DESIGNER'S GUIDE

Firefighting operations on building hydrant systems

F5-06 GD

Introduction

When to use

The purpose of this guide is to provide a consistent Fire and Emergency New Zealand position on the provision of hydrant systems in building design. The primary objectives are to:

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

Scope

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

- Fire hydrant systems in buildings as defined by NZS 4510:2008 Fire hydrant systems in buildings.
- Type 18 building fire hydrant system as specified in the compliance documents for the NZ Building Code (NZBC).
- Pillar hydrants that are located in a building complex (including grounds) that can be charged by a Fire and Emergency appliance.

Context

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 a Fire and Emergency response. Delays dealing with a fire may risk the safety of people and their property.

This guide is based around compliance with New Zealand Building Code Clause C5, which deals with 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]*

Other key sources of information for this guidance are based on NZS 4522:2010, NZS 4510:2008 SNZ PAS 4509:2007 and SNZ PAS 4505:2007.

Fire and Emergency also recommends the use of the Firefighting Facilities Checklist (FFFC) to document the Fire and Emergency agreement on specific sites hydrant requirements).

Definitions

Appliance

An emergency vehicle that provides firefighting, rescue or Hazardous Substances (HazSub) capability.

Hardstand area

An area designated and designed for use by a Fire and Emergency fire appliance and its crew, which can withstand the laden weight and associated loads of the vehicle in use.

Attendance point

A single point of emergency response attendance per building, as referenced in clause 6.2.1 of the C/ASx documents, and to comply with Clause C5.3 of the New Zealand Building Code, NZBC. This will give access to:

- indications of fire location
- controls for fire safety systems
- inlets for fire sprinkler or hydrant systems.

An attendance point, where facilities are provided to meet the provisions of NZBC C5-7 giving firefighters clear information, will be the initial tasking and safety briefing point for crews before deploying to any other access point.

Notes:

- The term attendance point is not limited to multi-storey buildings. When crews respond to an incident, the first point of response is the attendance point regardless of building type.
- Multiple attendance points are permitted provided they each contain the same fire safety features as at the main attendance point.

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. The address point can be either singular, or a range of individual points as described on the LINZ data set.

Fire service vehicular access

C/AS Part 6: Firefighting Clause 6.1.1 describes this. Additionally, for the health and safety of our personnel, this access:

- must not involve a canopy, or other part of a structure to drive or park under
- must be located outside a horizontal collapse zone requirement of 1.5 times height of the tilt slab
- must be within 135 m of a firefighting water supply.

If the access meets these requirements then it is deemed usable, and the 75 m hose run may be measured from this hard-standing.

Firefighter access point

NZ Building Code clause C6.3 applies. Additionally, for access points which are not linked to the requirements for an Attendance point described above, it will be advantageous to the building owner for the Provisions requirements of NZBC Clause C5.7 to apply. See the note in the attendance point definition. Failure to provide these may mean that briefings for safety and tasking may delay arrival at the additional access points.

Background

Provision of hydrants

The provision of hydrants helps to prevent loss of life and provide protection of property for all New Zealanders. Ensuring the facilities to apply water for firefighting are available provides enhanced safety for firefighters.

In addition to street hydrants connected to city reticulated mains, a building hydrant system is necessary, to allow Fire and Emergency to provide water on the fire floor to prevent laying extra hose or carrying excess firefighting resources such as portable booster pumps upstairs. This is especially relevant in tall buildings, or very large or complex buildings. This allows firefighters to commence fire attack at a much earlier stage which significantly affect the outcome of the fire event. This system is also needed in large low rise buildings for similar reasons.

In ground hydrants

Classification

In general, a fire hydrant is an assembly, usually contained in a pit or box below ground level, comprising a valve and outlet connection from a water supply main to permit controlled supply of water for firefighting.

A pillar upstand connected to a water supply main and fitted with a valve and instantaneous coupling(s) adaptor also constitutes a fire hydrant.

These type of fire hydrant designs are often classified as 'street hydrant' or 'in ground hydrant'. They are typically connected with city reticulated pipework for water supply and are often under the control of a local water authority.

Figure 1: Typical in ground fire hydrant

Private hydrants

In areas lacking access to reticulated mains, or the location of the site results in the distance to a street hydrant exceeding the design limit of 135 m (see Figure 2), the building design team is often responsible for designing fire hydrants and water supply systems on privately owned property sites. These are referred to as private hydrants and are often in the form of pillar hydrant. These may also take the form of a building hydrant system.

