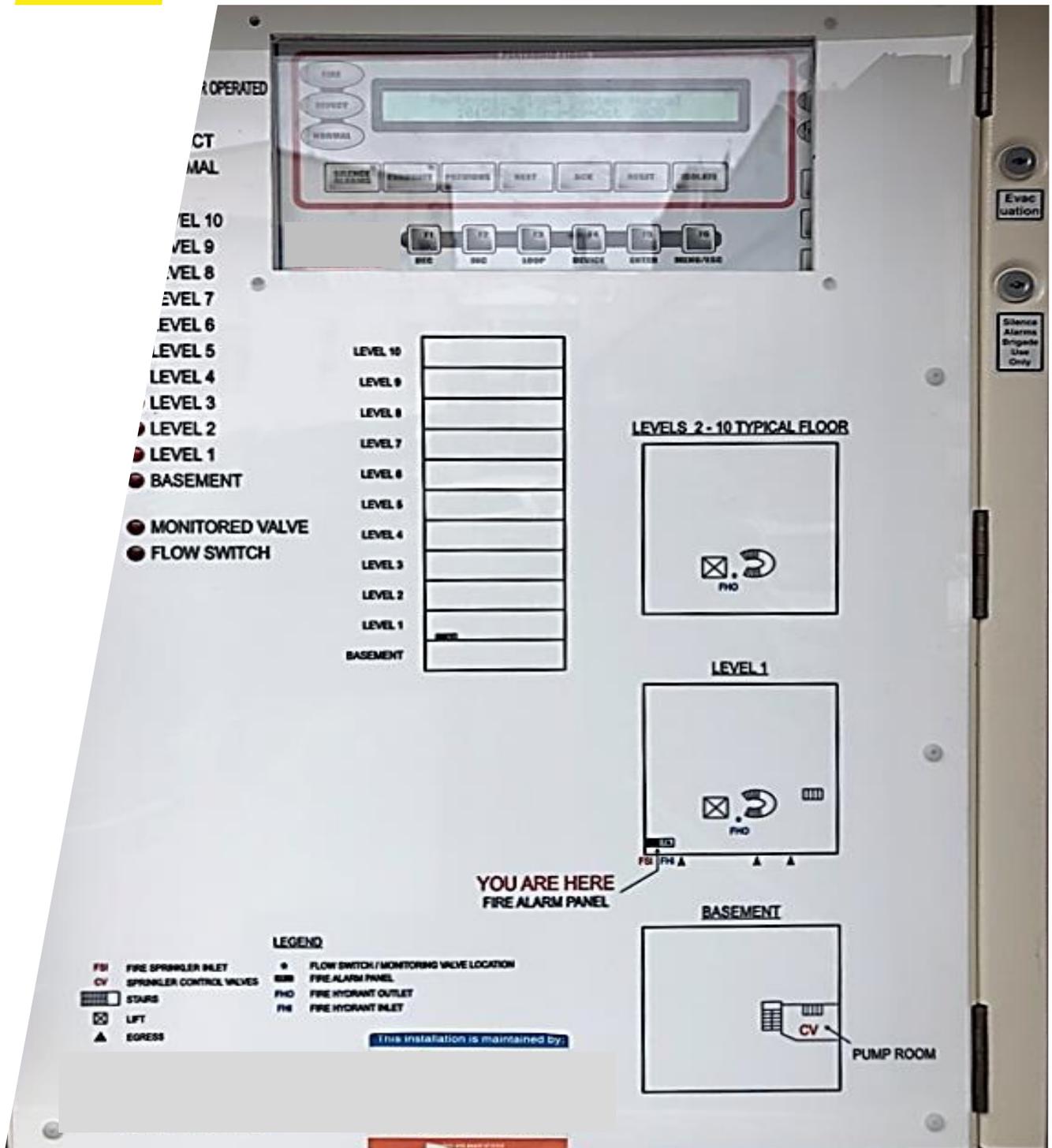


Designers' guide to firefighting operations

Fire alarm panels

F5-04 GD



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Status of this document

This document is issued by Fire and Emergency New Zealand.

