



Introduction

Purpose

The purpose of this guideline is to provide a consistent Fire and Emergency New Zealand position on requirements for fire control centres within buildings in the event of fire. The primary objectives are to:

- outline the Fire and Emergency position on appropriate life safety design considerations for owners, designers and other building practitioners on use of lifts if they are to be utilised in a fire emergency
- identify and overcome the limitations of the C/AS7 and Verification Method (VM) design methodology when considering the unusual challenges associated with use of lifts in the event of a fire emergency
- describe specific issues affecting firefighting operations when using lifts.

Scope

The scope of this guide relates to establishing a fire control centre (FCC) within a building that is intended to be utilised in a fire emergency. Buildings with simple safety features will not require an FCC. However, for firefighting operations in tall buildings and large footprint premises with multiple complex systems an FCC is required.

Building code performance requirements

Fire Safety C clauses C1 – C6 defines NZ Building Code performance requirements of the Building Act. C5 is the performance requirement on 'Access and Safety for Firefighting Operations'. Part 6 of C/ASx Acceptable Solutions provides only limited information on requirements for firefighting operations therefore additional guidelines are required.

C/ASx is the Acceptable Solution design for buildings, but does not specifically address fire crew operational requirements when considering use of lifts in a fire emergency. Below is a list of some standards specific to building fire safety systems that are mandated for a variety of buildings. This is not an exhaustive list.

- NZS PAS 4509:2008 Firefighting water supplies code of practice
 - NZS 4510:2008 Fire hydrant systems for buildings
 - NZS 4512: 2010 Fire detection and alarm systems in buildings
 - NZS 4541:2013 Automatic fire sprinkler systems.
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Definitions

The following definitions apply for the purpose of this guideline. Defined terms used throughout this document, are consistent with the Building Act 2004, New Zealand Building Code (NZBC) and Acceptable Solutions C/ASx.

British Research Establishment (BRE)	A research unit established by the UK government to consult, conduct research and testing for construction and the built environment.
C/ASx	New Zealand Building Code Fire Design Acceptable Solution parts 1 – 7 (x represents numbers 1 – 7)
Fire Engineering Brief (FEB)	A formal process as outlined in the International Fire Engineering Guidelines for all stakeholders to define the scope of work for the fire engineering analysis and the basis for analysis as agreed by stakeholders.
Fire Resistance Rating (FRR)	This is a defined term in the NZBC C Fire Documents. 'The term used to describe the minimum fire resistance required of primary and secondary elements as determined in the standard test for fire resistance'. See NZBC for full description.

Fire control centre

Fire and Emergency response and success	<p>The Acceptable Solutions and C/VM2 of the NZ Building Code require designers to provide features for firefighting operations. Fire and Emergency response and success of firefighting operations rely on fire safety features installed in buildings.</p> <p>A fire control centre is one feature in a building that will assist with firefighting operations. For tall (high-rise) buildings or complex buildings, a dedicated room or other location containing fire alarm and related fire protection control equipment is recommended.</p> <p>Note: See Diagrams and photographs for examples of fire control centres.</p>
Provision of FCCs in complex and high-rise buildings	<p>The NZBC does not specify Fire Control Centre (FCC) for high-rise buildings in either the Acceptable Solutions or in C/VM2. However, FCCs form an essential function in Fire and Emergency operations.</p> <p>Other standards and publications refer to the Fire Control Centre as 'Central Control Station', 'Emergency Command Centre', 'Fire Service Centre' or 'Fire Control Room'.</p> <p>According to the NCC 2016 Building Code of Australia, Part E1.8, a fire control centre must be provided for a building with an effective height of more than 25 m (i.e. any building above 8 storeys); and any Class 6, 7, 8 or 9 buildings (with the exception of detention centres) with a total floor area of more than 18,000 m².</p> <p>In a building > 58 m (20 storeys) the FCC should be a separate building/room.</p>
Operational need for FCCs	<p>These types of buildings in New Zealand would equate to CA, WB, SM and VP types. However, as the NZBC does not require these types of centres any longer, it is an operational need that drives the recommendation to have them. Fire safety design for tall high rise buildings (THRB) must consider an FCC for fire operations.</p> <p>The NZBC ensures that there is a dedicated space where the building may be managed during an incident without the impact of evacuations or operations encroaching on the users. This should be in addition to the mobile command centre which Fire and Emergency will deploy to manage the incident (i.e. not the building but the operations being carried out within the building).</p> <p>In high-rise building incidents the Incident Controller appoints a Lobby Control Officer (at ground floor lobby) to support fire attack operations at the upper levels.</p>

