Designers' guide to firefighting operations

Building hydrant systems

F5-05 GD

FIRE EMERGENCY NEW ZEALAND

WHAKARATONGA IWI

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Status of this document

This document is issued by Fire and Emergency New Zealand.

Recommendations for change

The document, its content and specific processes are not to be altered except through Fire and Emergency New Zealand document management processes.

Requests or recommendations for changes to this material should be sent to National Manager Response Capability.

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1. Context

Scope

During an emergency, Fire and Emergency is most efficient and effective when fire crews have fast and clear access to water supplies provided. Poor or inadequate supply and provision can delay our response. Delays in dealing with a fire may risk the safety of people and their property.

This chapter is about water supplies from an appliance to firefighters within and around the building. Its purpose is to provide a consistent Fire and Emergency New Zealand position on how to include hydrant systems in building design. Its primary objectives are to:

- summarise the key system design requirements
- explain:
  - the differences between various types of hydrant systems
  - when a hydrant system is required under the current legislative framework
  - the relevant Fire and Emergency operational procedure for their use.

For the purposes of this guide, the following systems are counted as a building hydrant system:

- Fire hydrant systems in and/or around buildings, as defined by NZS 4510:2008 Fire hydrant systems for buildings or NZS 4510:2022 Fire hydrant systems

> **Note re NZS 4510:2008 and NZS 4510:2022:**
>
> NZS 4510:2022 Fire hydrant systems has superseded NZS 4510:2008 Fire hydrant systems for buildings.
>
> Fire and Emergency therefore encourages all designers and building industry practitioners to use NZS 4510:2022.
>
> However, C/AS2 Acceptable solutions (C/AS2) still cites NZS 4510:2008, so until MBIE updates C/AS2 replacing NZS 4510:2008 with NZS 4510:2022, NZS 4510:2008 may still be used.

- Type 18 building fire hydrant system, as specified in the compliance documents for the New Zealand Building Code (Building Code)

Other key sources of information for this chapter are based on:

- SNZ PAS 4509:2008 New Zealand Fire Service firefighting water supplies code of practice
- SNZ PAS 4505:2007 Firefighting waterway equipment.

Fire and Emergency also recommends using the Firefighting facilities checklist (FFFC) to document the Fire and Emergency agreement on a specific site's hydrant requirements.

Who this chapter is for

This chapter is for building owners, designers and other building practitioners, and contractors.

We recommend that you apply the guidance in this chapter and the other Designers guide documents and, where appropriate, engage with us early in the design process.

What is not included in this chapter

This chapter gives building industry stakeholders an overview of the parts of Fire and Emergency's operations that relate to them. Please note that it is not an exhaustive guide to our operations, and it doesn't replace any statutory requirements. We recommend you read it alongside other chapters within this guide.

This chapter does not give an in-depth description of the requirements of underground fire hydrants used to gain water supplies from water mains on public streets (i.e. street hydrants or in-ground hydrants).

For more information on underground fire hydrant systems, see NZS 4522:2010 Underground fire hydrants, SNZ PAS 4509:2008 Firefighting water supplies code of practice (adequacy of the water supply) or SNZ PAS 4505:2007 Firefighting waterway equipment.

Legislative framework

Our functions under the Fire and Emergency New Zealand Act 2017 include:

- responding to and suppressing fires
- attending to other types of emergencies that may occur in a building.

We aim to reduce the risk to both firefighters and building occupants by encouraging appropriate building design for firefighting operations. This 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.

This guide is based around compliance with the Building Code Clause C5 Access and safety for firefighting operations. Clauses C5.3 and C5.5 of the Building Code describe how hydrant systems are required, installed and work:

> C5.3. Buildings must be provided with access for fire service vehicles to a hard-standing from which there is an unobstructed path to the building within 20 m of:
>
> a. the firefighter access into the building, and
>
> b. the inlets to automatic fire sprinkler systems or fire hydrant systems, where these are installed.
>
> C5.5) Buildings must be provided with the means to deliver water for firefighting to all parts of the building.
>
> Performance requirements in clauses C5.3 to C5.8 do not apply to backcountry huts, detached dwellings, within household units in multi-unit dwellings, or to outbuildings, and ancillary buildings.
>
> [Schedule 1, p. 33A].

Read this guide alongside the:

- mandatory requirements of the Building Code
- requirements of New Zealand Standards (Standards)
- Building Act 2004.

The Building Code Fire Safety – C Protection from fire, clauses C1 – C6 defines Building Code performance requirements of the Building Act 2004. C5 is the performance requirement for Access and safety for firefighting operations.

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 (C/AS2).