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1. Context

Scope	<p>We need accurate information about a fire's development when we arrive at a call to your building. Alarm panels are one of the ways we gather such information.</p> <p>This chapter explains how we use fire alarm panels, and how you can provide equipment that will be the most use to us during an incident.</p>
Who this chapter is for	<p>This chapter is for the use of anybody involved in the planning, designing, construction and maintenance of any building that intends on installing a fire alarm system. It provides advice and guidance from a Fire and Emergency perspective.</p>
What is not included in this chapter	<p>This is a guide to provide advice to industry on the Fire and Emergency position and our operations. However, it is not an exhaustive guide to our operations, nor does it replace any statutory requirements. We recommend you read it alongside other chapters in the guide.</p>
Legislative framework	<p>We aim to reduce the risk to both firefighters and building occupants through encouraging appropriate building design which allows us to achieve our statutory objective (under the Fire and Emergency New Zealand Act 2017) to reduce the incidence of unwanted fire and the associated risk to life and property. Our functions include responding to and suppressing fires and attending to other types of emergencies that may occur in a building.</p> <p>Read this guide alongside the:</p> <ul style="list-style-type: none">• mandatory requirements of the New Zealand Building Code (Building Code);• requirements of New Zealand Standards (Standards); and• Building Act 2004. <p>This guide does not replace any part of the Building Code or Standards or other mandatory building requirements.</p> <p>We note that the Building Code Fire Safety – C, clauses C1–C6 (Protection from fire) define Building Code performance requirements of the Building Act 2004.</p>

2. Definitions

The following definitions apply for the purposes of this chapter. Defined terms used throughout this document are consistent with the Building Act 2004, Building Code and C/AS2 Acceptable solutions.

Address point	This point is part of the data set administered by Land Information New Zealand (LINZ). It is the address (point) where the building is commonly known to be located. It can be either a single point or a range of individual points as described on the LINZ data set.
Appliance	An emergency vehicle that provides capability to Fire and Emergency's mandated functions.
Attendance point	<p>The place where the first attending Fire and Emergency pumping vehicle will stop and set up. There is only one attendance point, usually at the building's primary entry point. Firefighters may be deployed to other firefighter access points from here.</p> <p>A full description of the attendance point can be found in F5-02 GD FFO Emergency vehicle access.</p>
Breathing Apparatus (BA)	A device firefighters wear to provide breathable air in an atmosphere that is immediately dangerous to life or health. Also known as self-contained breathing apparatus (SCBA) or compressed air breathing apparatus (CABA).
Canopy	Projecting hood supported on brackets, corbels or columns over a door, window or niche.
Collapse zone	<p>The collapse zone is an area around the building measured as 1.5 times the height of the structure. This is the area which would be considered dangerous in the event of an outward failure of a facade element.</p> <p>For the purposes of this document, the term 'collapse zone' only applies to pre-cast concrete panel (tilt-slab) and unreinforced masonry type construction.</p> <p>Use a pragmatic approach where practicable when designing, and when in doubt, consult Fire and Emergency.</p>
Fire control centre (FCC)	<p>The principal location where the status of a fire detection system, an alarm system, and a communications and control system are displayed, and from which all systems can be manually controlled.</p> <p>Some industry standards and publications refer to the fire control centre as 'central control station', 'emergency command centre', 'fire service centre' or 'fire control room' (although different standards exist among these).</p>
Fire engineering brief (FEB)	A formal process outlined in the International Fire Engineering Guidelines for all stakeholders to define and agree on the basis and scope of work for the fire engineering analysis.
Fire resistance rating (FRR)	<p>Building Code clause C regarding Protection from fire defines FRR as:</p> <p>[t]he term used to describe the minimum fire resistance required of primary and secondary elements as determined in the standard test for fire resistance, or in accordance with specific calculation method verified by experimental data from standard fire resistance tests. It comprises three numbers giving the time in minutes for which each of the criteria stability, integrity and insulation are satisfied and is presented always in this order.</p>

Firefighter access point

The place where firefighters gain access to a building. This must comply with Building Code Clause C5.6:

Buildings must be designed and constructed in a manner that will allow firefighters, taking into account the firefighters' personal protective equipment and standard training, to:

- (a) reach the floor of fire origin,
- (b) search the general area of fire origin, and
- (c) protect their means of egress.

