University of Wollongong

Fire Services Design Standards
Version 4 – 2 September 2013

VERSION CONTROL SYSTEM

Section Modified	Description of Modification	Version	Organisation	Representative	Date
8.8	LIFE CYCLE COSTINGS MOVED TO SECTION 8.9	1.03	Asset Technologies Pacific	Tom Poyner	20/11/06
8.8	Warranty periods added	1.03	Asset Technologies Pacific	Tom Poyner	20/11/06
Throughout	UOW Logo added to headers	1.03	Asset Technologies Pacific	Tom Poyner	28/11/06
3.2	Add risk assessment activity to conceptual design process.	1.03	Asset Technologies Pacific	Tom Poyner	1/12/06
3.4	Insert OH&S reference link	1.03	Asset Technologies Pacific	Tom Poyner	1/12/06
8.7.5	Notifier AFP-2800 inserted as preferred FIP	1.03	Asset Technologies Pacific	Tom Poyner	1/12/06
Throughout		1.04	University of Wollongong	Chris Hewitt	9/6/10
Throughout		2	University of Wollongong	Chris Hewitt	13/810
1,3,4.2,4.10, 4.11,6,7,8	Added Emergency Mass Notification equipment	2.01	Asset Technologies Pacific	Donny Yap	19/7/11
Throughout	Document updated to reflect name change from Buildings & Grounds (B&G) to Facilities Management Division (FMD) and rebranding logo	3	University of Wollongong	Yvonne Butcher	5/3/12
Throughout	Document reviewed - no changes required	4	University of Wollongong	Dylan Chresby, Maintenance Manager	02/09/13

UNIVERSITY OF WOLLONGONG

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1. FIRE SERVICES

Fire Services shall be designed to ensure the safety and well being of persons, and minimise impact on property and business processes at UOW in the event of a fire.

The fire services shall generally comprise:

a. Portable Fire Extinguishers.

b. Hose Reels and Hydrants.

c. Dry-Fire Detection Systems.

d. Sprinklers.

e. Fire Doors and Associated Controls.

f. Smoke Exhaust Systems.

g. Emergency Evacuation and Warning Systems.

h. Gas suppression Systems.

i. Emergency Mass Notification Systems.

As required by BCA and client brief, the fire services shall be used in conjunction with physical and operational safety measures and procedures to provide appropriate communications and facilitate egress from buildings during emergency situations.

2. OVERVIEW

This design standard outlines the functional, installation and technical requirements for fire services at UOW.

The fire service designer shall use these standards as the basis for the design. However, it is incumbent upon the fire service designer to ensure that the type of fire services selected are suitable for the operational profile of the facility, are cost efficient and comply with all relevant codes and regulations.

As the various fire systems are generally considered in terms of overall functionality and performance, fire service designer are encouraged to develop the most suitable fire solution for any particular installation.

Where the fire service designer considers that an alternate design philosophy is more appropriate than that specified in the design standard, the fire service designer will advise the principal of the functional, performance or cost benefit that will be achieved through the implementation of the alternate design philosophy.

3. DESIGN PROCESS

This section provides an overview of the design process. The process shall be followed to achieve UOW's desired outcomes.