Address point	This point is part of the data set administered by Toitū Te Whenua | Land Information New Zealand (LINZ). It is the address (point) where the building is, or will be, located. The address point can be either singular, 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	The hardstanding area where the first attending Fire and Emergency vehicle will stop and set up. There is usually only one attendance point located at the building's primary entry point. The attendance point should comply with clause 6.2.1 of C/AS2, and must comply with Clause C5.3 of the Building Code. This will give access to within 20m of: • indications of fire location • controls for fire safety systems • inlets for fire sprinkler or hydrant systems. The attendance point is the initial tasking and safety briefing point for crews before they deploy to any other access point. It must have facilities that give firefighters clear information, in compliance with Building Code C5.7. For unusually large or complicated building layouts, a second (or more) attendance point may be appropriate. This must be discussed and agreed with Fire and Emergency Operations. For a full description of the attendance point, refer to F5-02 GD FFO Emergency vehicle access.
Design flow	Total minimum flow rate (in litres per minute) that a building hydrant system is designed to provide when all hose streams are simultaneously in use.
Design number	Number of hose streams a building hydrant is designed to provide for simultaneous use. Refer to NZS 4510 for further details.
Fire and Emergency vehicular access to hardstanding areas	Vehicular access to hardstanding for Fire and Emergency vehicles must comply with C/AS2 Part 6: Firefighting Clause 6.1.1. Refer to F5-02 Emergency vehicle access for additional considerations.
Firefighter access point	The place where firefighters gain access to a building. This must comply with the New Zealand 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.

Hardstanding 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 hardstanding 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 hardstanding will be the main road if the structure is close to it.
	
	To be operationally useful, hardstanding must be within 135 metres of a firefighting water supply.
	
	Additionally, for the health and safety of our personnel, hardstanding areas:
	• must not be located under a canopy, or other part of the structure on fire.
	• must not be located close to significant hazards such as dangerous goods, gas cylinders or similar.
	• must have a path of retreat for the appliance and crew if the incident deteriorates.
	• must be located outside the hazard zone of the firecell on fire. This hazard zone will include consideration of the following:
	  ○ a horizontal collapse zone requirement of 1.5 times the height of external walls of the firecell on fire
	  ○ radiant heat from flame projection or external walls exposing the pump operator and appliance
	  ○ the impact of the fire safety features within the building (for example, sprinklers).
	
	A full description of the hardstanding area can be found in F5-02 GD FFO Emergency vehicle access.

3. Our operations

3.1. How building hydrant systems help us fight fires

No reticulated water available	For most developments, the water supply will be from the reticulated network to the appliance and then into the building. However, where there is no reticulated water, or when the hose run from the nearest hydrant to the appliance exceeds 135 metres, we need you to provide a water supply for firefighting.
Large/tall buildings	Building hydrant systems help deliver water around tall buildings or buildings with large footprints. They reduce response times by allowing firefighters to start attacking the fire early. This can significantly affect the outcome of the fire. Building hydrants are also critical for supplying water to interior firefighting crews.

System description	Building hydrant systems consist of a fixed piping system and hose valve connections. Water is fed into these systems either through an automatic water supply or manually through a building hydrant inlet (BHI) that is charged by the firefighting crew. The system delivers water to hose connections throughout the building. Firefighters then extend hose lines from these hose connections to fight fires inside the building.

3.2. What we expect from hydrant systems

General	The Building Code requires building hydrants systems to be designed to comply with NZS 4510:2008 or NZS 4510:2022. SNZ PAS 4509:2008 may be used to calculate the required firefighting flow rates. The criteria for waterway equipment can be found in NZS 45NZS05:2007.
Single hydrant system for multiple buildings	At our discretion, we may approve a single hydrant system covering multiple buildings. We will consider the following factors when assessing whether this system is appropriate: • Maximum distance between the attendance point and the most remote hydrant outlet • Risk of building-to-building fire spread. This includes consideration of buildings on the same property • Resources we have available to support an incident at the project location.
Certification and labelling	A building hydrant system is certified by the hydrant system certifier. The type of building hydrant installed is normally labelled accordingly at its inlet location. For descriptions of the different types of risers, see 5.1 Risers.

4. Challenges

Overview	The main challenges we face with building hydrant systems are at fires in tall buildings or buildings with a large footprint. This is because the height and footprint of the building affect both the hose run distance and our ability to safely stage firefighting operations.

4.1. Hose runs

Hose run distance	To determine whether a building needs hydrants, you need to measure the hose run distance.

Hose run distance is the distance firefighters will need to roll hose to reach the furthest point of the building from the attendance point.

Buildings with very long hose runs make access for firefighting and rescues difficult. The Building Code requires provision of building hydrant systems when:

- the height from the Fire and Emergency attendance point to any floor is greater than 15 metres, or
- the hose run distance from Fire and Emergency vehicular access to any point on any floor is greater than 75 metres.

Note: At structure fires, firefighting operations are limited by the length of hose firefighters have to work with. If the hose run distance is greater than 75 metres from a building, a fire hydrant system should be provided. (This includes the initial distance from the appliance to the building.)

Measuring hose run distance

A hose run should be measured from the hardstanding area to the most remote part of the building.

> **Note:** Hose run distance should also account for obstructions such as internal partitions, rack storage, machinery, large pieces of furniture. Where a change of elevation occurs (i.e. stairs) this should also be accounted for.

In remote or rural locations, Fire and Emergency may not have sufficient resources to facilitate multiple hardstand locations in a timely manner. A hydrant system would enable a faster response to all parts of the building in this instance.