Hard-standing area (for Fire and Emergency vehicles)

A hard (roading) surface capable of withstanding the fully laden weight of a fire appliance from which fire operations for a structure are conducted. A hard-standing must be big enough for the fire appliance to enter, exit and manoeuvre and for firefighters to move around it to connect hose and safely access equipment. In most cases the hard-standing will be the main road if the structure is close to it

A full description of the hard-standing area can be found in F5-02 GD FFO Emergency vehicle access.

Zone index

A combination of diagrams, symbols, and text forming part of an indicating unit, to identify the location of, and general access to, individual zones.

Note: A zone index is often called a 'mimic panel' or a 'fire alarm panel' if integral with a control unit.

2.1. Terminology

Our alarm panel terminology

We use the term 'alarm panel' to refer to the general set of equipment associated with controlling and displaying live information on the fire alarm system.

It includes the following equipment (as described in NZS 4541:2021):

- **Control unit (or Zone control unit)** is a cabinet that contains equipment for controlling the alarm system in one or more zones and may also incorporate an indicating unit.
- **Indicating unit** contains devices for indicating the zone where an alarm has originated. It may also contain a zone index. It may form part of a control unit or may be a stand-alone piece of equipment.
Note: the main indicating unit should be located at the attendance point. It should contain a zone index and firefighter's controls.
- **Zone index** is a combination of diagrams, symbols and text forming part of an indicating unit, to identify the location of, and general access to, individual zones.
Note: often called a 'mimic panel' or a 'fire alarm panel' if integral with a control unit.

3. Our operations

Information from fire alarm panels

We use fire alarm panels to establish information about a fire. Most fire alarm systems will have a fire alarm panel; some systems may have several panels.

We use the alarm panel to understand:

- the types of detection in the building
- where the fire started and where it is spreading
- the layout of the building
- the points where we can enter the building, and any upper floors
- where any other firefighting facilities are located, e.g. other fire alarm panels, sprinkler or hydrant inlets, etc.

4. Challenges

4.1. Most common challenges

Summary

The most common challenges we face with alarm panels are:

- we can't find the alarm panel
- the panel is located so it is difficult to use
- we can't understand or make sense of the information on the panel.

4.2. How we use alarm panels

Alarm panel functions for firefighting

Firefighters are only interested in some of the panel functions. These can be generally categorised as locating and basic control functions.

- Locating functions include the diagram (sometimes referred to as the 'engraving') showing:
 - the building layout
 - the series of LED bulbs which indicate the status (normal/defect/fire, etc.) of the detection system.

Analogue addressable systems also contain an LCD screen displaying more detailed information. These systems show us the specific detectors that have activated, helping firefighters to locate the fire and to understand the patterns of fire spread.

- Location functions should always be visible from the street. Where the building has an FCC, location functions should also be displayed separately within it (see F5-09 GD FFO Fire control centres for more detail).

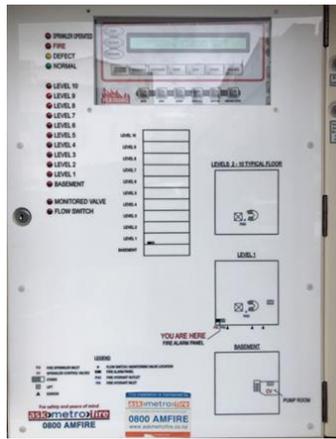


Figure 1 – Alarm panel showing embedded analogue addressable read-out

- Basic control functions allow us to silence the alarm sounders, trigger a full building evacuation, and view any impairment notifications, e.g. any detectors that have been disabled in any part of the building.

With analogue addressable systems, we use the scroll function of the LCD read-out to find out the specific detector locations and the order that the detections occurred.

We also use the panel's alarm silencing and trial evacuation functions.

The fire alarm equipment can be set up so that basic control functions can be used from outside the building. We prefer this arrangement, as sometimes building access is difficult. Where basic control functions aren't accessible from outside the building, the alarm panel diagram should clearly show where to find the basic controls.



Figure 2 – Functions of an analogue addressable system

Note: We don't program, disable, reset or disconnect fire alarm panels. This type of work is carried out by a specialist fire alarm contractor.