Purpose The purpose of the fire control centre is to provide an area from which firefighting operations and building emergency procedures can be controlled. This will include all building service safety systems.

The centres are not to be used for any purpose other than the control of firefighting activities and measures concerning occupant safety or security. However, in large complexes (e.g. hospitals) and modern buildings (e.g. tall buildings) the FCC can be co-located in the security control rooms.

Location Options for locating the FCC should be discussed with Fire and Emergency Operational representatives as early as possible, ideally during the FEB stage.

Fire and Emergency recommend that the fire control centre be:

- on the same level as the fire crews' entry point to the building near the lobby or other agreed location.
- located within five metres of the Fire Alarm Panel or main entrance to building.
- direct egress from any part of its floor must be to a public road or open area.

Notes:

- Fire control centres contain critical equipment that is operated by firefighters in the event of a building emergency. Therefore, FCCs need to be separated from the effects of fire and smoke.
- Firefighters need quick, easy access into FCCs, and need safe and effective egress as they will be in a potentially hostile environment.
- The dimensions of an FCC should ensure there is enough room for firefighters to access building plans and tactical plans whilst wearing firefighting uniform and breathing apparatus (BA).
- FCCs require good lighting, and sound levels within the centres need to be kept to a level that allows effective communication between the FCC and all firefighters on the fire ground.

Fire and Emergency NZ recommends an FCC be incorporated in the design for all complex, high-rise and THR buildings. Size and type of equipment allowed (additional to above) in the FCC to be discussed with Fire and Emergency at FEB stage.

Fire control centre size Fire and Emergency recommends that the FCC be of an appropriate size based on what safety and control systems are required for the building. The minimum size of the fire control centre will be not less than 8 m² with a minimum dimension of two metres.

If additional equipment is installed, have an additional area of not less than 2 m² net floor area for each additional facility and a clear space of not less than 1.5 m² in front of each additional control or indicator panel (NCC 2016 Building Code of Australia, Part E1.8).

Improved fire detection technology Fire and Emergency recognises technological improvement with fire detection and the ability to use intelligent fire alarm panels. An intelligent fire alarm panel in the FCC provides the Incident Controller the ability to interrogate the panel and have access to building cameras and voiceover systems. Access to security cameras will help specialist fire investigators determine how the fire started.

Fire and Emergency requirements for fire control centre

Fire and Emergency requirement for FCC including equipment:

- Be protected from effects of fire (fire rated to same FRR of the level where it is situated).
- Have control of the EWIS system with WIP phones.
- Have emergency or control for emergency utility supply for the entire building.
- Have fire service control for all other utilities in the building e.g. HVAC.
- Clearly marked Schematic Control panel on fans and the ability for the fire officer to override fans systems
- Have a mimic FAIP for the entire building.
- Copy of building plans including fire design drawings, preferably electronic plans with ability to interrogate 3D models etc.
- Copy of the evacuation scheme.
- Minimum area 8 m², with minimum wall dimension of 2 m.
- No other plant equipment allowed in, or pipework to go through, the FCC.
- Must be sound proof with a minimum STC 60 rating.

Fire control centre construction**Construction**

Fire and Emergency recommends that an FCC be in either a dedicated room within the building or a separate room enclosed in concrete or similar construction that is sufficiently impact resistant to withstand the impact of falling debris and with a fire resistance rating (FRR) of not less than that of the adjacent compartments.