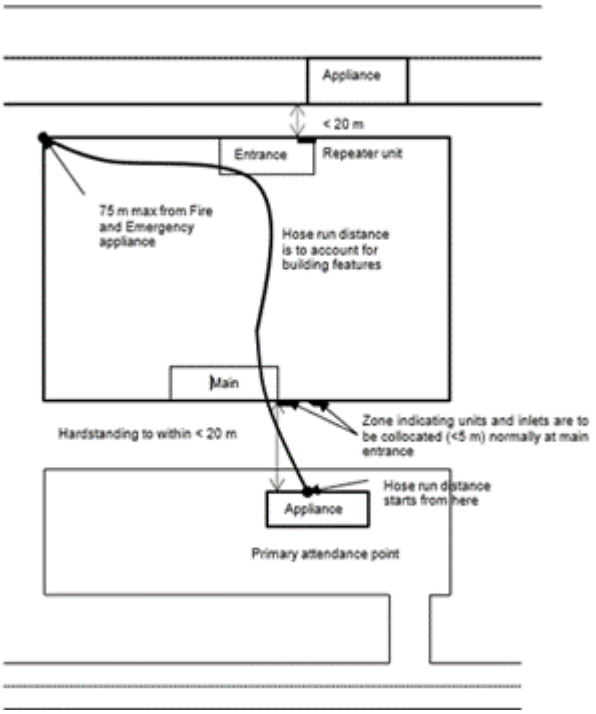

Figure 1 – Measurement of Fire and Emergency hose run

Boundary security requirements

For special buildings where boundary security is important, such as prisons, take care not to compromise boundary security when measuring hose run coverage. This also applies to building hydrant hose coverage.

4.2. Building footprint

Hazard zone

The location of a building hydrant needs to take the hazard zone into account. Large/tall buildings have a bigger hazard zone. Unprotected hydrant outlets that are too close to a particular building are less likely to be used due to potential fire exposure or collapse. Hydrant outlets should not be installed in the hazard zone unless protected (e.g. by fire-rated construction).

Estimating the hazard zone

Fire and Emergency operating procedures calculates the size of a hazard zone as 1.5 times the height of a tilt panel in a building.

Note that hazard zones aren't usually a consideration in urban areas. This is because several hydrants are available for any given location and buildings are generally larger and closer together.

5. Recommendations

Overview

Building hydrant systems preclude the need for long hose lays within tall or large buildings.

While an appliance will carry a pump, in tall buildings, a booster pump may also be required.

5.1. Risers

Overview

A riser is a hydrant main fitted with inlet connections at fire brigade access level and building hydrant outlet assemblies at specified points.

There are three main types of risers for firefighting purposes: charged, wet and dry.

Hydrant main, charged riser

Several different types of systems may be found in existing buildings, but new systems are typically wet or charged risers.

The system should be charged and pressured with water to ensure the integrity of the system. It should be maintained in this condition. These systems are normally provided with water for monitoring purposes. When a system is needed for firefighting, Fire and Emergency crews will use a pumping appliance to provide the system with extra water.

Figure 2 – Two-way charged riser inlet

Figure 3 – Typical charged riser outlet

Building hydrant systems complying with NZS 4510:2008 and NZS 4510:2022 are:

- suited to firefighting operations using manually controlled branches, and
- not suitable for the use of automatic branches that optimise flow rate to maintain a constant nozzle pressure.

In areas where system pipework is subject to freezing, consideration shall be given to antifreeze. This shall be peer reviewed by the hydrant system certifier.

Riser main, dry riser

A dry riser is typically a vertical pipe fitted with inlet connections at fire brigade access level and landing valves at specified points. The riser is normally dry, but can be charged with water, usually by pumping from Fire and Emergency appliances. An air release valve is fitted at the highest point to enable the riser to be fully charged.

Dry risers were installed to NZS 4510:1978 but are no longer permitted for new buildings. We recommend converting existing dry risers to charged risers where reasonably practicable.

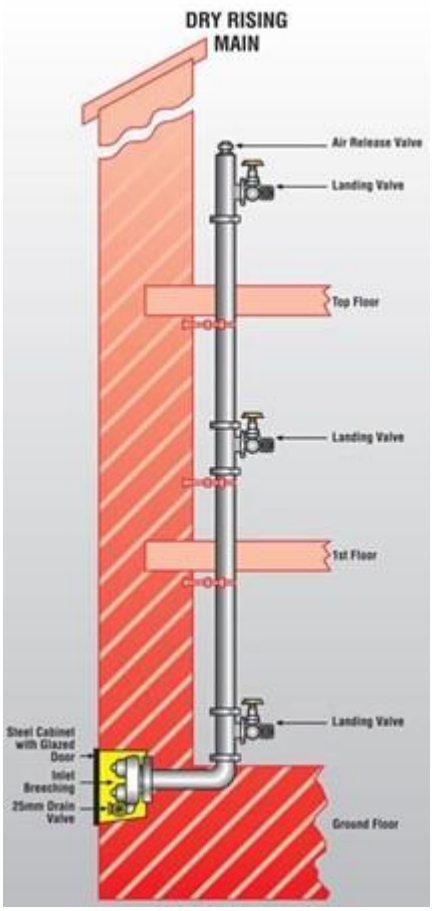

Figure 4 – Dry rising main schematic

Riser main, wet riser

A wet riser is a vertical pipe that is permanently charged with water from a pressurised supply sufficient for firefighting and fitted with landing valves at specified points. Wet risers were installed to comply with previous editions of NZS 4510. However, since these editions have been now superseded, wet risers are normally no longer installed.

5.2. Building hydrant inlet

Function

A building hydrant inlet allows Fire and Emergency to enhance the water supply to the building hydrant system.