4.3. Locating alarm panels

Immediately visible from the street

Firefighters need to be able to find the alarm panel to use it. We may have no previous knowledge of your building, so we need the alarm panel location to be obvious from the designated main attendance point.

Alarm panels are easiest to find when they are immediately visible from the street. If a building has more than one street frontage, we normally expect to find an alarm panel near the main entrance.

Providing strobe lights to highlight the alarm panel location

Darkness and poor weather conditions can make finding an alarm panel difficult. We recommend that alarm panels are provided with a strobe light to highlight the location. This allows us to find the panel in darkness and poor weather conditions.

We find that blue strobe lights are most visible. Red strobe lights are harder to see, as the colour doesn't stand out from our vehicle's emergency lights reflecting on a building facade or glazing.

While they make the panel easier to find, strobe lights can also distract the person using the alarm panel. To prevent this, we recommend installing a temporary deactivation switch so the user can turn off the strobe while they are using the panel. To prevent the strobe being accidentally left off, it should turn on again automatically after a set period, e.g. 10 minutes.



Figure 3 – Panel co-located and identified with a blue strobe

If there is more than one panel for a building or site

A large or complex building may have more than one alarm panel. These include the following types:

- **Main panels** are the most complex alarm panels for any fire alarm system. The main panel allows the maximum level of interrogation between the firefighter and the fire alarm system.

If the system has just one alarm panel, the main (only) panel should be located where firefighters can readily access the parts that we use (see 'How we use alarm panels' above).

If the fire alarm system has more than one alarm panel, the main panel should still be located so that we can access it easily. However, we recognise that for more complex buildings or tall buildings, the main panel may be located in the fire control centre. See chapter F5-09 GD FFO Fire control centres for guidance.

- **Mimic panels** supplement the main panel, but their functionality is more limited than the main panel. However, to be useful for firefighters, they should have a zone index and control unit.

Mimic panels should also be easy to find from outside the building, be provided with strobe lights to show their location, and have an engraving indicating the location of the main alarm panel.

- **Sector panels** are provided on sites with several buildings, e.g. schools and hospitals, with a very large footprint, or with a complex building, such as a shopping mall. We expect a sector panel to be able to tell us which building in a complex, or which part of the building in a large footprint, has had an alarm activation.

Sector panels are most useful if they are located near to the site entrance and are immediately visible from the street. The easiest sector panels to find are located in a plinth on the edge of the roadway so that they are visible from the emergency vehicle. This means that we do not need to get out of the vehicle to view the panel, which reduces delays in identifying the affected building.