Fire and Emergency recommend the use of NZS 4510:2008 and SNZ PAS 4509:2008 to calculate the required fire flow, and specify fire hydrant location and distribution, alongside the requirements of the NZ Building Code. Other criteria for waterway equipment can be found in NZS 4505:2007.

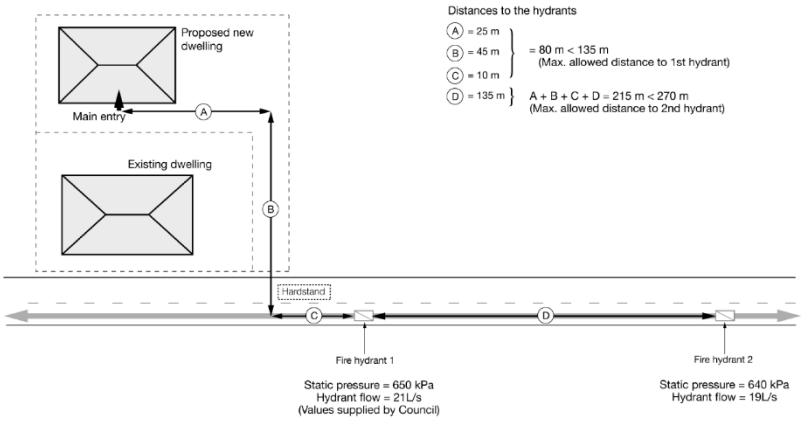

Figure 2: Firefighting water supply requirements for a non-sprinklered house with access to a reticulated supply

Fire hydrant layout design

When a pumping appliance is used to draw or deliver water, it should be positioned on a hardstanding that has sufficient space to allow firefighters to access equipment on either side or from the top of the appliance. Fire and Emergency will typically use firefighters to run out hose or perform a forward hose lay. Sometimes a specialist 'hose layer' vehicle will be used at very large incidents where water supplies are brought in from hydrants a significant distance away.

Designers should take this into account when locating in ground hydrants. For instance, hydrants at the end of dead-end streets will not facilitate straight hose lays. In ground hydrants that are too close to a particular building are less likely to be used due to potential fire exposure or collapse. Fire and Emergency operating procedures utilise a factor of 1.5 times the height of a tilt panel in a building as being the size of the collapse zone. This is not normally a consideration in urban areas, where a multitude of hydrants are available for any given location and where buildings are generally larger and closer together.

Underground fire hydrants

This chapter does not provide in depth cover on 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 (adequate water supply) or SNZ PAS 4505:2007 Specification for firefighting waterway equipment respectively.

Building hydrant system

Hose run distance

In addition to in ground fire hydrants, provision of building hydrant systems is required in the following design cases to demonstrate compliance of the NZ building code:

- height from Fire and Emergency attendance point to any floor is greater than 15 m
- fire service hose run distance from Fire and Emergency vehicular access to any point on any floor is less than 75 m
- building height is greater than 25 m or eight floors.

Note: Fire and Emergency is limited operationally by the amount of hose firefighters are physically able to work with in a building. If the hose run distance, including the initial distance from the appliance to the building, is greater than 75 m (as per the compliance documents requirements), a building fire hydrant system should be present.

Fire and Emergency considers a multi-storey building to have an escape height of 15 m or more, and a high-rise building to have a building height of 25 m or more. These buildings present a challenge to Fire and Emergency in terms of access for firefighting and rescue. In excess of these heights, Fire and Emergency operations

become much more dependent upon building fire safety features, hence the requirement of a building hydrant.

When measuring the hose run distance to establish the requirement for building hydrants, the starting point should be where the fire appliance would normally operate from, i.e. the attendance point. This would normally be in the vicinity of the main entrance, or otherwise at a position determined by Fire and Emergency. The distance is not a direct measurement from plan drawings. Rather it is the distance that it would take fire crews to roll hose and reach the furthest point in the building. This distance shall also account for obstructions such as internal partitions, rack storage, machinery and large pieces of furniture in the way.

Where an alternative vehicle access point is proposed to determine the requirement for hose run distance, this should take into consideration firefighters' personal protective equipment and standard training to determine the suitability of this point as an appropriate measurement point. This may be discussed with Fire and Emergency operational representatives. In the event that this is not deemed suitable then a building hydrant should be provided.