Location

Fire and Emergency's position on the location of building hydrant inlets is as follows:

- The building hydrant inlet shall be on the outside of the protected premises, preferably within 5 metres of the fire alarm panel in the main entrance.
- The location of the inlet should be in clear view of, and within 20 metres, of the appliance hardstanding or the roadway (i.e. within one length of hose).
- Access to the inlet shall be unobstructed.
- The inlet should be on the outside face of the building, preferably on the front face.
- In certain situations, the inlet may have to be located away from the building provided that all criteria of NZS 4510 is met (although, this is not Fire and Emergency's preferred option). For example, where traffic access for a Fire and Emergency appliance cannot be provided due to an underground car park roof.

Note: Fire and Emergency crews usually go straight to the fire alarm panel when they arrive to get information about the nature of the incident. A well-designed building should allow fire appliance access to a point close to the fire alarm panel (see F5-04 GD FFO Fire alarm panels).

We recommend locating fire alarm panels next to the main entrance of the building for easy identification. If fire hydrant inlets are positioned near the fire alarm panel, firefighters will be able to locate the inlets and supply water to them quickly, without having to reposition the fire appliance.

Enclosure

The inlet enclosure shall be constructed to allow hoses to be connected without kinking or rubbing on the bottom edge of the cabinet. There should be a clearance of at least 75 mm between the rim of any hand-wheel and any part of the enclosure or equipment.

Note: There must be enough clearance for firefighters to operate valves without scraping their hands or damaging the hose.

Figure 5 – Clear space, sloping splash guard to base

Figure 6 – Insufficient clearance, hose rubs on bottom edge

Door

The door should have a 'BUILDING HYDRANT INLET' sign.

It should be locked with a triangle key that requires no more than five complete turns to unlock. Fire and Emergency must approve.

Figure 7 – Triangle key lock

Clear working space

There must be a working space clear of all objects around the inlet enclosure, with the following dimensions:

- 600 mm either side of the inlet enclosure
- 1200 mm out from the face of the enclosure
- extending up 2000 mm from the surrounding standing surface.

Figure 8 – Clear space in front of the inlets

Trip hazards

When locating the inlet, consider whether the hose connected to the hydrant system will be a trip hazard. Although NZS 4510 allows hydrant inlets to be positioned close to an egress path, the hose can present a trip hazard both for occupant egress and responding firefighters (See Figure 9 for an example of this.)

Figure 9 – Hydrant inlet located creating trip hazard

Falling glass

Where the door of the enclosure is on a glazed exterior of a multi-storey building, either a veranda or other assembly shall be provided to protect firefighters and hose from falling glass. This assembly should extend at least 1 metre in front and 1 metre either side of the enclosure.

When charged with water, hoses are extremely vulnerable to failure from falling glass. Without a protective assembly or veranda, it is risky to use the inlets and the risk is greatest for non-sprinklered buildings. In such cases, the canopy design protects against a failed window unit falling from the highest level.

In some cases, the ground floor of the building is designed with a setback with glass façade on levels above. Note that the proposed setback distance does not serve the same purpose as a protected canopy because falling glass from the façade above may still damage hose and/or harm firefighters below.

Figure 10 – Panel at the front main entrance with overhead protection

5.3. Building hydrant outlets

National Commander's Instruction (NZS 4510:2008 Appendix D)

Fire and Emergency has issued National Notice 010/2024 Use of hydrant outlets in open paths in buildings instructing firefighting personnel not to use unprotected hydrant outlets within buildings. As per Appendix D of NZS 4510:2008 Fire hydrant systems for buildings, this National Commander's Instruction (NCI) is now standard operating procedure for firefighters when encountering unprotected hydrant outlets. Therefore, Fire and Emergency personnel will no longer routinely use internal unprotected hydrant outlet locations.

When designing a building that requires a building hydrant system with outlets proposed to be in open paths, we recommend engaging early with local Fire and Emergency Risk Reduction teams. They can advise you on options to achieve a satisfactory outcome.

Hydrant outlets in unprotected areas are a significant risk to responding firefighters. These outlets can be difficult to locate during a fire and, if the fire is near these outlets, heat damage to the hydrant outlet itself can compromise the entire hydrant system.

There is now a new Standard for the design and installation of fire hydrant systems – NZS 4510:2022 Fire hydrant systems, which supersedes NZS 4510:2008 Fire hydrant systems for buildings. The new Standard has better provisions for firefighter safety when considering non-standard design of

hydrant outlet locations, and we encourage building designers to use this version of NZS 4510.

Location and hydrant spacing in multi-level buildings

Building hydrant outlets shall be located on every floor, including the access or entrance level, so that firefighting crews can use them quickly and efficiently. There shall be at least one building hydrant outlet assembly per floor, including roof and intermediate floors. Firefighters prefer to set up and begin their attack from within a fire-protected stair enclosure, starting at the floor below the fire floor. The attack then proceeds towards the fire location. If a quick evacuation becomes necessary, the hose then functions as a lifeline, leading the firefighters back to the protection of the stairs.

The building hydrant outlet assembly may also be located in:

- a vertical safe path at each floor or mid-floor landing
- a protected lobby connected to a horizontal safe path in low-rise buildings
- the lobby of a firefighting shaft (see F5-14 GD FFO Firefighting shafts in taller buildings)
- any other location permitted by NZS 4510:2022 Paragraph 3.2.1.