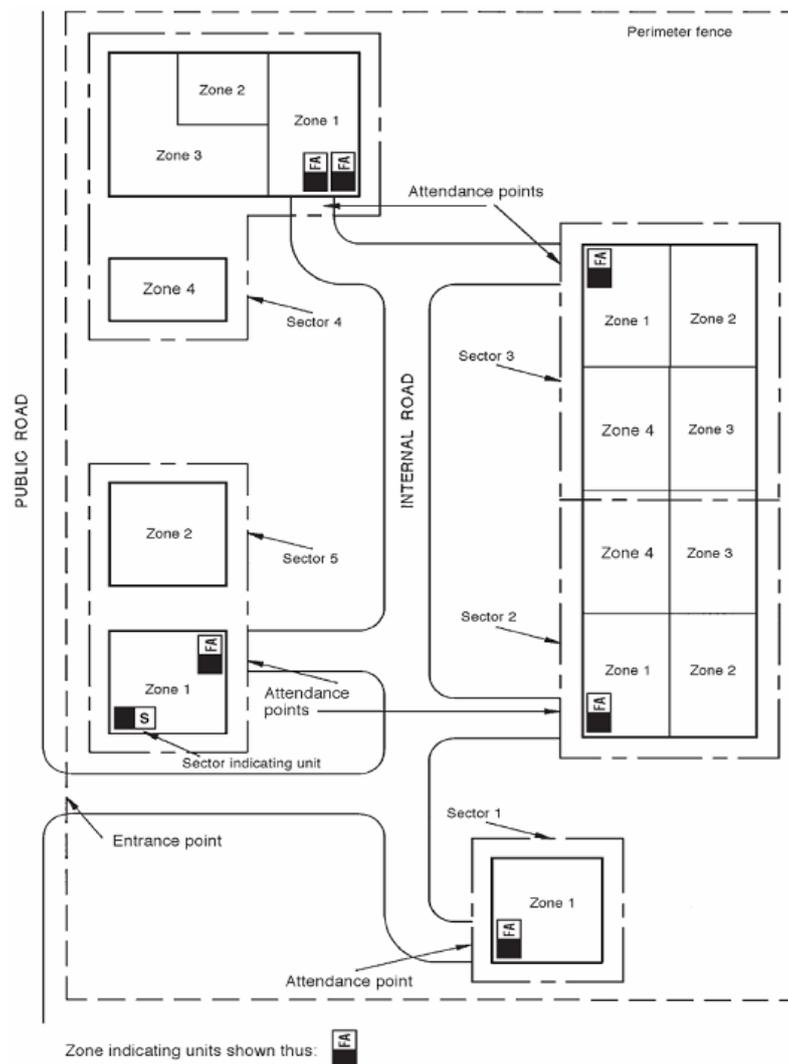


Figure 4 –Sector panel

Information readable from a standing position

We need to be able to easily read the information on the alarm panel display. If it is located too high or too low the information can be hard to read. This may limit our understanding of the fire, and ability to track the fire development.

We need the panel to be located so we can read it from the street from a standing position. We acknowledge that sometimes this may mean that access to the panel from the inside of the building is not at standing height, e.g. if the floor level is not on grade with the street level. This situation should be discussed early in the design stage by contacting designers.guide@fireandemergency.nz for your local operations representative. Sector panels are the exception to these requirements – we prefer these to be readable from the emergency vehicle.

NZS 4512:2021, paragraph 4.3.1 and 4.3.2 provides specific requirements for alarm panel locations which, if followed, should address the above concerns.

Protection for alarm panel users

When considering where to locate the alarm panel we recommend the following to protect the alarm panel user:

- Avoid, or provide protection from overhead risks, e.g. building features such as cladding or other decorative features, signs which may fall during a fire.
 - Avoid areas under cantilevered construction. When we arrive at a building, we don't know how stable this construction will be. We will not use an alarm panel in a potentially risky space
 - Avoid areas under canopies which could collapse during a fire
 - Avoid narrow alleyways between the building and the neighbouring property – these are difficult to get into or escape from, if an unexpected building collapse occurs.
-

Co-location with other firefighting facilities and escape routes

In most cases, we prefer alarm panels to be co-located with other firefighting facilities, i.e. This means that we will find the alarm panel, inlets for building hydrant and sprinkler systems, and entry points to the building (for firefighting purposes) in the same area. This saves us time searching for three separate locations. This makes it easier for us to share information quickly and react effectively.

However, we also recommend that you consider how the location of the alarm panel (and other firefighting facilities) may conflict with the escape routes from the building for occupants.

Firefighters often need to gather and plan near the firefighting facilities. This may partially block the escape route for building occupants or create trip hazards. If this may be an issue for your building, we recommend that you discuss this early in the design stage by emailing designers.guide@fireandemergency.nz to contact your local operations representative.



Figure 5 – Panel and facilities co-located at entry point

Agreeing an alarm panel location

To meet the requirements of NZS 4512:2021, you need to agree on the final alarm panel locations with Fire and Emergency (paragraph 4.3.1 and 4.3.2). We strongly encourage you to discuss the potential location of your alarm panel with us. This should be during the design stage of the project, when it's easiest to change the location.

The request for agreement on proposed locations should be the last stage in your discussions with us and should consist of a formalisation of the alarm panel location that was agreed in principle during the design phase.

We strongly recommend that you don't install the alarm panel until you have formally agreed on the alarm panel engraving, suitability and location with us. We strongly recommend that you contact us before installing it, rather than when the job is complete, when changing it will be costly.

4.4. Accessing alarm panels

Access to glass-fronted alarm panel fixtures

Where all or part of the alarm panel is located inside a glass-fronted enclosed wall recess or cabinet, you need to consider how we will access the alarm panel equipment. Access options include the use of standard keys, or doors that release automatically when the alarm activates.



