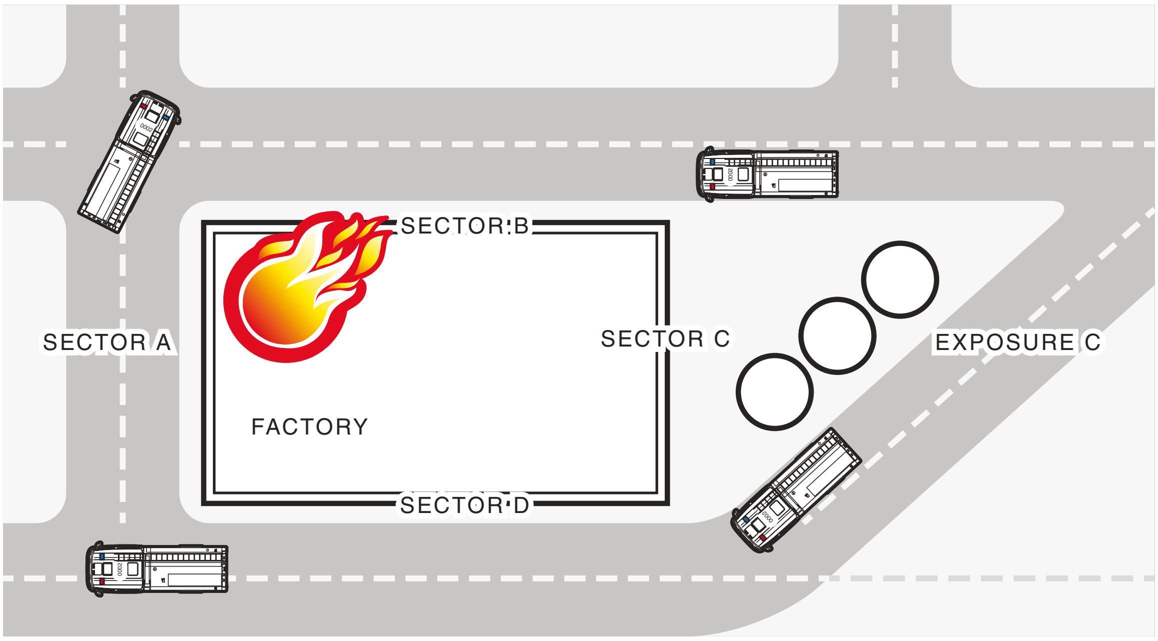


FIGURE C2 EXAMPLE OF FIRE BRIGADE OPERATIONS USING SECTORING

C3.7.3 *Firefighting operations—High-rise buildings*

High-rise building fires often pose special challenges to the attending fire brigade because of the time taken to get personnel and resources to the fire floor. Typically, fire crews will access the level beneath the fire floor, often by taking control of the firefighter lift within the building. The first firefighters, carrying small diameter layflat hose and forced entry equipment, will access the fire floor by the fire stair, connect the hose to the in-stair fire hydrant and enter the fire floor under the protection of a firefighting stream.

Because of the risks with which firefighters are confronted when fighting a fire internally, the requirement to provide pressures and flows that facilitate first attack firefighting is critical. Where a fixed on-site pump is not installed (a circumstance often found at a low-rise building), the location of and connection to the fire brigade booster assembly becomes a tactical priority. In this regard, depending on the fire scenario found on arrival, either members of the first arriving crew or the next arriving crew will connect the fire brigade pumping appliance to the fire brigade booster assembly so that internal crews will have the required pressure (i.e. not less than 700 kPa) and flow to implement firefighting strategies that enable the fire environment to be controlled.

To control the spread of fire and to protect the internal exposures under threat by fire, the Incident Commander will place crews at strategic locations above and below the fire floor. The organizing, command and control of these crews is typically done by placing officers (sector commanders) on each level of the building in which firefighters are operating. Unlike a low-rise building where each side of the building is allocated a name (e.g. Sector A) by the Incident Commander, in a high-rise building typically the floor numbering system within the building is used to identify the location of firefighters. For example, Basement B2 would be known as Sector B2, the ground floor would be known as Sector G, the second floor would be known as Sector 2 and so on.