Fire and Emergency NZ recommends that the Fire Control Centre be provided with either FRR of 120/120/120 or burnout whichever is higher in the instance as this provides greater resilience for operational needs. This will also ensure that the fire control systems are provided with further redundancy during incidents.

Any material used as a finish or surface lining within the room will have a low spread of flame index (SFI) and low smoke development index (SDI).

Any services, pipes, ducts etc. that are not required for the proper functioning of the centre should not pass through it. Openings in walls, floors and ceilings are to be limited to only what is required for the proper functioning of the centre and any penetration is treated with fire stopping material/system that is rated to not less than the surrounding walls.

Internal doors

A door opening in the internal walls enclosing a fire control room must be fitted with a self-closing smoke sealed fire door rated to no less than the walls and ceilings. Required doors are to open into the room, be lockable (able to be opened using a Lockwood 197 key – normally expected or, in some cases, the FCC will be occupied 24/7 based on what systems are contained within) and located so that persons using escape routes from the building will not obstruct or hinder access to or egress from the room.



Figure 1: Lockwood 197 key for fire control centre door

Access to the room via two paths of travel, one from the front of the building and one from a public place or safe path which leads to a place of safety with a fire rated door of not less than the fire cell.

Any openings associated with natural or mechanical ventilation made in any ceiling or floor above or below the FCC shall be protected by a fire damper. If the opening is for a duct through a wall it is required to have the correct fire resistance rating (FRR), other than through an external wall.

Ventilation and power supplies**Ventilation**

The fire control centre is ventilated by:

- natural ventilation from a window or doorway in an external wall of the building that opens directly into the FCC from a roadway or open space
- a pressurised system that only serves the FCC and is installed in accordance with AS/NZS 1668.1:2015 (as if the room is a fire isolated pressurised stairway)
- ventilation is activated automatically by the operation of the fire alarm, or sprinkler system and has a manual overriding control in the room
- ventilation must provide a flow of air at a rate of 30 changes per hour with any door to the room open
- all components of the dedicated ventilation system are to be protected by an enclosing construction with an FRR of not less than 60/60/60 that is outside the FCC.

Power supply

Power is to be connected to the supply side of the main disconnection switch for the building and or supplied by emergency power. The power supply should have an alternative supply (such as UPS) or emergency generator which should operate in the event of loss of primary power.

Lighting of fire control centre

Emergency lighting in accordance with the requirements of the NZBC except that an illumination level of not less than 500 lux is required at the surface of any table used to view building plans.

Identification signage of the centre

It is recommended that a sign with the words Fire Control Centre shall be in contrasting colours such as white on a safety red background and should be placed on the external face of the door to the centre.

Signage will comply with NZBC, Clause F8.

Fire control centre equipment

Equipment recommendation

A fire control centre must have:

- fire alarm indicator panel
- controls and visual status indicators for fire pumps, smoke control fans and any other fire safety equipment installed in the building
- telephone directly connected to an external telephone exchange
- a blackboard or white board not less than 1200 mm wide x 1000 mm high
- a pin up board not less than 1200 mm wide x 1000 mm high
- a raked plan layout table of a size suitable for laying out plans, tactical fire plans, building plans and any other relevant documents
- public address and WIP controls (EWIS).
- remote elevator control panel and elevator supervisory panel
- emergency generator supervisory panel

and may have:

- master emergency control panels, enunciator panels, remote switching controls for gas or electrical supplies and emergency generator backup
- building security, surveillance and management systems if they are completely segregated from all other systems
- screens to monitor media, weather, social media etc.

Equipment not permitted in the FCC

It is recommended that the following is **not located** in the centre but may be located in rooms accessible from fire control centres:

- internal combustion engines
- pumps
- sprinkler control valves
- pipe fittings.

Sound levels

Sound levels within the FCC must not have adverse effects on fire service operations. It is recommended that the ambient sound levels within the centre do not exceed 50 dB(A) when all the fire safety equipment is operating in emergency mode. The measurement must be taken for a sufficient time to characterise the effects of all sound sources. Where there is not a great variation in noise level, a time of 60 seconds can be used.