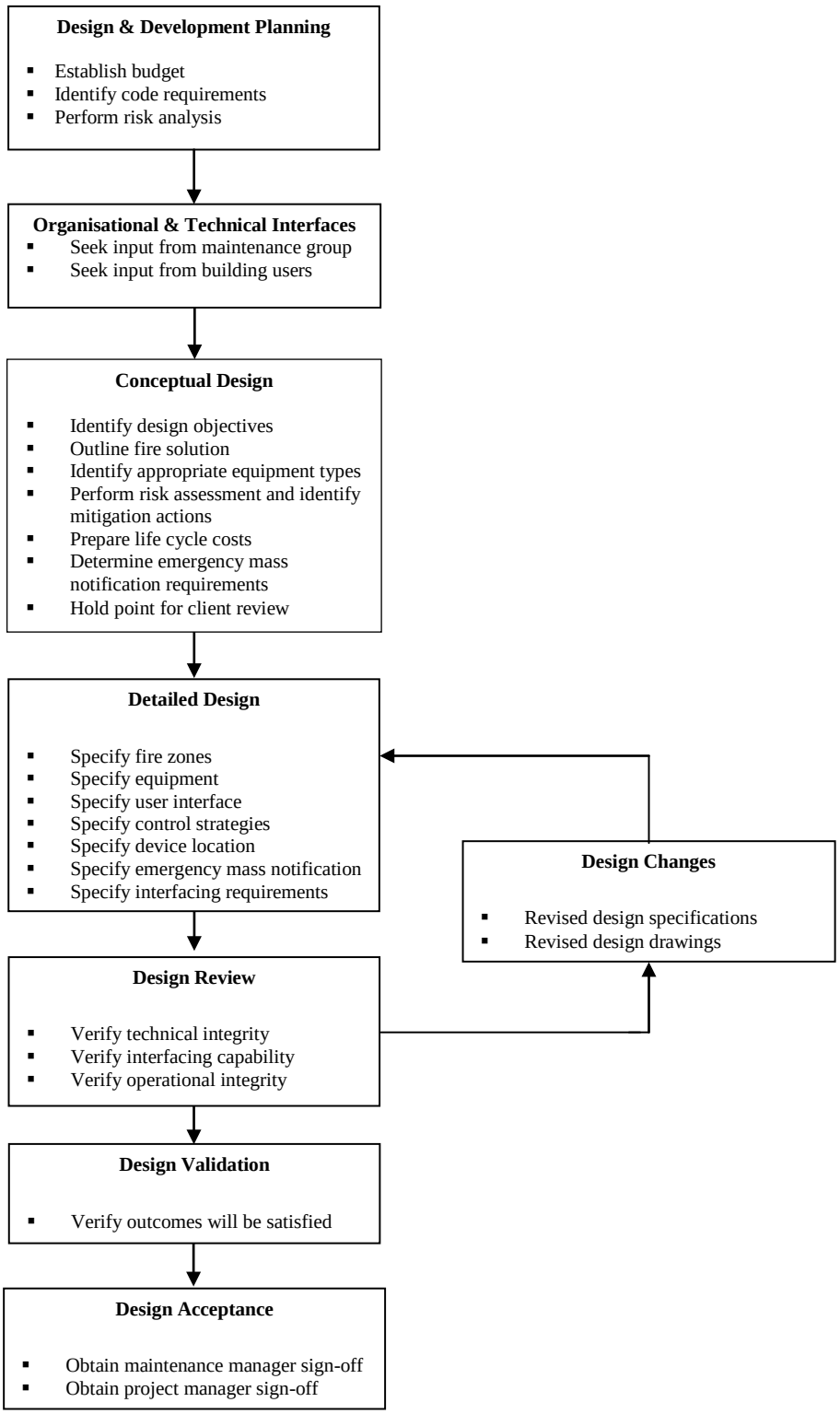

Figure 1 - Process Flow

4. FUNCTIONAL REQUIREMENTS

This section of the design guidelines outlines the functional requirements. A risk analysis should be undertaken to identify specific risks associated with the area under consideration and to determine whether the provision of additional fire services are necessary to mitigate the risks.

4.1 Portable Fire Extinguishers, Hose Reels and Hydrants

4.1.1 Portable Fire Extinguishers

Hand fire extinguishers must be provided to all areas in accordance with BCA requirements and the clients brief.

Additional fire extinguishers should be provided in areas that may be occupied by emergency services for extended periods such as security control rooms.

All extinguishers shall be provided with BCA compliant signage

4.1.2 Hose Reels and Hydrants

The fire hose reel system shall extend from the potable cold-water reticulation system with dedicated service pipes connecting to fire hose reels on each level.

Hydrants shall be provided where required by the BCA.
Booster connections must be provided if required to meet design pressure. System duties and locations are to comply with the BCA, AS 2419 and AS 2441.

4.2 Fire Indicator Panel

FIP to be a Notifier AFP-2800 complete with evacuation voice over module and network card.

Each building must be equipped with its own FIP showing all alarm circuits.

The building system must be integrated into the campus FIP

A minimum of 20% spare capacity shall be provided at each panel. The maximum number of smoke detectors provided on any circuit must be no greater than 90% as permitted by the code.

All new FIPs to include a fibre optic link from the main FIP to main communication room within the building.

FIP interface to BMCS to show the state of fire alarm, either normal or in fire alarm mode only.