C3.8 Overhaul and salvage

At the conclusion of a fire incident or when the fire is under control, the Incident Commander would initiate activities aimed at ending the fire incident. In this regard, some of the tasks undertaken would include, but are not limited to—

(a) removal of water from the building;

(b) reduction of water damage;

(c) extinguishment of spot fires; and

(d) protection of stock.

C3.9 Implications for design

Taking into consideration the information in Paragraphs C2 and C3, a fire hydrant system designer should aim to develop a fire hydrant system design that assists the attending fire brigade to achieve their objectives and support the strategies and tactics typically applied on the fire ground. In this regard, some of the questions the fire hydrant system designer should ask themselves are the following:

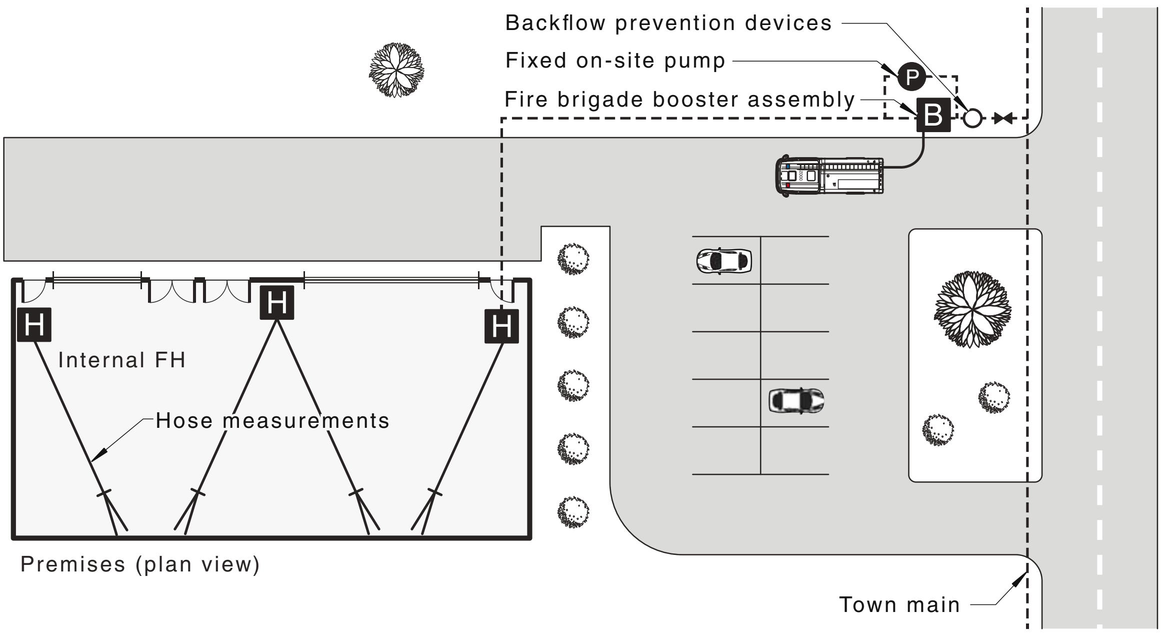
(a) Does the fire hydrant layout allow for offensive and defensive firefighting operations to be undertaken?

(b) Does the fire hydrant layout provide attending fire brigade personnel with ready access to a fire hydrant as they approach and progressively move through or around a building?