Fire fan control panel

Smoke management system

The fire fan control panel is part of a building's smoke management system. Smoke management systems can help Fire and Emergency conduct firefighting and search and rescue operations by providing better visibility and maintaining tenable conditions for evacuating occupants and firefighters. A properly operating smoke management system gives firefighters more options for evacuation of occupants away from firefighting operations as other escape paths should remain tenable for longer.

The smoke management system is designed to work automatically however the system can be used by fire crews in manual mode to clear smoke, improving visibility for firefighting crews and reducing smoke damage. There may be occasions when fire crews will manually override the system to control smoke movement and to prevent harm to occupants or smoke damage to the building. These include:

- stopping a supply fan that is introducing smoke laden air into a non-fire zone
- controlling a zone pressurisation system by manipulation of zone smoke control dampers
- starting a stair pressurisation fan, which has shut down due to a false detection of smoke at air intake
- stopping an exhaust fan that is drawing smoke laden air into a non-fire area
- assisting in clearing smoke after a fire.

To manually override the system the fire crew will need access to the fire fan control panel (FFCP).

Function

The FFCP should include manual controls which override the automatic operation of the air-handling equipment.

It should allow manual control of the functions of each air supply fan, exhaust fan and zone smoke control dampers required, or allowed to operate, in fire mode.

The panel should also include indicators that show the status of the air-handling equipment. The FFCP should be simple to understand and easy to operate. The number of separate damper override switches should be kept to the minimum, except where special risks require greater control of the system. This will greatly enhance the firefighter's ability to make informed manual alterations to the system while working under pressure.

Location

The FFCP should be incorporated into or adjacent to the FAP and constructed in accordance with the fire detection control and indicating equipment requirements in AS 1670.1:2015.

Controls

The FFCP and the method of transmission and interface to smoke control systems shall be provided in accordance with SA 1670.1

Controls, indication and labelling shall be in accordance with AS 1670.1:2015 and AS/NZS 1668.1:2015 – Table 4.1.

Indicators

Each fan required to be equipped with a three position 'ON', 'AUTO' and 'OFF' switch and shall also be provided with positive indication on the FFCP of fan operating status. Fan status shall be monitored by a pressure differential switch arranged to sense airflow or a current monitoring relay sensing fan motor current, arranged to sense a change in motor load resulting from a loss of airflow or equivalent. The sensing device shall be selected so that a difference between design and low airflow can be indicated. These devices shall be integrated with the smoke control system control logic, to illuminate indicators on the FFCP.

The standard states the following indicator colours shall be used for each status conditions:

- red – indicating fan running
- green – indicating fan stopped
- amber – indicating fan fault.

For more information, see standard: (AS/NZS 1668.1:2015 – Table 4.1).

Operating Instructions

A concise set of instructions for starting, operating and stopping each air-handling system shall be permanently displayed in a convenient and conspicuous location near the FFCP for use by attending emergency services personnel.

Note: Operating instructions and a complete functional air-handling schematic for air-handling systems are essential aids for normal operating personnel. They assume even greater importance as an accurate guide for attending emergency services personnel who may be called upon to make quick decisions in an emergency situation.

For more information, see standard: (AS/NZS 1668.1:2015 C4.13.3)

Smoke control schematic diagram

A suitable smoke control schematic diagram showing the functional air-side operating arrangement for each air-handling plant shall be permanently displayed adjacent to the operating instructions in a readily accessible position for viewing.

As a minimum, the diagram shall include all zone smoke control, stair pressurisation, car park ventilation, kitchen exhaust and any other mechanical systems required to operate in fire mode. Information unrelated to smoke control systems shall be omitted from the diagram.

Information contained in the diagram shall be clear, concise and appropriate for use by attending emergency services personnel.