The current preferred location for stairway hose connections is at the intermediate stair landings between floors. This is because firefighters usually stretch hose from below the fire floor for their protection. If the connections are at intermediate landings, the hose line reaches further than it would if the connection were at the main landing, a full storey below the fire floor. Despite this consideration, NZS 4510:2022 does permit connections to be located at main floor landings.

If hose valves are located on main landings, consider the position of hose connections in relation to the door. The connections should not be behind the door when it is open.

Designers should position the outlet to permit the hose line to run out the door without kinking or obstructing travel on the stair.

Stairway hose connections

When firefighters use hose lines from stairway hose connections, the stair doors need to be ajar so the hose lines can pass through. However, this can also allow smoke and heat to enter the stairway.

At this point, occupants should either have exited the building, be below the level of the fire, use another stairway, or be sheltered in place until after the incident. However, building occupants may be still exposed to fire or smoke during firefighting operations due to:

- conflicting evacuation instructions
- occupants not following evacuation instructions
- the need for firefighters to operate from all stairways
- the need for total building evacuation (especially in response to terrorist incidents).

Refer to F5-07 GD FFO Stairs in buildings for considerations for stair design.

Fire-rated lobby hose connections

Another approach to protecting the stair from smoke contamination during fire suppression operations is to place hose connections in a fire-rated lobby area between the stairs and the building interior. Although such lobbies require extra room, they can double as refuge areas for individuals with mobility

impairments. If the lobbies are open to the exterior, any smoke that enters them will dissipate easily.

Additional building hydrant outlet assemblies shall be installed at every point on the floor not covered by an arc of:

- 32 metres for non-sprinklered buildings
- 40 metres for sprinklered buildings.

The coverage for hose from a hydrant outlet is measured as an arc from the point of entry into the space covered by the hydrant outlet.

Note: This is different from hose run lengths, which consider the layout of hose as a measured distance from the pump of a fire appliance.

Hose length

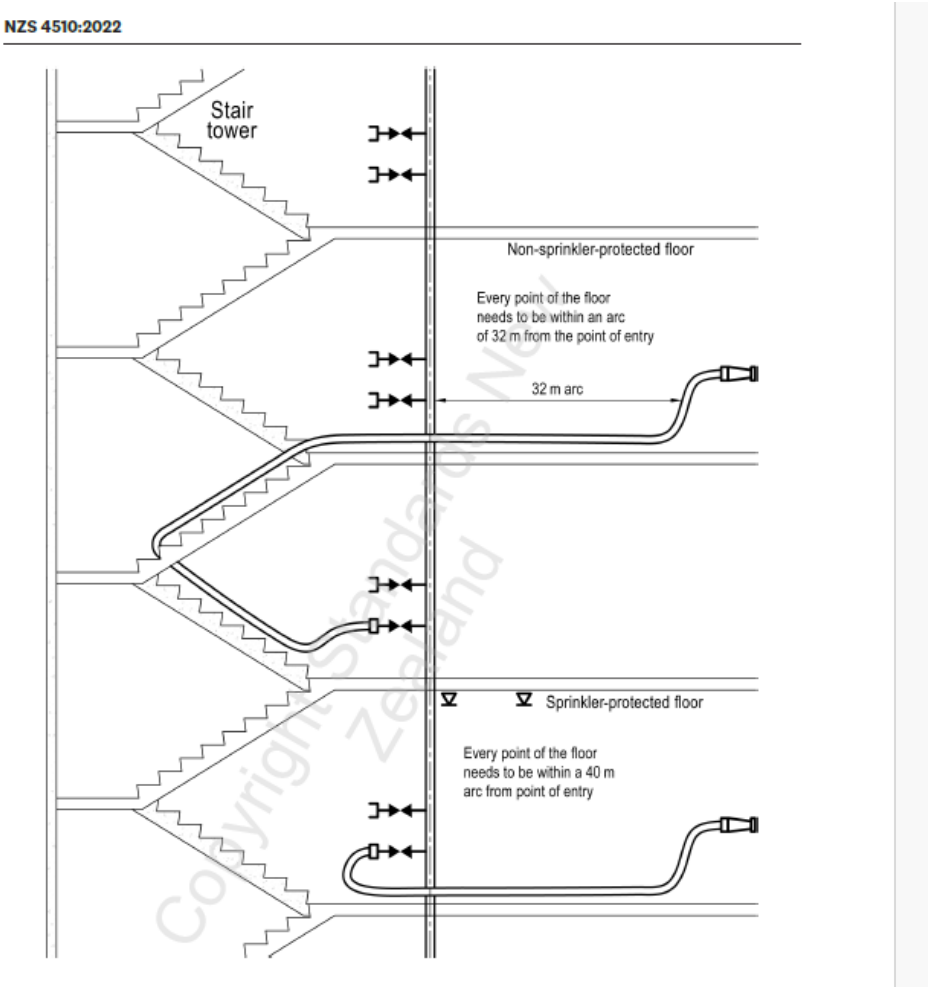

Figure 11 – Measurement of hose length (Source: NZS 4510:2022 p26 © Standards New Zealand 2022 LN001514)

When considering the position of the hydrant outlet and the measurement of the arc, designers should also ensure that firefighters can access all areas of the floor to extinguish a fire with 50 metres of hose. There may be situations where a 50-metre hose run could end within the arc due to obstructions and internal layouts.