Electric bells are not used on the main campus as they cause confusion to which area is being evacuated. We have dispensation from the Fire Brigade for this deletion.

Cascading fire alarm systems should be avoided on the main campus as it is UOW policy to evacuate the building in full during any fire alarm.

The matrix of operation of the FIP is standard across the main campus and shall be programmed with a 3 minute ‘alert tone’ followed by an ‘excavation tone’. The voice over message during the evacuation tone shall be, ‘Please evacuate via the nearest fire exit’.

On activation on a fire alarm, the EWIS system shall be triggered immediately and a text message to be forwarded though the 'existing' university pager system quoting building number, and description of space in alarm. The format of the message is to match existing.

The installer shall provide shop drawings for Consultant and Facilities Management Division (FMD) approval to detail the following:

- Isolation and EWIS zones, (EWIS zones to match isolation zones).
- Floor layouts showing all field equipment locations.
- Field descriptors and associated final room number for each addressable device.
- Services isolation buttons for interfacing with fire doors, mechanical plant, access control, auto doors etc, as required.

The installer shall undertake 12 month annual testing and provide written results at completion of DLP period. At completion of the DLP there shall be a handover meeting with UOW representative and UOW fire maintenance provider to ensure a smooth handover.

For all new buildings or major extensions to buildings, the campus electronic block plan located in the Fire Control Room shall be upgraded to incorporate the new building location and building number and incorporate a hardwired led.

The FIP shall be installed in a designated area within the building main entrance area. The areas shall be provided with adequate access and ventilation.

The FIP must be placed in a position easily accessible by the Fire Brigade from vehicular access and the position of the FIP should be verified at documentation stage with all relevant parties.

The FIP shall be mechanically secured and cable entries shall be insulated to protect against cable damage. Cable terminations shall be permanent and insulated to protect against faults and interference.

The Designer shall assess whether a high speed network card may be utilised in the FIP. Whilst the current fibre network utilises low speed multi-mode network

cards, UOW is interested in migrating to the high speed network technology once all non-compatible Notifier 1010/202 fire indicator panels have been upgraded.

The Designer must confirm that the fire fibre network has sufficient bandwidth to accommodate the new FIP.

FIP cabinets should contain sufficient spare space for the possible future installation of a Notifier Digital Voice Command (DVC) unit, for the purposes of providing emergency mass notification communications.

4.3 Smoke Detection Systems

Smoke detectors shall be provided on floors to BCA requirements. New smoke detection systems shall be an addressable architecture. The systems design shall ensure uniform detector sensitivity across the system.

The systems should enable changes to detector designation through software rather than hardware, to enable internal partitioning to be performed without significant fire services costs.

Smoke detectors shall generally be ionisation type; however photo optical, nephelometric or laser type may be selected to accommodate particular risks or environments.

Smoke detectors shall be provided in mechanical systems as required by the BCA.

4.4. Sprinklers

Sprinklers shall be considered in areas where automatic extinguishing is justified as well as where required to comply with the Building Code of Australia and other statutory requirements. A sprinkler system is the preferred choice of the University.

The hazard rating shall comply with the BCA for administration and educational areas taking into consideration any special requirements or materials stored within the area.

Where the risk analysis deems necessary the provision of an early suppression fast response system should be considered.

4.5. Gas Discharge

Where required, gas discharge services shall be provided to suppress a fire or to provide a secondary level of protection.

The discharge gas shall be suitable for populated areas and comply with all health standards. The intensity and quantity shall be determined by the designer following the outcomes of the risk analysis with the objective of

mitigating the likelihood of the fire spreading and the consequences from the outbreak.

4.6. Fire Doors and Associated Controls

Fire doors secured by electric locks must release (fail safe) to open on a fire alarm signal and the interface must be direct to the FIP

Where flammable gas services are installed they shall be isolated during a fire alarm via a Fire Alarm fail safe trip.
Electric magnetic hold-open devices and sequence closers must be provided to all fire or smoke barrier doors in high traffic areas which must automatically release the door, allowing closure, in the event of any smoke or fire alarm activated at the FIP via a fail safe trip wired directly to the FIP.

4.7 Smoke Exhaust Systems

Where required, smoke exhaust systems must be incorporated into the design in accordance with the BCA and Australian Standards.