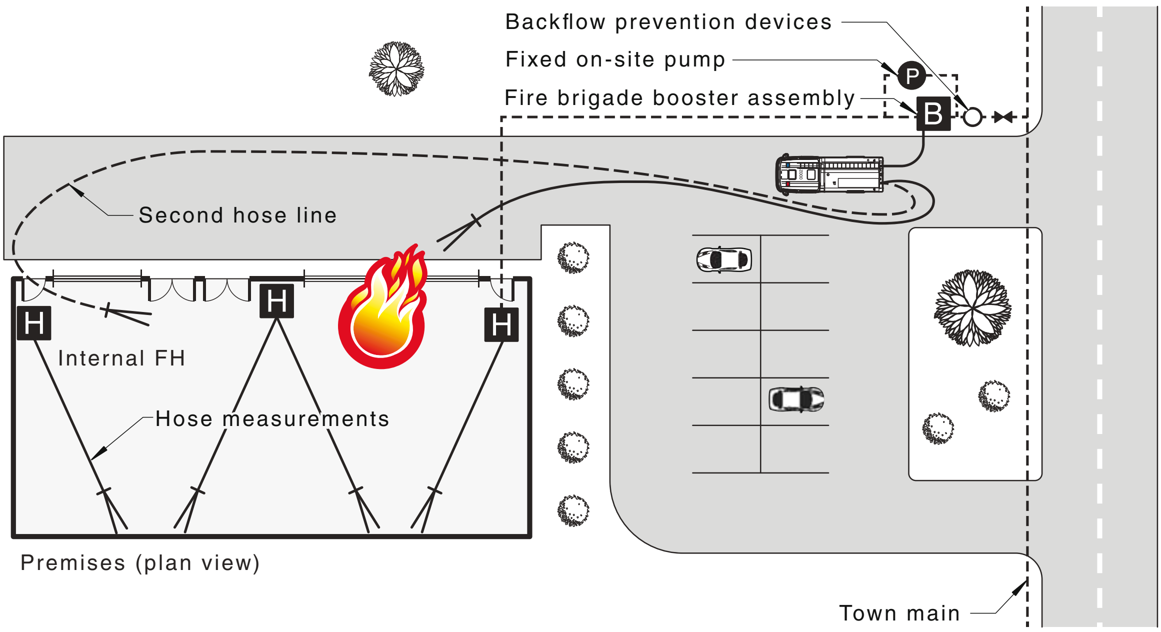
(c) Does the fire hydrant layout locate the first feed fire hydrant or fire brigade booster assembly in a position that may be readily seen by the attending fire brigade upon approach to the building?

(d) Are the fire hydrants in the design located as far as practicable from the risks associated with the building?

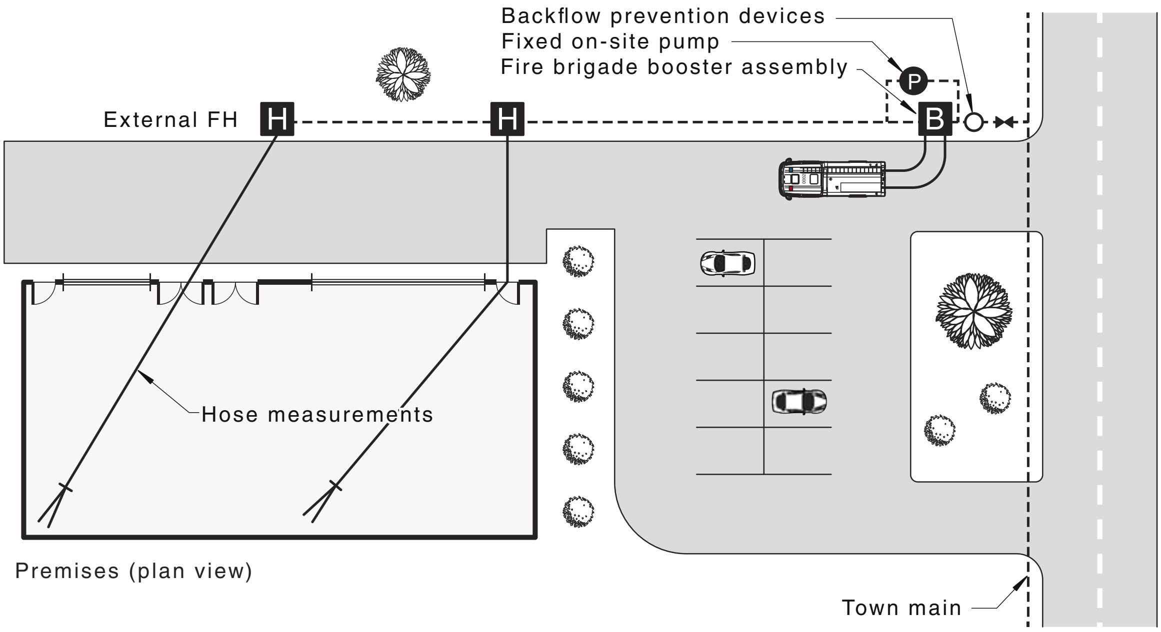
Figures C3 provides examples of fire hydrant system designs and fire brigade operations, the implications of which are examined in subsequent paragraphs.