Internal hydrant outlet spacing

The safest solution for firefighters is to locate hydrant outlets either:

- externally in open air (e.g. not under canopies or within breezeways) or
- within safe paths.

The primary design objective should be achieving full coverage from these locations.

However, when there is no alternative to internal unprotected hydrant outlets, we expect their design to be based on the considerations outlined in NZS 4510:2022 Appendix A. The information contained in NZS 4510:2008 Appendix C is not a normative (mandatory) portion of the standard, and its use may result in unsafe designs for firefighters.

When specifying internal unprotected hydrant outlets, there are design features that can be used as mitigation. These include:

- an automatic sprinkler system to limit fire growth/spread
- a smoke management system to maintain the smoke layer above a pre-determined height to maintain good visibility
- fire-rated corridors
- a combination of these.

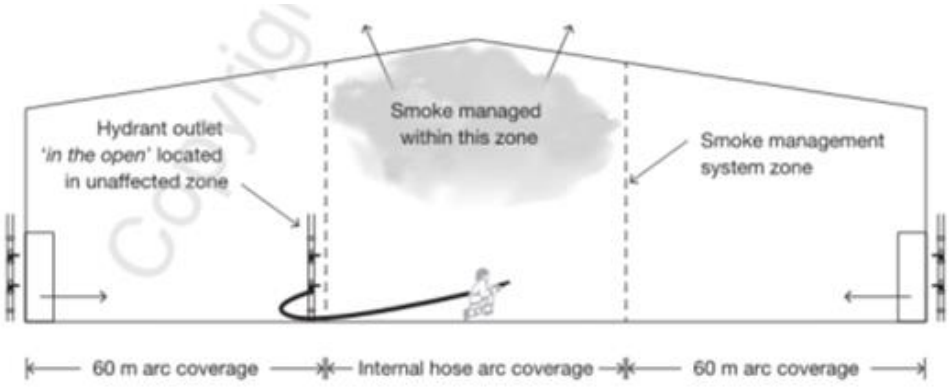

Figure 12 – Use of smoke control to protect hydrant outlets (Source: NZS 4510:2022 p78 © Standards New Zealand 2022 LN001514)

When determining the outlet spacing of an internal hydrant system, the maximum distances should not exceed:

- 32 metres for non-sprinklered buildings
- 40 metres for sprinklered buildings.

The hose run distance of 75 metres, as outlined in C/AS2 Acceptable Solutions, only relates to the initial assessment of whether a building hydrant system is required within the building.

The measured arc is smaller if the building is not sprinkler protected. This is to allow for hose to be taken up the stairs from the floor below, as per standard Fire and Emergency procedures.

NZS 4510 allows the larger measured arc to be taken from the fire floor of a sprinkler protected building. This allows the hose to be connected on the fire floor, although this is not standard Fire and Emergency procedure.

Mechanical damage

Where activities such as vehicle movements increase the risk of damaging the hydrant outlets, protection (e.g. bollards) should be provided. While this is not contained within the 2008 revision, it is a requirement of the 2022 revision of NZS 4510.

Figure 13 – Car park building hydrant with visible signs

Scissor stairs

Where hydrants are located in a scissors stairwell serving a common protected lobby or floor area, building hydrant outlets shall be located at each floor level accessible from the stairs. The scissor stairwell door at each level providing direct access from the street should display a sign indicating the floor level location of hydrants that can be accessed from that particular door.

Note: If the building has sets of stairs that serve alternating floors, we recommend installing building hydrants in multiple stairwells. This gives firefighters access to water independent of which floor the fire is on.

Typical firefighting equipment weight

When locating building hydrant outlets remote from hardstands, please consider that firefighters:

- typically carry approximately 45 kg of equipment (breathing apparatus, hose bandoliers, branches, etc.)
- may have to start firefighting operations from a doorway that may be several floors above ground level.

Figure 14 – Typical firefighting equipment carried into a multi-storey building

Padlock key access

Note: It is important that firefighters have quick access to building fire hydrant outlets without compromising security requirements.

A hydrant outlet may only be inside an enclosure :

- clearly marked with the words 'BUILDING HYDRANT OUTLET' for easy identification
- the door of any such outlet enclosure is made of breakable material
- where required by the building owner, valves may be locked using the type of triangular key locking device shown in Paragraph 4 of NZS 4510:2022.

Alternatively, enclosure doors may be secured using other types of lock approved by the National Commander (Paragraph 4.1.3, NZS 4510:2008). If building fire hydrant outlets are chained and padlocked shut, a standard Lockwood 144 key must operate the padlock.

Lockwood 144 (fire hydrant enclosure padlocks)

Triangle key used to unlock BHI enclosure commonly held on all appliances

Figure 15 – Type of keys commonly held by Fire and Emergency

5.4. Large footprint low rise/single level buildings

Types of building

Building fire hydrants are also required for low-rise buildings with large floor plates that do not allow all of the building to be reached within a 75-metre hose run from the Fire and Emergency attendance point. Examples include shopping malls, airports and warehouses. Unlike high-rise buildings, these buildings don't usually have a safe location for Fire and Emergency to establish a firefighting attack.