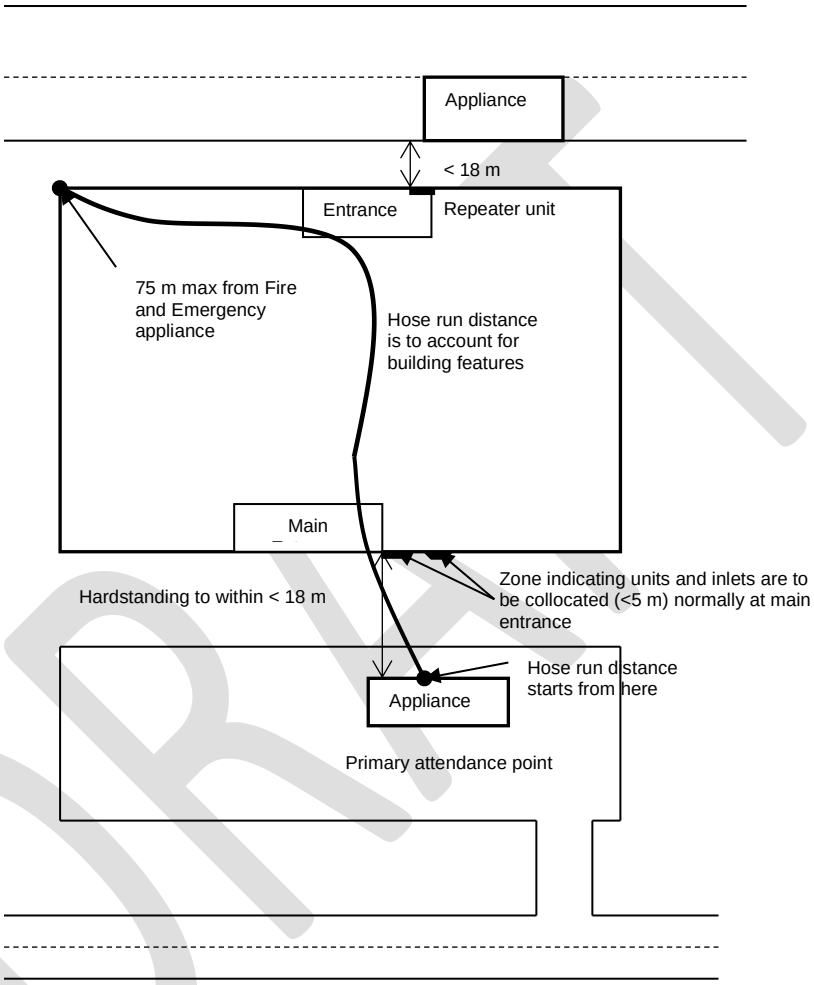

Figure 3: Measurement of 75 m hose run distance

Note: For special buildings where boundary security is important, such as prisons, the hose run coverage should be measured in a way without compromising the boundary security. This also applies to building hydrant hose coverage.

Building hydrants types

System description

Building hydrant systems consist of a fixed piping system and hose valve connections to preclude the need for long hose lays within tall or large buildings. 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 fire service. The system delivers water to hose connections throughout the building, firefighters then extend hose lines from these hose connections to conduct interior fire suppression operations. Building hydrants are, in effect, a critical component in the supply of water to interior firefighting crews.

A building hydrant system is certified by the hydrant system certifier. There are a number of different terms that have been used to describe different types of risers within buildings, these are explained below. The type of building hydrant installed is normally labelled accordingly at its inlet location.

Hydrant main, charged riser

A hydrant main installed in a building for firefighting purposes, fitted with inlet connections at fire brigade access level and building hydrant outlet assemblies at specified points. While there are variety of different types of building hydrant system available, the type of building hydrant system shall, unless otherwise approved by the hydrant system certifier, be a wet-pipe system, charged and pressured with water to ensure the integrity of the system and maintained in this condition. These are normally pressurised with water for monitoring purposes and provided with water by pumping fire service appliances for firefighting purposes.

Figure 4: Two-way charged riser inlet

Figure 5: Typical charged riser outlet

Building hydrant systems complying with NZS 4510:2008 are:

- suited to firefighting operations using manually controlled branches
- not suitable for the use of automatic branches that optimise flow rate in order 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 vertical pipe installed in a building for firefighting purposes, fitted with inlet connections at fire brigade access level and landing valves at specified points. The riser is normally dry but is capable of being charged with water usually by pumping from fire service appliances.