Figure 6 – Glass-fronted enclosure with triangular key access and a triangular key

Alarm panels inside buildings

Where the alarm panel or part of the panel is located inside a building, you need to consider how we will access that part of the building. We have powers of entry under Section 42 of the Fire and Emergency Act 2017, which means we can force entry into buildings if necessary. However, forced entry may damage your building. If you plan how we will gain access to parts of the panel inside the building, it will reduce the possibility of your building being damaged by forced entry in the event of an alarm.

Options include:

- giving us keys as part of pre-incident planning (only possible when the alarm is connected directly to Fire and Emergency)
- providing a building warden or security guard with access keys
- security doors that automatically unlock on fire alarm
- on-site lockboxes.

Options and arrangements for firefighter access points into your building can be discussed and formalised with your local Fire and Emergency representative, email designers.guide@fireandemergency.nz

4.5. Understanding the alarm panel output

Making sense of the

We need to be able to read and understand information on the alarm panel quickly in an emergency.

information on the alarm panel

Diagrams on the panel need to be clear, correspond well with the internal layout of the building and minimise potential confusion. NZS4512:2021, paragraph 4.2.9 provides a comprehensive list of details to be included on the alarm panel diagram. In addition to these requirements, we recommend that you also include the following information:

- Clearly indicate the location of sprinkler and hydrant inlets as well as the sprinkler valve room (if applicable).
- Show any areas covered by gas flooding or similar systems which may present a hazard to firefighters.

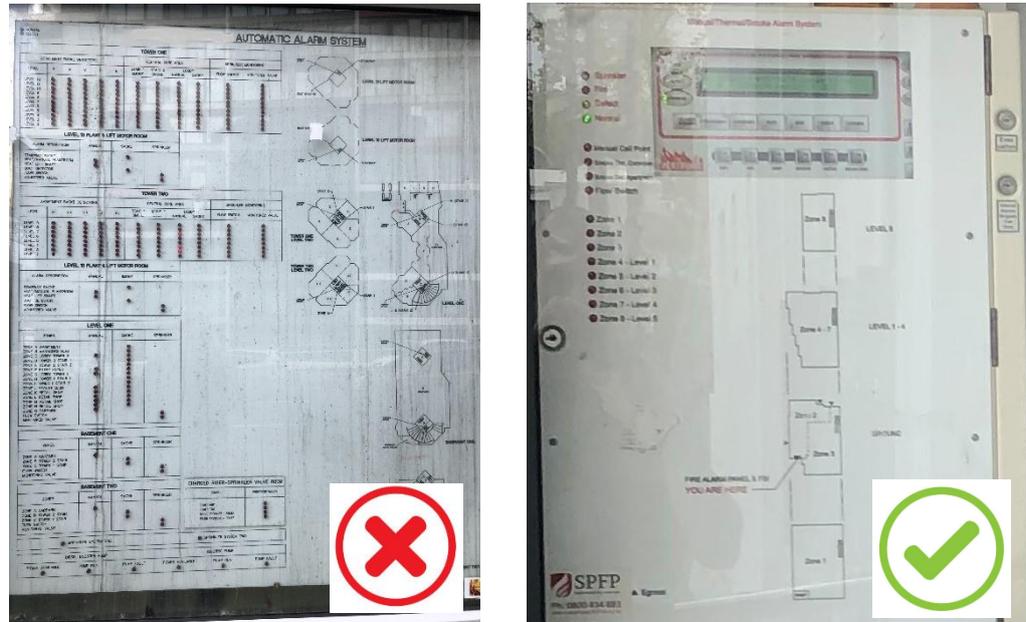


Figure 7 – Highlights the difference between a complex panel and an easy-to-interpret panel

Labelling of detectors

Labelling of alarm zones and individual detectors also needs to be clear, simple and easy to understand. Where the fire alarm system permits naming of the detectors, this is only useful if a description of location is added to the system, e.g. 'smoke detector, second floor, northeast meeting room', as opposed to 'L2-78-Z6'.

Labelled detectors need to be visible from a standing position on the floor where they are located.

Labelling should take into account:

- high ceilings, i.e. the text must be large enough to read from a distance
- any adjacent services which may obstruct/obscure the label, such as pipes or conduit trays.