5.4.1. External hydrant outlets

Why we prefer them

For low rise buildings, Fire and Emergency prefers a system of external building hydrant outlets that function in the same way as street or inground hydrants. These outlets should be located near entry points to the building. This aligns with our standard operating procedures, which require clean air to set up and respond to a building fire. Our procedures don't allow firefighters to enter a building to find a water supply to start firefighting – they may only enter with a charged hose and available water supply. We don't recommend using internal outlets because the environment may be hazardous or have extremely poor visibility.

Function

External building hydrant outlets are for interior firefighting. They are part of a building hydrant system and are separate from street or inground hydrants.

The system should include a building hydrant inlet within 20 metres of the Fire and Emergency attendance point. The designer should demonstrate that pressure and flow requirements are achievable at each outlet.

This system shall be maintained as part of the fire safety systems of the building, as required under the Building Warrant of Fitness Scheme.

5.4.1.1. Requirements for external hydrant outlets

Some of the requirements for external fire hydrant outlets from New Zealand standards include the following.

Access for firefighting crews

- Pedestrian access to the building for firefighting crews
- Doors designed to allow crews to enter the building during a fire
- Access clear of obstructions

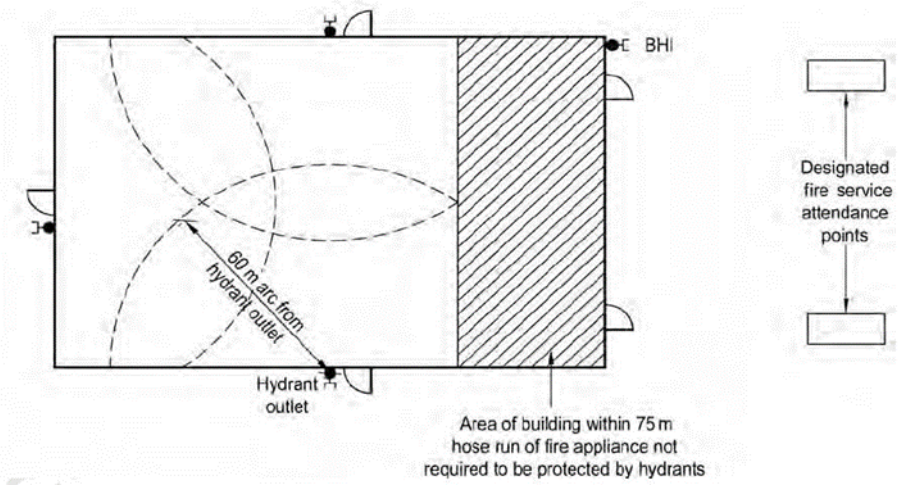

Figure 16 – External hydrant outlets and access (Source: NZS 4510:2008 Figure p89 © Standards New Zealand 2022 LN001514)

Hydrant coverage

If the hydrant is no more than three metres from the point of entry to the building, all parts of the building should be within a 60-metre arc from the building hydrant outlet.

If the hydrant is more than three metres from the building entry point, the coverage arc should be reduced accordingly as per NZS 4510.

Fire resistance rating (FRR)

Non-sprinklered buildings shall:

- provide 60/60/60 FRR construction extending 2 metres each side of the outlet extending 3 metres from ground level
- be no closer than 2 metres from a non-rated opening into the building (see NZS 4510:2022 Paragraph 4.4).

Signage

A sign stating 'BUILDING HYDRANT OUTLET' when the outlet is within an enclosure.

5.5. Extended hose runs in large subdivisions

Legislative changes affecting vehicle access

The Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 removed the requirement to provide parking spaces for residential houses. One of the consequences of this change is that an increasing number of residential dwellings don't have adequate vehicular access for firefighting purposes.

Building Code provisions for firefighting

The current Building Code includes explicit provisions for firefighting. Most buildings are required to comply with the 75-metre hose run distance from the appliance to the most remote point of the building (the 75-metre rule). This rule is used to demonstrate compliance with Building Code Clause C5.5.

Problems complying with the Building Code

There have been attempts to find alternative ways to comply with C5.5 for these types of developments. One is by providing a NZS 4510 Fire hydrant system with the inlet at the Fire and Emergency attendance point (typically the street) and hydrant outlets at each residential building located beyond 75 metres. This can create further problems for the following reasons:

- The hydrant system is a specified system and be captured in a compliance schedule. Residential houses are not required to include a compliance schedule.
- If the hydrant system is on shared land and not connected to any building, it cannot be added to any compliance schedule.
- If the subdivision includes a vertical elevation from street height, the system may need a pump to supply water to the elevated part. This results in additional maintenance requirements.
- There is no compliance schedule ensuring maintenance occurs and no entity responsible for maintaining the hydrant system. This significantly reduces the system's reliability.
- NZS 4510 Building hydrant system is designed around internal firefighting operations and does not consider water requirements to mitigate fire spread between buildings.

In these circumstances, Fire and Emergency will not support any alternative solution designs that substitute a building hydrant system for design features/building infrastructure that support effective firefighting.

5.6. Minimum pressure

Pressure requirement under NZS 4510:2022

Most new standpipe systems are designed by hydraulic calculations. This ensures that the water supply, pipe sizes used, and pumps (if needed) will provide a certain flow and pressure at a specified number of hose connections in the system.