Dry risers were installed to NZS 4510:1978 and are no longer permitted for new buildings. It is recommended that existing dry risers are converted to a charged riser, on a reasonably practicable basis. An air release valve is fitted at the highest point to enable the riser to be fully charged.

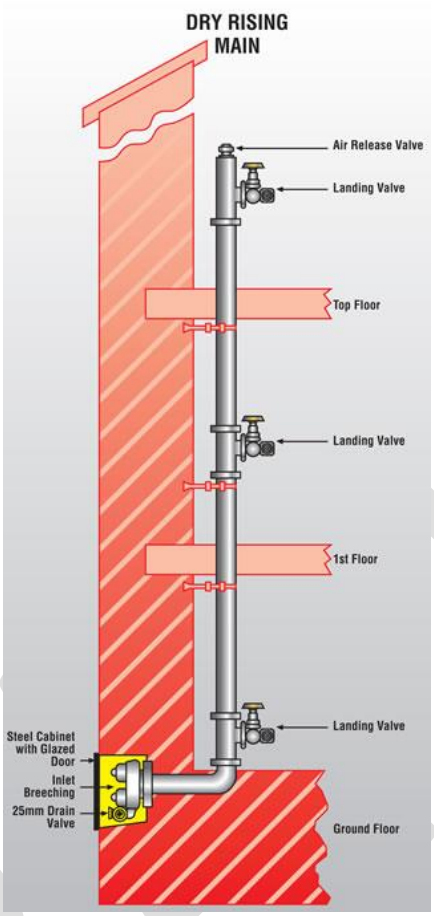

Figure 6: Dry rising main schematic

Riser main, wet riser

A vertical pipe installed in a building for firefighting purposes, permanently charged with water from a pressurised supply sufficient for firefighting and fitted with landing valves at specified points. Wet risers were installed to superseded editions of NZS 4510:2008 and are now not normally installed.

Design issues and considerations

Building hydrant inlet

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

Location

The following is the Fire and Emergency position regarding the location of building hydrant inlets:

- The building hydrant inlet shall be on the outside of the protected premises preferably within 5 m of the fire alarm panel in the main entrance.
- The location of the inlet should be in clear view of, and within 18 m, 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 (although it is not the Fire and Emergency preferred option), provided that all criteria of the standards are met. 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 usually proceed to the fire alarm panel immediately upon arrival in order to gain 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. It is recommended that fire alarm panels be located adjacent to the main entrance of the building for easy identification. Positioning fire hydrant inlets in close proximity to the fire alarm panel will therefore allow firefighters 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. A clearance of at least 75 mm shall be provided between the rim of any hand-wheel and any part of the enclosure or equipment.

Note: Sufficient clearance should be provided to allow firefighters to operate valves without scraping their hands or cause damage to hose.

Figure 7: Clear space, sloping splash guard to base

Figure 8: Insufficient clearance, hose rubs on bottom edge

Door

The door should be provided with signage that states 'BUILDING HYDRANT INLET' and locked with a triangle key that requires no more than five complete turns to unlock. If another lock is proposed this requires approval by Fire and Emergency.

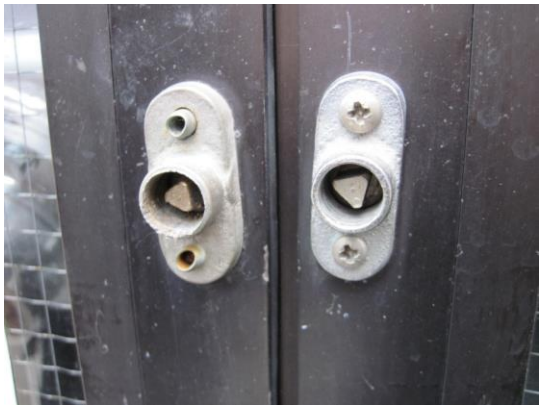

Figure 9: Triangle key lock

Clear working space

A space measuring 600 mm either side of the inlet enclosure, 1200 mm out from the face of the enclosure and extending up 2000 mm from the surrounding standing surface shall be clear of all objects.

Figure 10: Clear space in front of the inlets

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 extending at least 1 m in front and 1 m either side of the enclosure to provide protection from falling glass.

Note: This is required for the continued operation and use of the inlets by providing a canopy to protect firefighters and hose, which is extremely vulnerable to failure from falling glass, when charged. The canopy should be designed to withstand impact of a 100 kg object (file cabinet/person etc.) falling from the highest floor above.