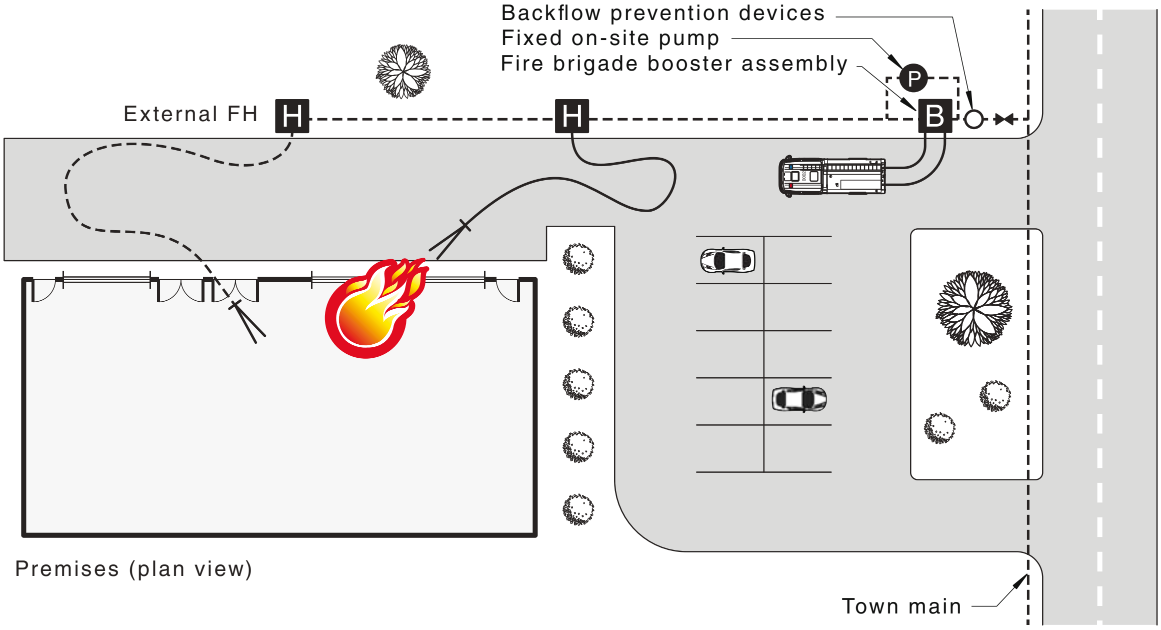
(a) Low-rise building internal fire hydrant system design



(b) Low-rise building internal fire hydrant system design—Operational impact



(c) Low-rise building external fire hydrant system design



(d) Enhanced fire hydrant system design—Operational impact

FIGURE C3 EXAMPLES OF FIRE HYDRANT SYSTEM DESIGNS AND IMPACT ON FIRE BRIGADE OPERATIONS

In Figure C3(a), to provide fire hydrant coverage to this low-rise building, the fire hydrant system designer has elected to position the fire hydrants internally within 4 m of the exits and from these points provide fire hydrant coverage to all parts of the building. In Figure C3(b), the problem of this design approach is highlighted, with the fire in the building compromising access to the internal fire hydrants and, therefore, compromising the effectiveness of the fire hydrant system. In the example shown, the attending fire brigade has been required to lay all hose from the fire brigade pumping appliance, which may result in extended hose lays being required and a delay in fire brigade intervention.

In Figure C3(c), to provide fire hydrant coverage to this low-rise building, the fire hydrant system designer has elected to position the fire hydrants externally from the building and from these points provide fire hydrant coverage to all parts of the building. In Figure C3(d), the benefits of this design approach are highlighted, with the fire in building not compromising access to the external fire hydrants. As such, through the application of this design approach, the attending fire brigade is able to commence operations in an environment free from heat and smoke thus allowing the brigade to rapidly deploy hose lines.

In summary, where possible, when developing a fire hydrant system design, the fire hydrant system designer should consider how the attending fire brigade personnel are going to approach, and move through and around the building as they endeavour to extinguish a fire in any location within the protected building and the risks associated with the building. For low-rise building in particular, where space is available around the building, external fire hydrants should always be installed.

C4 FIRE BRIGADE PUMPING APPLIANCES

C4.1 General

Fire brigade pumping appliances are equipped with an on-board pump, which is used to increase the pressure of the water supplied to it.