Figure 2: Photo showing basic fan controls incorporated in a panel

For more information, see standard: (AS/NZS 1668.1:2015 C4.13.3)

Remote elevator control panel and supervisory panel

Elevator system

The remote elevator control panel and elevator supervisory panel can help firefighting, rescue, and egress operations by providing status of elevators and providing a manual operation by overseeing the situation in the building for evacuating occupants and moving firefighters.

The elevator system is designed to work automatically in a normal situation, however the system will be used by fire crews in manual mode to move floor by floor efficiently to ferry gear and potentially evacuate people quickly in an emergency.

Two elevators types

There will be two types of elevators in tall high-rise buildings. One will be occupants' evacuation elevators and the other one will be a dedicated fire service elevator. Both elevators can be located in the same elevator banks and will be protected from the fire and smoke. The elevator lobby will be protected to the same level as the elevator hoist way.

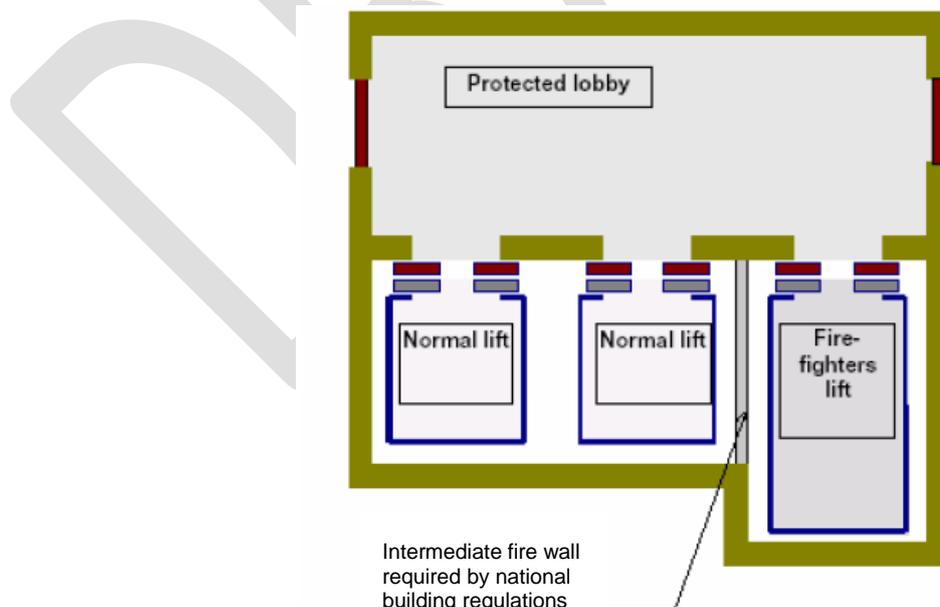


Figure 3: Elevators in high-rise buildings

Elevator panel definitions

Remote elevator control panel	Control panel is operated by a firefighter in fire control centre to move the elevators floor to floor manually
Elevator supervisory panel	The indicating panel shows the location of the elevators located in fire control centre.
Key operated elevator panel	Control panel located in the elevator cab to move the elevator floor to floor by a firefighter in the elevator cab. The elevator can operated when key was turned into a fire operation.
Emergency generator supervisory panel	The panel shows the status of the emergency generator supplying electric power to life safety systems.

Elevator functions

Occupants' evacuation elevators	<p>In a fire situation all elevators will be recalled to a primary floor which is usually the ground floor. Once firefighters arrive at the building and fire control centre, they will oversee the elevator systems and their operation.</p> <p>The firefighter who controls the elevator systems will identify the situation and, if it is deemed safe to do so and the OIC approves, they may take elevators to the fire floor first. This would be done in conjunction with communicating to people on the fire floor, using two-way communication systems located in the elevator lobby and in the car.</p>
Fire service elevators	<p>In a fire situation all elevator will be recalled to a primary floor which is usually the ground floor. Once firefighters arrive at the building and fire control centre, the firefighters will find out where the fire is located. They will use an elevator to move up to one or two floors below the fire floor to set up a forward control point from where fire crews will attack the fire depending on the fire spread and size.</p> <p>Fire crews will use a key to operate the fire service elevator cab manually as shown in the figure below. The fire fighters will communicate with the operator in the fire control centre by a two-way communication device or a radio system. If the elevator system in the building does not have the key operator system in the elevator cab, the fire service elevator shall be operated by a remote elevator control panel located in the fire control centre.</p>