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

Figure 11: Panel at the front main entrance with overhead protection

Building hydrant outlet

Location and hydrant spacing

Building hydrant outlets shall be located to allow ready and efficient use by the fire service. Other than on the ground floor (except when access to all areas exceed 75 m), there shall be at least one building hydrant outlet assembly per floor including roof and intermediate floors. This building hydrant outlet assembly shall be located in the vertical safe path (i.e. fire-resistance rated stairs) or a protected lobby at each floor or mid-floor landing.

Firefighters set up and begin their attack from within the 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.

Note: 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, although NZS 4510:2008 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 and without obstructing travel on the stair.

Stairway hose connections

Fire attack using hose lines from stairway hose connections requires stair doors will be ajar due to the hose line which 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. But, there is now some concern within the fire protection community that occupants may be exposed to fire or smoke conditions during these firefighting operations. Some reasons for this include: conflicting evacuation instructions, occupants not following evacuation instructions, the need for the fire department to operate from all stairways, or the need for total building evacuation (especially in response to terrorist incidents). Refer to guide: F5-07 GD Firefighting operations on stairs in buildings for consideration for stair design.

Fire-rated lobby hose connections

Another approach to maintaining the integrity of stair enclosures 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 a little more room, they can double as refuge areas for individuals with mobility impairments. If the lobbies are open to the exterior, any smoke that does migrate into 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 m or 40 m for sprinklered and non-sprinklered building respectively. Unlike the other requirements that consider the layout of hose as a measured distance from the pump of a fire appliance, the coverage for hose from a hydrant outlet is measured as an arc from the point of entry into a room or space from a safe path stairwell.

Hose length

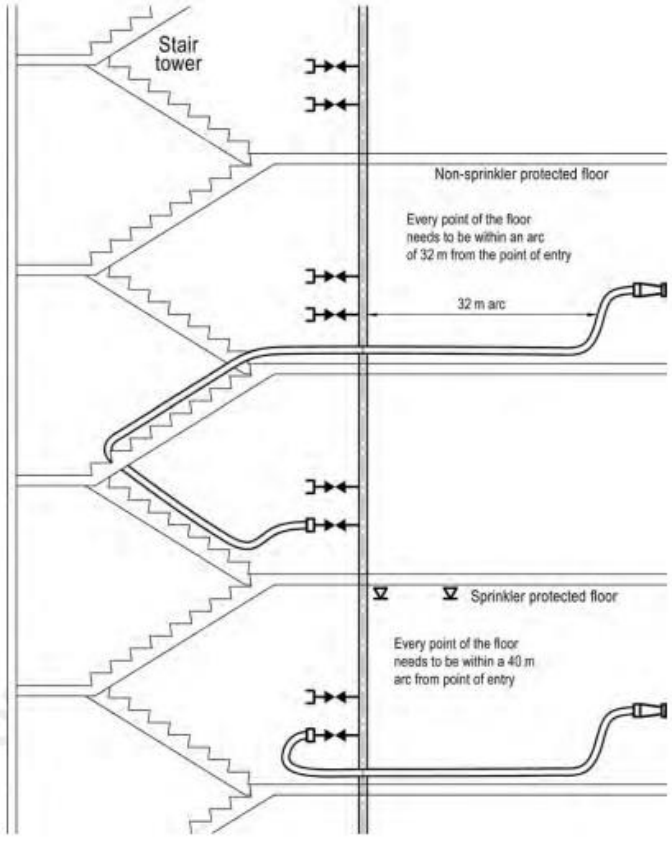

Figure 12: Measurement of hose length

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 m of hose. There may be situations where a 50 m hose run could end within the arc due to obstructions and internal layouts.

Internal hydrant outlet spacing

If the provision for floor coverage cannot be achieved from single or multiple entry points, the standard allows for additional hydrant outlets to be provided internally on a floor inside a building as long as firefighting protection can be provided from the stairwell prior to connecting to a subsequent hydrant outlet. In simple terms, an internal hydrant outlet within a floor space of a building must be within the enclosed arc of the protected outlet in the stairwell. Although this is permitted in the current version of the standard it is the least preferred option of Fire and Emergency and should be avoided if possible.

When determining the outlet spacing of an internal hydrant system, the maximum distances should not exceed 32 m and 40 m for unsprinklered or sprinklered buildings respectively. The hose run distance of 75 m, as outlined in the C/ASx documents, only relates to the initial assessment of whether a building hydrant system is required within the building.