Fire brigade pumping appliances may be used for the direct connection of fire hoses to attack a fire, to boost the performance of an installed fire hydrant system or to supply water to an aerial appliance.

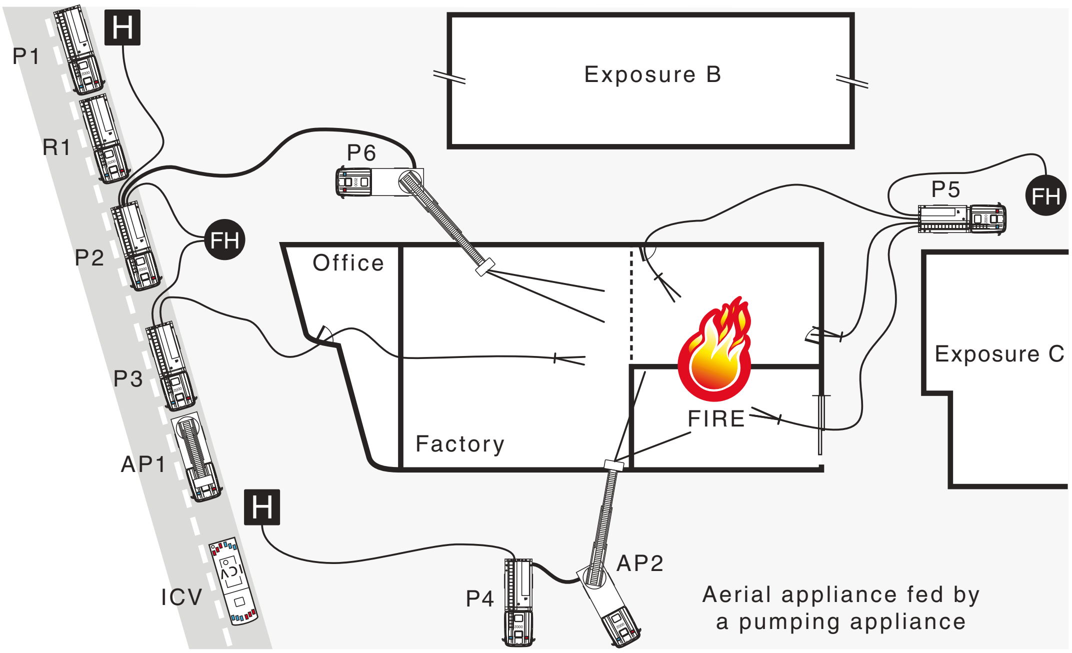
C4.2 Fire brigade aerial appliances

Aerial appliances have on-board hydraulically operated extending ladders, elevating platforms or extending booms, with firefighting nozzles fixed to the elevating part of the appliance. These are used principally to direct large capacity hose streams down onto a fire or onto adjacent properties, to prevent fire from spreading.

To ensure stability, aerial appliances are fitted with 'outriggers'; however, where excessive ground gradients are present, despite the provision of 'outriggers' aerial appliances may not be able to be used. As such, where a hardstand is required to be provided, the gradient of the hardstand should not exceed 1 in 8. Hardstand areas and approaches with gradients of not more than 1 in 8 will also enable all other fire brigade vehicles to more effectively manoeuvre around a site.

Aerial appliances may or may not be fitted with a pump.

Figure C4 depicts a typical example of deployment of fire brigade pumping and aerial appliances at a large fire.



LEGEND:
P = pumping appliance
R = rescue appliance
AP = aerial appliance
ICV = incident control vehicle
H street hydrant
FH on-site feed fire hydrant

FIGURE C4 EXAMPLE DEPLOYMENT OF PUMPING AND AERIAL APPLIANCES

C4.3 Pumping operations

Where a town main supply is available, layflat (soft canvas) hose conforming to AS 2792 is used to connect a feed fire hydrant to the pump suction of the fire brigade pumping appliance. A minimum pressure at the feed hydrant is required to overcome the frictional losses associated with the layflat hoses at appropriate flow rates. At low feed pressures, the hose will begin to collapse and restrict supply.

