick response heads.

3. Drainpipes shall not terminate in blind spaces under the building. Drains will be sized to accommodate a discharge rate of 2000 L per minute (200 – 250 mm diameter would be considered minimum).
4. The minimum classification of sprinkler systems on the ANU Campus shall be Ordinary Hazard 1. Extra light hazard systems shall not be accepted.
5. All sprinkler systems shall be fitted with an automatic electric jacking pump with run hour meter to enable the sprinkler system to be restored to normal operating pressures after maintenance procedures.
6. Local Fire and Rescue Authorities requires that all sprinkler systems be separately monitored and that all flow switches are represented at the Fire Indicator Panel (FIP).
7. Devices such as retard chambers will not be accepted on the ANU's fire sprinkler systems.
8. Pre-action systems in conjunction with VESDA systems shall be installed in any super computer hall, server room or the like.

Dry Fire Alarm Systems

08.030 For dry fire alarm systems, the Consultant shall prepare plans, specifications and tender documents for the installation of the alarm system as part of the design and documentation procedure.

08.031 Plans and specifications shall conform to *AS 1670 Automatic fire detection and alarm systems - System design, installation, and commissioning*.

08.032 The dry system shall meet the requirements of the Australian Standards and comply with the requirements of the Chief Officer, local Fire and Rescue Authority.

08.033 The Consultant shall arrange for the successful tenderer to submit full detail drawings of the installation (layout), type of detectors and FIP type to the Principal's Representative before any work is commenced.

08.034 The drawings shall show the following information:

- circuit grouping;
- detector grouping and position;
- route of cabling and conduit runs concealed from view; and
- cabling and location of any other ancillary equipment associated with the contract.

08.035 Additional Requirements

1. For fire detection systems, the specification for the automatic fire alarm system shall include all wiring in the installation as part of the contract and such wiring shall be carried out in accordance with *AS 3000 Electrical Installations*.
2. All detectors shall be identified on the layout plans by circuit and detector numerals. Example: 8/12 indicates No. 8 circuit, No. 12 detector.
3. A systems interface matrix shall be supplied and installed near the FIP.
4. VESDA systems shall be considered in all major communication rooms.

Fire Detection Alarm System

08.036 The ANU has a preference for automatic fire detection systems in all buildings. If for any reason a dispensation from this rule is sought, the application must go to the Associate Director, Infrastructure and Planning, Facilities and Services.

08.037 Fire detection systems in accommodation building may have a programmed delay of 2 minutes on the smoke detector before generating a general fire alarm. The smoke detector shall be fitted with a sounder base and raise a local alarm to warn the occupant and allow them to clear any smoke / particles to prevent a false alarm. Any smoke detector in a common space or thermal detector shall raise a general fire alarm immediately.

08.038 The fire detection alarm system shall automatically indicate an alarm to the local fire authority upon detection of a fire by a thermal or smoke detector or any other fire detection device or manually operated alarm via the ANU's fire monitoring service provider.

Very Early Smoke Detection Apparatus (VESDA): Aspirated Smoke Detection System

08.039 The use of a Very Early Smoke Detection Apparatus (VESDA) system should be considered in all high risk or high insurance areas of the ANU.

08.040 VESDA systems shall work independently; they shall be connected to the FIP and only Fire 1 and Fire 2 conditions shall activate the FIP.

08.041 An isolated VESDA system shall display a fault on the FIP. A fault on the VESDA shall also activate a fault on the FIP.

08.042 The VESDA shall have a mimic panel installed and the controller is to be located remotely from the VESDA.

Detectors

08.043 All detectors containing end of line resistors shall be clearly marked on their bases and on the as installed drawings.

08.044 All ceiling mounted detectors shall be symmetrically located with respect to luminaires, air registers and other ceiling mounted items.

08.045 If cabling for fire systems is external on the building, it must run in Galvanised Steel Screw conduit, boxes and connections to prevent damage from hail.

Fire Hydrants, Hydraulic Hose Reels and Fire Extinguishers

08.046 The size and length of hoses shall be determined by the Chief Officer, local Fire and Rescue Authority.

08.047 The quantity and location of hydrants, hose reels and fire extinguishers shall be determined by the relevant standards and hazards in the facility.

08.048 Fire extinguishers shall comply with the relevant Australian Standards.

08.049 Installation of hose reels shall be included in the fire services contract and not form part of the general building works.

08.050 Fire blankets and a small DCP AB(E) extinguisher shall be installed in food cooking and reheat areas such as kitchenettes.

08.051 Commercial kitchens shall have a wet chemical fire extinguishing system installed to reduce risk of fat fires spreading, this will be interlocked with a gas shutoff system.