Note: The measured arc is smaller if the building is not sprinkler protected to allow for hose to be taken up the stairs from the floor below as per standard Fire and Emergency procedures. Further, the NZ standard allows the larger measured arc to be taken from the fire floor of a sprinkler protected building as this allows the hose to be connected on the fire floor, although not standard or typical Fire and Emergency procedure.

Remote building hydrant outlets

Remote building hydrant outlets outside of stairwells can often be hard to locate. They should be placed as uniformly as possible on all floors to make them easier to find, especially in car parks or areas with a large floor area. Highly visible signs, markings on the fire alarm index panel or other markings can assist firefighters in locating them quickly. Often these may be tailored to décor or occupancy to satisfy architects or interior designers.

Car park building hydrant with

Figure 13: Car park building hydrant with visible signs

Placement of remote hydrant outlets can also affect their accessibility. For instance, in car parks designers should try to locate outlets adjacent to drive aisles. Where they are intermingled with parking spaces, an access path at least one metre wide and delineated with bollards or a raised, curbed area should be provided to preclude cars from obstructing or damaging the connection.

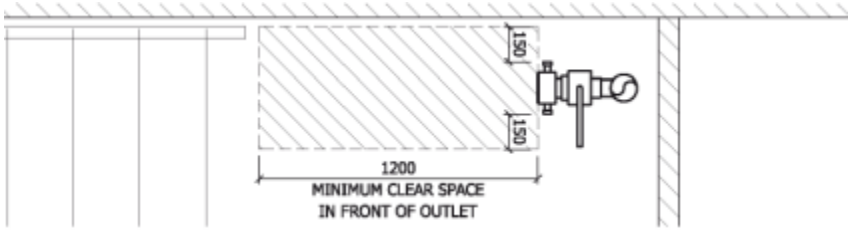

Figure 14: Car park building hydrant clearance

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. Provision of building hydrant outlets in both stairwells of a scissor stair is no longer required by the current standard. The scissor stairwell door at each level providing direct access from the street should display a sign indicating the floor level location of hydrants which can be accessed from that particular door.

Note: If the building is constructed using sets of stairs, which serve alternating floors. It is recommended that building hydrants are installed in multiple stairwells so firefighters will have access to water independent of which floor the fire is on.

Typical firefighting equipment weight

When designing the building hydrant location, designers should be reminded that consideration should be given to firefighters who will typically have to carry approximately 45 kg of equipment (breathing apparatus, hose bandoliers, branches etc.) and may have to commence firefighting operations from a doorway which may be several floors above ground level.

Figure 15: Typical firefighting equipment carried into a multi-storey building

Padlock-key access

An enclosure to hydrant outlets is permitted when:

- clearly marked with the words 'BUILDING HYDRANT OUTLET' for easy identification
- the door of any such outlet enclosure is frangible
- where required by the building owner, valves may be locked using the type of triangular key locking device shown in NZS 4510:2008.

Alternatively, enclosure doors may be secured using other types of lock declared acceptable to the National Commander (Paragraph 4.1.3, NZS4510:2008). If building fire hydrant outlets are to be chained and padlocked shut, a standard Lockwood 144 key will operate the padlock.

Note: It is important that firefighters have quick access to building fire hydrant outlets while giving consideration to security.

Lockwood 144
(fire hydrant enclosure padlocks)

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

Figure 16: Type of keys commonly held by Fire and Emergency

Large footprint low rise/single level buildings

Building fire hydrants are also required for low rise buildings that have large floor plates that do not allow all of the building to be reached within a 75 m hose run from the Fire and Emergency attendance point (e.g. shopping malls, airports, warehouses). Such buildings commonly do not contain a safe location for Fire and Emergency to establish a firefighting attack, as found in high rise buildings.

For low rise buildings, the preferred approach is the use of a system of external building hydrant outlets located close to entry points to the building which provide an equivalent function. This is to align with Fire and Emergency standard operating procedures which require 'clean air' to set up and respond to a building fire. It is standard procedure not to enter a building without a charged hose and available water supply. Therefore, the use of internal outlets is not recommended as the environment may be toxic or untenable and procedures do not allow for entering a building to locate a water supply to commence firefighting.

These building hydrant outlets are intended for use for interior firefighting, part of a building hydrant system, and are distinct from street hydrants or inground hydrants. This system shall be maintained as part of the fire safety systems of the building as required under the Building Warrant of Fitness Scheme. Such a system should include a building hydrant inlet within 20 m of the Fire and Emergency attendance point and the designer should demonstrate the pressure and flow requirements are achievable at each outlet.