Figure 4: Typical key panel in fire service elevator cab



Figure 5: Fire service lift control keys

Controls and operations

Fire service elevator operation

Control and operation of fire service elevator is shown the diagram below. The elevator key is kept in the fire control centre or a knox box located in the building security office. A set of access keys are also included on appliances which allow access to various locks, doors lift access etc. These are carried by the brigade to allow access in the event of keys not being present locally.

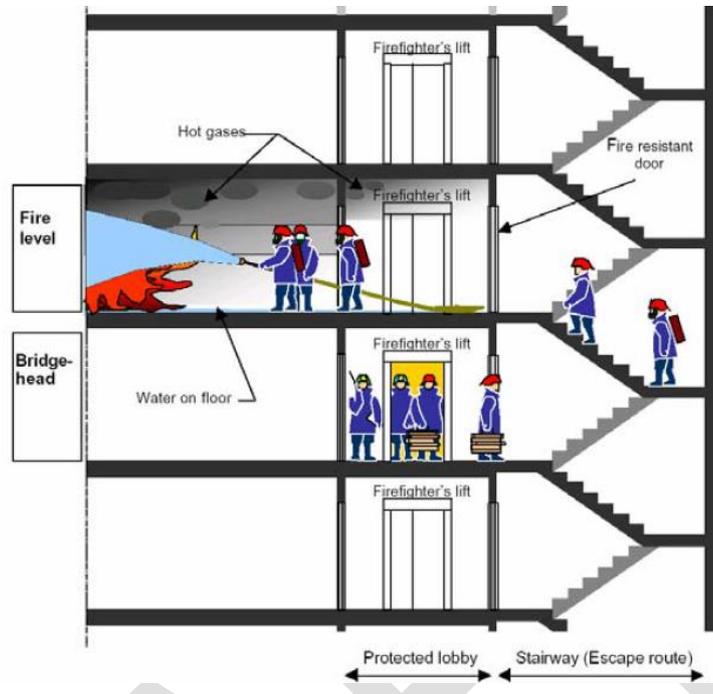


Figure 6: Elevator operation diagram

FIRE OPERATION	
When	flashing, exit elevator
To operate car	Insert fire key and turn to "ON." Enter floor selection.
To cancel floor selection	Press "CALL CANCEL" button.
To close door	Press and hold "CLOSE" button.
To open door	Press and hold "OPEN" button.
To hold car at floor	With doors open, turn key to "HOLD."
For emergency stop	Use "STOP" switch.
To automatically return to recall floor	Turn key to "OFF."

Figure 7: Safety code for elevators and escalators (Abstract from ASME A17.1)

Panel locations

The FFCP shall be incorporated into or adjacent to the FBP and constructed in accordance with the fire detection control and indicating equipment requirements in AS 1670.1:2015.

Emergency generator supervisory panel

Life safety systems

Backup electrical power for life safety systems such as fire alarm systems, fire pump, smoke control systems, exit signs, emergency lightings, lifts, pressurizations systems for vertical openings etc. should be supplied by emergency generators or UPS.

Life safety systems should run, even though the power is off. Firefighters need to monitor the status of the emergency generators to ensure there are no issues during an incident.

Completing the Firefighting facilities checklist

Completing the checklist

To complete Part C: 6. Fire Control Centre of the Firefighting facilities checklist (FFFC) correctly you should not only ascertain what equipment will be installed but also ensure that it is installed in the most appropriate location for firefighting operations.

Remember that all these systems are put in place for Fire and Emergency use in emergency situations and in many cases, require our agreement and sign off as meeting our requirements.