NZS 4510:2022 specifies a minimum design pressure of 600 kPa, or maximum permitted under NZS 4510:2022 at the most hydraulically disadvantaged point to allow for Fire and Emergency fire suppression tactics. This is the pressure available at each building hydrant outlet when the design number of hose streams are in simultaneous operation at the design flow.

Pressures needed during operations

These minimum pressures are based on certain assumptions about Fire and Emergency connecting and feeding the hydrant system. We will provide a supply pressure of up to 1050 kPa into the building hydrant inlet to ensure the adequacy of fire streams to assure the safety of firefighters conducting interior operations.

Fire and Emergency will begin their attack with hose branches that generally require at least 600 kPa to operate. It is assumed that the total flow required will be less than the rated flow of the pump on the fire appliance. At these lower flows, output pressures will be higher.

Requirement for pump	We will need a pump to meet the pressure requirement when the highest building hydrant outlet above the road surface closest to the hydrant inlet exceeds 40 metres from the Fire and Emergency attendance point/hardstanding.

5.7. Minimum flow rates

Sprinklered buildings	• Buildings fitted with an approved sprinkler system must be designed to allow three hose streams to simultaneously flow at 500 litres/min.
	• The design number of hose streams in simultaneous use shall be three flowing at 500 L/min each.
	• Total design flow shall be 1500 L/min.
	• The design number of flowing streams per floor shall be:
	  ○ two on the hydraulically most remote floor
	  ○ the third stream on the floor immediately adjacent.
	• Water supply must last at least 30 minutes.

Non-sprinklered buildings	For buildings not fitted with an approved sprinkler system, the design number of hose streams in simultaneous use shall be determined from Section 3.3 of NZS 4510:2022. The minimum flow rate per hose stream shall be 440 L/min.
Pressure loss	**Note:** Fire and Emergency appliance delivers water at the maximum pressure or 1050 Kpa, when measured at the delivery outlet. Pressure losses will occur in the pipework due to pipework sizes, layout, friction and pumping against gravity. Designers should demonstrate by hydraulic calculations that the operating pressure of 600 kPa at the highest/furthest hydrant outlet can be achieved by: • a Fire and Emergency pump, or • using a dedicated pump, or • by boosting the firefighting crews' water supply in some way.

5.8. Flow test

Water flow and pressure measurement	Although an adequate water supply is necessary, the Standard does not require a water supply sufficient for firefighting to be permanently piped to a hydrant system. It is assumed that as with any other building, the firefighting crew will, on arrival, access the available water supply and connect to the riser system.
Testing hydrant systems	Fire hydrant systems are tested by flowing water from the highest outlet, which is commonly found on the roof. They are flow tested from the Fire and Emergency inlet using a water supply from a street hydrant through a pump. The flow and pressure available are measured at the highest outlet. Wet hydrant systems, which have a permanent water supply from a town main connection, are flow tested using the installed water supply and pumps. The flow and pressure are recorded at the outlet and the pressure at the water supply inlet is also measured. These pressures and flows must be within the limits specified in NZS 4510:2022 Fire hydrant systems.

5.9. Construction/demolition sites

Permanent building hydrant system during construction and demolition

Where building construction includes installation of a permanent building hydrant system, the system shall be installed and brought into commission progressively as building work proceeds. In multi-storey buildings, NZS 4510 requires that system to be functional, with a building hydrant outlet on every floor, up to a level not lower than 9 metres below the highest floor slab.

In buildings under demolition which are fitted with a building hydrant system, the system shall be maintained in a functional state for as long as possible and should be the last service removed. The system shall remain functional on the floor below the highest intact floor and removal shall not occur before the combustible contents of the building have been removed.

During the course of construction, demolition and building alteration, the building hydrant inlet shall be accessible from the street frontage. This may require installation of a temporary inlet, for example, at the site security fence. The location of such temporary inlets shall be marked with signs posted.

Increased likelihood of fire

The likelihood of a fire increases in buildings under construction. This is due to number of potential fire sources, such as welding/cutting activities and the large quantities of building materials stored within. In buildings where fire safety precautions are not fully installed, providing a functional building hydrant system helps Fire and Emergency's operations if a fire occurs.

Buildings under demolition are at even greater risk of fire during the demolition works.

5.10. Hydrant impairment

Advise Fire and Emergency of defective hydrants

We advise that contractors inform us of damage to hydrants resulting from work. If firefighters are informed of defective building fire hydrants, they can make alternative operational plans.

To comply with the Building Act 2004, defective systems must be repaired in a timely manner.

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

F5-06 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

F5-12 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

Building Act 2004

Building Regulations 1992 > NZ building code > Fire safety

Fire and Emergency New Zealand Act 2017

6.3. Standards

SNZ PAS 4505:2007 Firefighting waterway equipment

NZS 4510:2008 Fire hydrant systems for buildings

NZS 4510:2022 Fire hydrant systems

NZS 4512:2021 Fire detection and alarm systems in buildings

NZS 4541:2020 Automatic fire sprinkler systems

6.4. References

C/AS2 Acceptable Solutions

Document information

Owner	National Manager Response Capability
Last reviewed	21 July 2025
Review period	Every three years

Record of amendments

Date	Brief description of amendment
July 2025	Add note clarifying use of superseded hydrant standard.
May 2025	Revised to reflect new revision of hydrant standard and publishing National Notice 010/2024. Review period changed from two to three years.
July 2018	Initial version