Some of the requirements for external fire hydrant outlets from NZ standards include:

- pedestrian access to the building for the fire service. Any doors should be designed to allow the fire service to enter the building during a fire emergency.
- all parts of the building are within a 60 m arc from the building hydrant outlet where the hydrant is located no more than three metres from the point of entry to the building
- hose length between the hydrant and the door should be allowed for, where the hydrant is located more than three metres from the point of entry to the building. This distance is to be subtracted from the allowed 60 m arc length, and this reduced arc distance is to be used to calculate coverage from the point of entry to the building
- clearance from obstructions
- a sign stating BUILDING HYDRANT OUTLET.

Note: Ministry of Education (MOE) fire safety requirements permit a 150 m hose run if the school building is sprinklered.

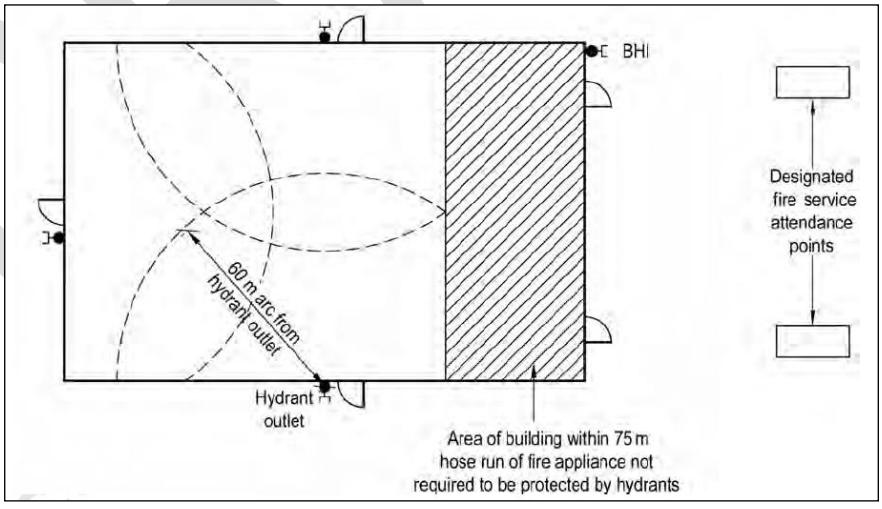

Figure 17: External hydrant outlets and access

Minimum pressure

Pressure requirement

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 4510:2008 specifies a minimum design pressure of 600 kPa, or maximum permitted under NZS 4510:2008 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. 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.

A pump is required to meet the pressure requirement once the height of the highest building hydrant outlet above the road surface closest to the hydrant inlet exceeds 40 m (i.e. from the Fire and Emergency attendance point, hardstanding).

Minimum flow rates

Hose streams design number

For building fitted with an approved sprinkler system, the design number of hose streams in simultaneous use shall be three flowing at 500 litres per minute 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, and the third stream on the floor immediately adjacent. Water supply must last at least 30 minutes.

For buildings not fitted with an approved sprinkler system, the design number of hose streams in simultaneous use shall be determined from Section C3 of NZS4541:2008 The minimum flow rate per hose stream shall be 440 L/min.

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, by using a dedicated pump or by boosting the fire service water supply in some way.

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 fire service will, on arrival, access the available water supply and couple-in to the riser system.

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 service inlet using a water supply from a street hydrant through a pump. The flow and pressure available are measured as 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 4510:2008.

The water authority has a list of approved testers that carry out water testing on their network. The responsibility on data collection for sufficient water supplies rests with the designer. This then should be provided to Fire and Emergency NZ for agreement on adequacy of the supply. This may be included or provided within the Firefighting Facilities Checklist as provided by Fire and Emergency to provide a document which can include a number of fire safety features for acceptance.

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, the system shall be functional, with a building hydrant outlet on every floor, up to a level not lower than 9 m 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.

Note: The likelihood of a fire increases in buildings under construction due to number of potential fire sources, such as welding/cutting activities and the large quantities of building materials stored within. Provision of a functional building hydrant system assists fire service operation in such buildings where fire safety precautions are not fully installed.

Buildings under demolition provide an even bigger threat and likelihood of fire during the demolition works. It is important that any existing fire suppression system be maintained throughout this period.