Diagrams and photographs

Schematic of a typical fire control centre

Dimensions given are for compliance with the NCC 2016 Building Code of Australia (BCA) and is shown as guide only. This schematic has been included as a reference to the type of items Fire and Emergency NZ would expect in a fire control centre however this should be discussed at an early stage of the FEB design phase with operational representatives.

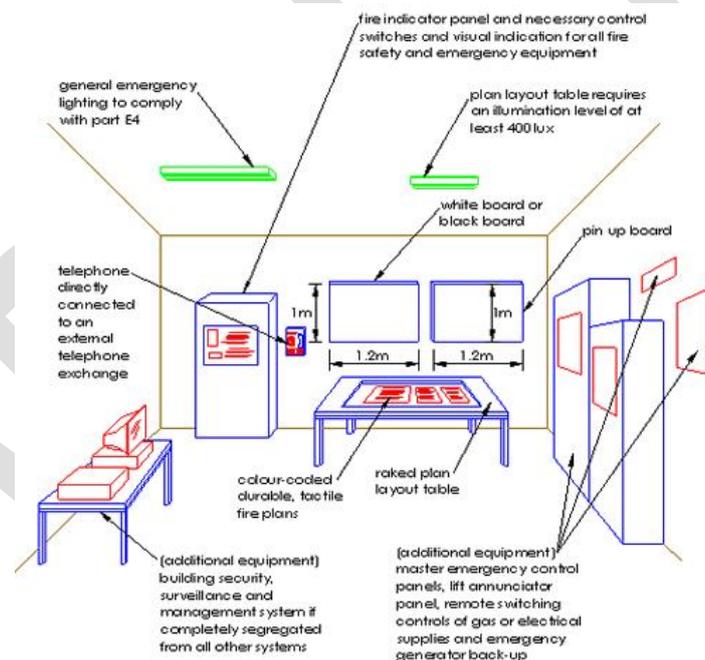


Figure 8: Fire control centre size and contents (illustrative only)

Typical fire control equipment centre



Figure 9: Some of the equipment found in a typical fire control centre

Sky Tower panels



Figure 10: Sky Tower – lower refuge level



Figure 11: Sky Tower – lower refuge level

EWIS panels

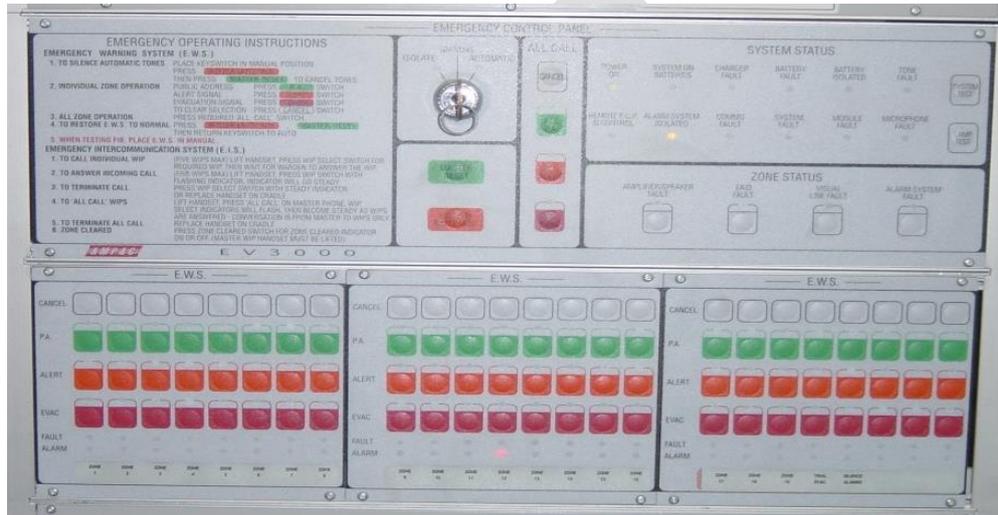


Figure 12: EWIS panel



Figure 13: EWIS panel with analogue addressable display

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