Alarm zones and sprinkler zones

Alarm and sprinkler zones don't always cover the same areas of the building or have the same naming conventions. This can be confusing to the panel user.

The alarm panel should indicate both alarm zones and sprinkler zones, with separate indicator LED lamps for each. The zones should be designed so that that the user can quickly understand them and how they overlap.

Hard copies of building information

We also recommend that near the main alarm panel, you provide hard copies of building information such as floor plans and alarm and sprinkler zones. A cause-and-effect matrix for the fire alarm versus associated fire design features is also useful to help us understand how the building design works.

These give us more information on the building and help us interpret the alarm panel output. The other major benefit of hard copies is that they allow us to take the building information to our incident command point (ICP).

If the building has a fire control centre, you should also provide hard copies of building information in the fire control centre (see chapter F5-09 GD FFO Fire control centres for more details).



Figure 8 – Hard copy information and diagrams clearly located with the main panel

4.6. Emergency warning and intercommunication systems (EWIS)

Emergency warning and inter-communication systems (EWIS)

Emergency warning and intercommunication systems (EWIS) can be used to control the evacuation in buildings where not everybody is expected to evacuate the building at once. The EWIS follows a pre-programmed pattern of alert and evacuation modes to evacuate the building.

If necessary, a user can manually override the evacuation sequence and control the evacuation. They can also use the EWIS public address system to speak directly to floor occupants. Some EWIS also have WIP phones, which allow the EWIS user to communicate with other parts of the building.

It is important to note that the EWIS is a separate piece of equipment from the fire alarm panel, and that both need to be used together during a fire event. The alarm provides information. The EWIS provides a separate way of receiving and delivering information.

How we use EWIS

The EWIS provides firefighters with additional means of communication. We use the EWIS to deliver messages over the public address system. These can be messages to specific areas of the building, e.g. "Floor 2, evacuate immediately," or we can use them to control the flow of occupants away from certain parts of the building, e.g. "All occupants on levels 2, 3 and 4, evacuate immediately via the northern stairs".



We also use the WIP phones to speak to each other and to building wardens.

If we need to take control of the evacuation, we can also do this using the EWIS functions.

Where to locate your EWIS

AS1670.4:2018 gives detailed guidance on where to locate EWIS systems. However, we highlight the following general considerations for our use:

- The EWIS and alarm panel need to be co-located so that firefighters can use both sets of equipment together and efficiently.
- The EWIS should be located in a quiet area of the building. EWIS users need to receive, process and deliver information, and background noise, e.g. in sprinkler pump rooms or along the main escape routes from the building and near fire alarm sounders, can make this task challenging.
- The space containing the EWIS should be protected from fire and smoke and preferably have more than one means of escape.
- We need floor area in and around the EWIS so we can easily access and operate the equipment.
- The programming of the EWIS and fire alarm panel should be well coordinated so that it is clear which area of the building is covered by the zones on the alarm panel and EWIS.

We recommend that, early in the design stage, you contact us at designers.guide@fireandemergency.nz to discuss the best EWIS location for your building. Ideally you should discuss this with us when you consult us about where to locate the alarm panel and other firefighting facilities.

4.7. Other equipment associated with fire alarm panels

Fire control centre

Complex buildings may have complex evacuation strategies and several fire safety systems e.g. sprinkler, smoke control, building hydrant systems, etc. Where this is the case, we recommend you consider providing a fire control centre (FCC).

The FCC is a dedicated room or space containing the fire alarm panel and other related fire protection control equipment (including the EWIS). It provides a safe space for controlling firefighting and other building systems, as well as emergency procedures.

Like the EWIS, the FCC and fire alarm panel requirements need to be coordinated into the final building design so that the FCC contains the main fire alarm panel.

For more information on fire control centres, see chapter F5-09 GD FFO Fire control centres.

Building hydrant and sprinkler inlets

Building hydrant and sprinkler inlets should be located near the alarm panel, as discussed in the previous section. For more detailed information on this equipment, refer to F5-05 GD FFO Building hydrant systems and F5-06 GD FFO Automatic sprinkler systems.