Hydrant impairment

Advise Fire and Emergency of defective hydrants

We advise that contractors inform Fire and Emergency of damage done to hydrants resulting from work. If firefighters are informed of defective building fire hydrants, alternative operational plans can be used to mitigate them.

In order to comply with the Building Act 2004, defective systems must be repaired.

Hydrant replacement with sprinkler system

Substitution of a building hydrant system

Fire and Emergency may consider the substitution of a building hydrant system with a sprinkler system under the following circumstances:

- The proposed building does not require a sprinkler system but requires a building hydrant system under the NZBC.
- The sprinkler system fully complies with NZS 4541:2013 automatic fire sprinkler systems.
- There is sprinkler coverage throughout the building.
- Hose reels are not required under the evacuation scheme but provided (19 m or 25 m).
- It will be considered on a case-by-case basis only.

Note: The justification for this trade-off rests on the assumption that a certified sprinkler system will provide a higher level of life safety and property protection in the event of a fire than a fire hydrant system would. Firefighters are able to extinguish sprinkler-controlled fires using hose reels and/or the sprinkler system. It must be noted that this is not intended as a blanket trade-off for all buildings and that the necessary compliance route should be sought with the Building Consent Authority.

Pillar hydrant

Location

Pillar hydrants can replace underground hydrants in controlled areas (secured), such as factory sites etc. Their function is to provide quicker access to reticulated water, without the need to use a standpipe placed onto an underground fire hydrant. They are also generally more visible and do not need any other fitting.

Where pillar hydrants are to be considered as either replacements for, or additions to, underground hydrants, their design and location should be discussed with Fire and Emergency during the design stage to ensure access to them and their operation is consistent with operational practice.

The following section gives a performance specification for pillar hydrants. It is the responsibility of the designer, manufacturer and maintenance contractor to ensure these objectives have been met. This performance specification is to be used in the absence of a suitable pillar hydrant standard. Further reference to pillar hydrants is contained in SNZ PAS 4505:2007 Specification for firefighting waterway equipment.

Specification

Key design specifications for pillar hydrants:

- Outlets - It is recommended that each pillar hydrant has two outlets. The waterway equipment on outlets shall be female instantaneous couplings with a diameter of 65 mm complying with NZS 4505:2007.
- Operation - Separate gate valves will be fitted to allow for individual control of outlets. The gate valves may be chained and padlocked shut. A standard Lockwood 144 key will operate the padlock.
- Heights of outlets - Outlets and operation valves are to be placed at a level no less than 600mm and, no greater than 900mm above ground level, with a minimum of 500mm radius of clear working area to the front and sides of the pillar hydrant.
- Environmental requirements - The pillar hydrant and its components are expected to function through all environmental and climatic conditions. Where such conditions have stopped hydrants functioning as they are designed to, the hydrant will be repaired or replaced.
- Reliability - Pillar hydrants must be reliable and operate as intended.
- Hydrant protection - Pillar hydrants shall be protected from impact and damage by the erection of bollards or other suitable methods of protection. However, protective measures should not affect access and the operation of the pillar hydrants.
- Colour - All pipe work on pillar hydrants shall be painted red except for hydrant couplings where they can remain silver. All markings shall follow the recommendations of SNZ PAS 4509:2008 Firefighting water supplies code of practice.
- Potential hazard - Whether in use or not, the hydrant is not to place bystanders or firefighters at risk.

Adequacy of water supplies

As outlined in section 74 of the Fire and Emergency NZ Act 2017

"FENZ may check, and require checks to be made as to, the adequacy of firefighting water supplies, including tests of water volume and pressure, as FENZ considers necessary or desirable, in order to check compliance with a code of practice for firefighting water supplies:

a) In any water main; or
b) In any area."

Pillar hydrants should be tested in accordance with the fire hydrant testing requirements in SNZ PAS 4509:2008. Pillar hydrants are usually on a privately-owned water reticulation main. It is the responsibility of the site owner or designer to carry out flow and pressure testing and to ensure that this is adequate for Fire and Emergency operations in the event of an incident. Where pillar hydrants are found to be defective or have insufficient flows, the tester will notify the owner of the water supply and it is their responsibility to upgrade or fix any defect.

Pressure and flow characteristics	Minimum running pressure is to be no lower than 100 Kpa. Maximum pressure is to be no greater than 1050 Kpa. Flow requirements are to meet specification for fire risk classification for the particular premise or premises, in accordance with SNZ PAS 4509:2008.