Evacuation Systems: Emergency Warning System (EWS) and Emergency Warning and Intercommunication System

08.052 The ANU has a preference for programming EWIS for a one out all out evacuation process. EWIS can be programed for alert then evacuate but the delay from alert to evacuation shall be 5 minutes.

08.053 Where required, the contractor shall ensure that the location of Warden Intercom points are such that they can be operated without interference from noise from the system speakers or air handling system.

08.054 Emergency Warning System (EWS) and EWIS evacuation systems shall be installed in all buildings that are greater than two stories high. All evacuation systems installed shall comply with AS 1670 and NCC requirements.

08.055 When possible, PA and EWS (including Grade 1, 2 and 3 systems) will share cabling. The cable must be suitable for the installation to comply with AS1670-2018.

08.056 Fire and PA zones must be suitably designed to comply with AS1670-2018 and also offer the required PA zoning.

08.057 Loudspeakers (across both PA and EWS) must comply with AS7240.24, ISO7240.24 or EN.24.

08.058 Loudspeakers must be equal to AS7240.24 / EN.24 compliant speakers and horns such the DNH range of speakers below:

Loud Speaker	Horn
CAP-15-54 (T)	DP-10-54 (T)
CAS-15-54 (T)	DPD-10-54 (T)
P-3X2P-54(T)	DSP-15-54 T
SAFE-561-54(T)	HP-10-54 T
VES-561-54(T)	MH-30-54 T
SAFE-10P-54(T)	

08.059 A BVRDTSM Baldwin Boxall Touch screen Microphone to suit Vigil2 shall be installed in the reception desk of a building so that staff can utilise the PA system.

Fire Indicator Panel (FIP)

08.060 The panel shall incorporate all Alarm Zone Facilities (AZF's), Ancillary Control Facilities (ACF's), Master Alarm Facilities (MAF's), indicators and isolators grouped in a neat logical order.

08.061 The Fire Indicator Box shall also contain all necessary test facilities, batteries and battery charger and battery voltmeter and all associated wiring and accessories.

08.062 The Fire Indicator Box shall be a recessed wall mounted enclosure.

08.063 The ampere hour capacity shall be sized to allow for additional items such as buzzers, bells and relays as required by this specification. Batteries shall comply with the current version of *AS 60598 Luminaires - General requirements and tests*.

08.064 The battery charger shall be a fully automatic constant potential type employing all solid-state components, and shall be capable of recharging a fully discharged bank of batteries to 80% of their capacity within 24 hours.

Required Exit/Egress Doors

08.065 All exit doors shall be fitted with an approved latching device that must be capable of opening from inside with normal door lever action and without recourse to a key. Should dead-locking devices be used, the dead-lock must cancel out under normal door lever action.

Access Control Door Integration

08.066 The access control door system is to be tripped to release all doors on any fire alarm condition. This is achieved by connecting the fire trip circuit to the output circuit on the FIP.

Fire Doors

08.067 All fire doors and door hardware shall meet the requirements of the NCC and Australian Standards.

08.068 Sliding type fire doors shall not be installed, expect in special cases and then only by approval of the Chief Officer, local Fire and Rescue Authority.

Smoke Doors

08.069 Corridor smoke doors shall be double acting with a 180º swinging movement. The doors shall be effectively sealed against fire and smoke for reasonable periods of time. The closing mechanism shall ensure that the door returns to the sealed position as required.

Electromagnetic Door Holders

08.070 All smoke and fire doors shall be fitted with magnetic door holders operating in conjunction with the fire protection or detection system, whichever is the case and shall operate on 24 V DC.

Automatic sliding or swing doors in paths of egress

08.071 Automatic sliding and swing doors shall be tripped and drive open on any fire alarm condition. This is achieved by connecting the fire trip circuit to the output circuit on the FIP.

Emergency and Exit Lighting

08.072 Emergency lighting shall be installed in accordance with current version of *AS 2293 Emergency escape lighting and exit signs for buildings - System design, installation and operation* and AS 3000. Refer to Section.07 Electrical Services.

08.073 The emergency and exit light fittings shall have a built in self-testing system incorporated in each fitting. Centralised monitoring systems are not recommended.

08.074 Emergency light test switches shall be provided at each DB.

Labelling & Cable Markers

08.075 All wiring to detectors, door holders, door locks, strobe lights, bells, sirens, mimic panels etc. shall be clearly marked.

08.076 Circuits to detectors shall be numbered sequentially circuit 1 - cable 1, circuit 2 - cable 2 etc.

08.077 All switches and isolators shall be clearly labelled. The Fire Indicator Box shall have a label fixed to the front of the panel stating the following:

- Fire Brigade installation number (AFA number);
- Source of 240V power supply (distribution board and circuit number); and
- Labels shall be of red background with white engraved letters.

Other requirements

08.078 Deep fat fryers shall have over temperature cut-off switches installed to shut down the fryer if a maximum temperature is reached.