Fire damper control will be achieved through the control system when fire mode operation is enabled. Where permitted by the code automatic resets of ventilation equipment shall be provided.

4.8 Stair Pressurisation Systems

Where required they will meet BCA requirements.

4.9 Evacuation Warning and Intercom Systems

The Evacuation Warning & Intercom System (EWIS) shall be designed in accordance with AS 1670 and AS 2220. All speakers shall be the fully recessed type where ceilings are available.

The EWIS panel shall be located adjacent but separate to the FIP. New systems shall be provided with a minimum of 10% spare zones and 20% minimum capacity on each amplifier circuit.

EWIS system to be designed to provide good speech intelligibility.

EWIS to be designed to provide approximately 15 to 20dB noise level above normal ambient levels. EWIS sound levels near the maximum allowable must be avoided.

Speakers shall be wired sequentially to allow easy monitoring and alteration of the system.

4.10 Digital Voice Command and Digital Audio Amplifiers

UOW is in the process of establishing an emergency mass notification system.

The Designer shall assess the opportunity to install Notifier digital voice command (DVC) or digital audio amplifier (DAA) equipment to extend the emergency mass notification coverage area.

The DVC/DAA shall be located adjacent to the FI to facilitate integration into the fire fibre network. The DVC/DAA output shall be connected to the background music input of the EWIS or OWS panel.

The installation of DAAs is preferred provided an existing DVC is available for connection to in an adjacent building, and the installation of cabling between the DVC and DAA is practical.

The Designer shall ensure that, where new DVCs are installed, the capacity of the fire fibre network is not exceeded. The Designer shall assess the opportunity to utilise high speed network cards within the DVC as part of the design process.

DVCs and DAAs shall be provided with local battery backup. Batteries shall be sized to provide a minimum 24 hours standby with 30 minutes communication time.

Testing of the EWIS/OWS shall be performed to ensure that the system performance has not been affected following the installation of the DVC/DAA.

4.11 Systems Interfacing

Where the fire system interconnects to other building services such as BMCS services, electronic monitoring and access control systems or automatic door systems, an interface shall be provided that achieves optimum functionality, performance and reliability.

All control interfaces shall be low level design and monitoring only interfaces may be either low or high level design.

Control interfaces shall comprise of a set of electrical contacts controlled via a signal from the FIP. Monitoring only high level interfaces shall be provided using a standard protocol and an established software product.

Following is a summary of the interfaces to the Fire Services:

System to be Interfaced	Interface Type	Interface Responsibility
BMCS	Low level/high level	BMCS Contractor
Lift	Low level	Fire Contractor
Automatic doors	Low level	Fire Contractor
EWIS	Low level/high level	Fire Contractor
Electronic Monitoring and Access Control	Low level/high level	EMAC Contractor

Table 2 - System Interfaces

Following is a summary of the interfaces to the EWIS panels:

System to be Interfaced	Interface Type	Interface Responsibility
Emergency Mass Notification DVC/DAA	Low level	Fire Contractor

Table 3 - System Interfaces

The main UOW campus has three Fire computers which are part of the fire network to provide real time information on buildings across the campus. These computers are located at:

- Fire Control Room (Building 11A).
- University Security Office (Building 116 – Northfields Avenue).
- Facilities Management Division (Building 31).

For any new or modification to existing buildings with addressable systems, these computers shall be uploaded with the new floor layouts showing accurate detector layouts and any other key field equipment. The key items that need to be shown by the floor layouts are as follows:

- Fire isolation zones.
- Final room numbers.
- Accurate field equipment locations.
- All unnecessary information to be removed from layouts for clarity.
- Services isolation buttons for interfacing with fire doors, mechanical plant, access control, lift, auto doors and access control etc as required.

Programming of the fire computers shall be undertaken by the Notifier as a sole provider.

Block Plan

Block plans to be provided adjacent to the FIP incorporating the following

- Colour Block Plan showing fire isolation zones, room numbers and any other key field equipment.
- Mounted in a frame or other approved system.
- Softcopy in DWG format to be provided.

5. STANDARDS

The design shall comply with the current version of all relevant codes and standards in force at the time that the design specification is prepared.

Where the fire service designer considers a standard to be inappropriate to the circumstances, the fire service designer shall advise the principal and seek direction.