Interfaces with other building systems

Other equipment or systems may also be interfaced with the alarm panel. These include:

- security systems
- smoke control systems
- fire and smoke curtains

- lifts (refer to F5-08 GD FFO Lifts for more information).

We need to know that this equipment/system exists and to be able to control or override it. Controls for other systems interfaced with the fire alarm panel need to be located with the fire alarm panel at the main attendance point. This makes them immediately obvious to firefighters. Controls do not need to be located at every alarm panel.

We recommend that where the fire alarm interfaces with other systems in the building, you provide a hard copy summary on how these systems are intended to operate during a fire. This does not need to be detailed. A cause-and-effect matrix for the fire alarm versus associated fire design features is enough to help us understand how the building design works.

5. Recommendations

Locating alarm panels

- Locate the parts of the alarm panel that firefighters use so that they are immediately visible from the street.
- Provide strobe lights to highlight the alarm panel location.
- If there is more than one panel for a building or site, make it clear where others are located and what areas of the building or site each panel covers.
- Locate the panel so that the information on it is readable from a standing position.
- Consider how you will protect firefighters using the alarm panel from overhead risks.
- Consider co-locating alarm panels with other firefighting facilities but also keep in mind how this may interfere with the escape route path.
- Engage with us about your alarm panel location in the development stages of your project.

Accessing alarm panels

- If your panel is to be located behind a glass frontage, provide us with access to the cabinet to use basic control functions.
- If one of your panels is located inside a building, provide us with access to that part of the building.

Understanding the alarm panel output

- Design the panel information so that we can quickly and easily make sense of the information on the alarm panel.
- Design alarm zones and sprinkler zones to minimise confusion and clearly show how the zones overlap.
- Provide hard copies of building information with the alarm panel to improve our understanding of your building and its design features.
- Label detectors clearly so we can see them when standing in the area they cover.

Other associated equipment

- Engage with us early in your design development to discuss where to locate other equipment associated with the alarm panel.
- Provide us with information on other equipment interfaced with the alarm and how we should expect it to perform during a fire.

- Provide us with controls/overrides for other systems interfaced with the alarm panel located at the attendance point.
-

5.1. Completing the firefighting facilities checklist

Completing the checklist

When completing F5 SC Part C: 5 Fire alarm panel of the firefighting facilities checklist (FFFC), you should state what equipment will be installed and clearly outline where it will be located. This will allow us to understand the proposed layout and ensure that it is installed in the most appropriate location for firefighting operations.

Remember that all of these systems are put in place for us to use in emergency situations – always consult us when deciding where to locate them – email designers.guide@fireandemergency.nz.

6. Related information

6.1. Designers' guide to firefighting operations

- F5 01 GD FFO Introduction
- F5-02 GD FFO Emergency vehicles access
- F5-03 GD FFO Radio communications
- F5-04 GD FFO Fire alarm panels
- F5-05 GD FFO Building hydrant systems
- F5-06 GD FFO Automatic sprinkler systems
- F5-07 GD FFO Stairs in buildings
- F5-08 GD FFO Lifts
- F5-09 GD FFO Fire Control Centres
- F5-10 GD FFO Evacuation and rescues
- F5-11 GD FFO Water supplies
- F5-12 GD FFO Construction, refurbishment and demolition sites
- F5-13 GD FFO Multi-tiered vehicle stacking buildings
- F5-14 GD FFO Firefighting shafts in taller buildings

6.2. Legislation

- [Fire and Emergency New Zealand Act 2017](#)
- [Building Act 2004](#)
- Building Regulations 1992 > NZ building code > [Fire safety](#)

6.3. Standards

- NZS 4512:2021 Fire detection and alarm systems in buildings
- NZS 4541:2020 Automatic fire sprinkler systems
- AS 1670.1:2018 Fire detection, warning, control and intercom systems – System design, installation and commissioning

6.4. References

- [New Zealand Building Code Compliance C Protection from fire](#)
- [New Zealand Building Code handbook, third edition, amendment 13](#)
- [C/AS2 Acceptable solutions](#)

Note: The legislation, standards and references referred to in this guide (including those listed above) are relevant at the time that this document was published. Note however that the legislation/links may have been updated since this document was published.

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