The fire service designer should use the OH&S Consideration for Design Guideline.

6. MINIMUM PERFORMANCE STANDARDS

The fire services shall be designed to meet or exceed the following performance standards:

Function	Measurement
1. FIP records alarm status in response to positive fire signal	< 2 seconds
2. FIP transmits alarm signal to Monitoring Body on receipt of alarm status	< 5 seconds
3. Sprinkler reaction to temperature status	< 10 seconds
4. FIP circuit isolation	< 2 seconds
5. FIP transmits closure signal to auto door on receipt of alarm status	< 5 seconds
6. FIP transmits alarm signal to BMCS on receipt of alarm status	< 2 seconds
7. FIP transmits alarm signal to EMAC on receipt of alarm status	< 2 seconds
8. FIP transmits alarm signal to Mechanical Service on receipt of alarm status	< 2 seconds
9. EWIS transmits alarm signal on receipt of alarm status	< 2 seconds
10. EWIS transmits evacuation signal on receipt of evacuation status	< 2 seconds
11. Master DVC voice broadcast through EWIS speakers	<1 second

Table 4 - Minimum Performance Standards

7. INSTALLATION GUIDELINES

7.1 Portable Fire Equipment

Portable fire extinguishers shall be installed with mounting brackets, and appropriate signage. The type must be suitable for the application and the environment in which it is installed.

Care shall be taken when specifying the location to ensure that the portable fire extinguishers will not be subjected to mechanical damage or harsh environmental conditions.

7.2 Fire Services Cabling

Fire systems cabling shall be installed such that stress does not occur to any part of the cable, FIP or to the connected fire detector. Cables shall be securely supported and protected from mechanical damage.

All cabling installed between fire equipment and detectors shall consist of a number of junction boxes of cable. Cabling shall be concealed wherever possible in ceiling spaces, wall cavities, risers and the like.

Fire services cabling shall be separated from all other cabling within the building. Fire cabling may be installed in designated conduits or service duct. Where cable trays are to be used for multiple services then a minimum of 100mm separation shall be maintained at all times between fire cabling and other services.

Cabling may be installed underground to comply with AS 1670. Provision must be made for all connections and modifications to be updated on the campus site plan.

Prior to the connection of equipment, cabling shall be tested for continuity, and disturbance.

7.3. Electrical Cabling

Electrical cabling supplying fire equipment shall be sized to meet the rating of the equipment and the potential additional equipment likely to be connected. Designated circuits shall supply all fire services equipment.

Electrical cabling shall be installed such that stress does not occur to any part of the cable or to the connected equipment. Cables shall be securely supported and protected from mechanical damage.

All cabling installed between equipment or devices shall consist of one continuous length of cable. Cabling shall be concealed wherever possible in ceiling spaces, wall cavities, risers and the like.

Prior to the connection of equipment, cabling shall be tested for continuity, polarity and disturbance.

7.4 Detectors and Field Devices

Smoke detectors shall be installed with the correct base type and mounting bracket. All smoke detectors shall have a plug-in base mounting.

The detectors shall be suitable for the environment in which they are installed. The detectors shall be mechanically secured to protect against operational damage and ensure stability for continuous use. Cable terminations shall be permanent and insulated to protect against faults and interference.

Installation shall be in accordance with the manufacturers requirements. The detectors shall be low maintenance and resistant to moisture. All duct-installed detectors shall be accessible and designed to operate within the pressures created by the ventilation system.

7.5 Fire Dampers

Fire dampers shall be installed to provide fire mode operation of the ventilation system.

The dampers shall be suitable for the environment in which they are installed and suitable access shall be provided for maintenance purposes.

The dampers shall be mechanically secured to protect against operational damage and ensure stability for continuous use. Actuator cable terminations shall be permanent and insulated to protect against faults and interference. Installation shall be in accordance with the manufacturers requirements.

7.6. Fire Indicator Panel

The FIP shall be installed in a designated area within the building main entrance area. The areas shall be provided with adequate access and ventilation.

The FIP must be placed in a position easily accessible by the Fire Brigade from vehicular access and the position of the FIP should be verified at documentation stage with all relevant parties.

The FIP shall be mechanically secured and cable entries shall be insulated to protect against cable damage. Cable terminations shall be permanent and insulated to protect against faults and interference.

7.7 Pipe Work and Hydraulic Services

Pipe work modifications shall be in accordance with AS 2118 and fully hydraulically calculated according to the Hazard Classification.

Fire sprinkler services shall be piped through the building to a set of sprinkler valves. Each floor shall have its own flow switch to activate an alarm and shall be directly wired to the FIP. Pumps, indicators and valve tamper switches shall be illuminated on the FIP.

New sprinkler services shall have a second supply source from the Authority external water main, pressurised through a second dual pump set before being manifold to the sprinkler valve set.

Screwed couplings only shall be used. The maximum permissible piping length shall be 4 metres. At tees and the like, a piping support shall be positioned at the main pipe takeoff in addition to supports, which carry the main pipe itself. Rolled grooved couplings shall not be used.

For above ground pipes screwed joints shall be used on pipes up to and including 50 N.B., above which size welded flanged joints only will be accepted.

Flanges may be tack welded in-site, however all other welding of the flange to the pipe shall be carried out with the joint dismounted to ensure a high weld quality. Flange gaskets shall be made using 3mm minimum thickness jointing material, suitable for the service and manufactured in accordance with the relevant standard.

Sprinkler heads are to be semi recessed with escutcheons to match ceiling grid panels.

Refer also to Hydraulic Design Standards for associated design information.

7.8 Software

The application software shall comprise the graphical user interface (GUI). Screens shall be developed on a geographical basis and identify the location of smoke detectors, sprinkler heads, sprinkler valves and flow switches.

System programming and configuration, reporting and alarm management shall be performed from the GUI. Floor plans containing device locations and detailed schematics identifying devices connected shall be available to the operator.

Monitoring and control shall be available to the operator from both graphical and text screens. The status and alarm condition shall be visually identified on each of the graphic screens.

7.9 Labelling

All equipment shall be clearly labelled using black lettering on white background self adhesive permanent engraved labels, attached to a suitable fixed part of the equipment.

Equipment labels shall identify the equipment in accordance with UOW's asset register convention.

7.10 Emergency Evacuation Procedures Sign

An emergency evacuation procedure sign shall be installed on each floor of the building with a 1:200plan and shall include the following details:

a. The name of the building and floor number or area description.

b. A brief statement of evacuation procedures involving:

- Fire Brigade Responsibility.
- General Communications.
- Process to Evacuate.
- Fire Wardens' Directions.
- External Assembly Area.
- Fire Response Procedure.
- Location of Fire Exits.
- Location of Manual Alarm Points.
- Location of Fire Extinguishers and Fire Hose Reels.
- Copies of all Software to UOW.

8. EQUIPMENT

The following lists University preferred equipment.

8.1. Extinguishers

Chubb
Quell

8.2. Sprinkler Heads and Sprinkler Accessories

Tyco

8.3. Smoke Detectors

Addressable - Notifier, Hiochi and Olsons

8.4. Fire Indicator Panel

Notifier AFP-2800

8.5. Fire Indicator Panel

Device	Function	Make	Model
Fire Sprnkler Pumpsets	▪ Supplies sprinkler system	Kelair	Various
Fire Hose Reel & Jacking Pumps	▪ Supplies fire hose reel and jacking pumps	Kelair	Various

Table 5 - Pumps

8.6 Very Early Smoke Detection Apparatus

VESDA Laser Compact

8.7 Emergency Mass Notification Equipment

Notifier

9. WARRANTY

The designer shall ensure that all components are supplied with the following minimum warranty periods:

System/Equipment	Warranty Period
Extinguishers	12 Months
Hose Reels	12 Months
Hydrants	12 Months
Sprinkler Heads & Accessories	2 Years
Smoke Detectors	12 Months
Fire Indicator Panel	12 Months
Pumps	12 Months
Very Early Smoke Detection Apparatus	2 Years

Table 6 - Warranty Periods

10. LIFE CYCLE COSTING

The fire service designer shall prepare life cycle costings as part of the conceptual system design. A twenty-year period of financial interest shall be used as the basis of the life cycle analysis. In the case of fire services, these costs will include:

a. The initial cost of the system equipment

b. Installation costs

c. Maintenance costs

d. Software support and regular upgrades

e. Licenses and statutory costs

f. Cost of third party support for interfaces