The type and capability of the fire brigade pumping appliance or appliances available to attend a fire incident will, in most instances, vary between State and Territory fire brigades and between rural and metropolitan fire brigades. In major metropolitan areas and some regional centres, pumping appliances with a capacity to provide 1000 kPa at 40 L/s are commonly available.

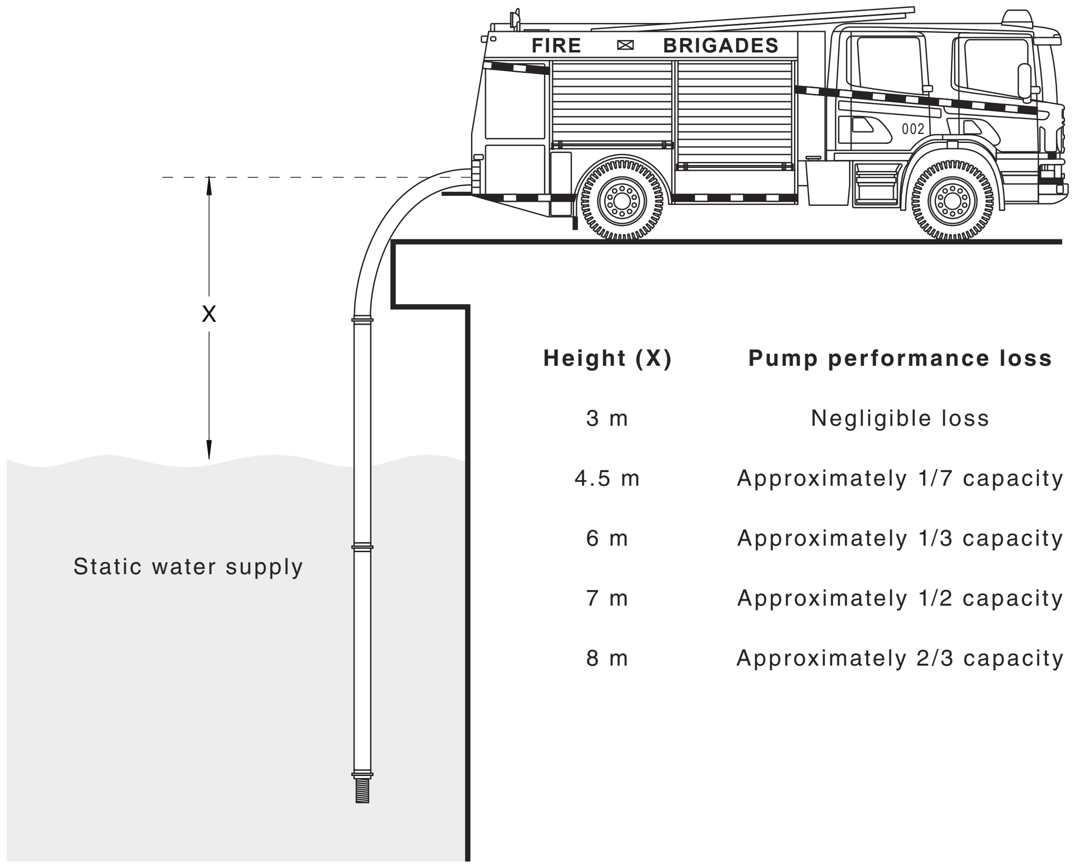
C4.4 Draughting operations

Where a static water supply (e.g. reservoirs, open water or a ground level tank) is available, rigid wall fire hose (suction hose) is used to connect the water supply to the pump suction of the fire brigade pumping appliance. A characteristic of this suction hose is that it has been designed to withstand external pressures, as such, it has a pressure limitation of 200 kPa.

The successful draughting of water from a static water supply is dependent on the air in the suction hose being removed by the fire brigade pumping appliance. An on-board primer is used to remove the air from the suction hose and, as a consequence, vertical and horizontal lift limitations are placed on the fire brigade pumping appliances draughting from a static water supply. For example, the maximum number of rigid wall hoses carried by a typical metropolitan fire brigade pumping appliance is three.

Apart from the vertical and horizontal lift limitations, appliance pump performance is compromised when operating with a negative suction pressure. Figure C5 details some typical pump performance losses associated with draughting from a static supply.

The pump suction of a fire brigade pumping appliance may be located at the rear of the appliance as shown in Figure C5 or mid-mounted as shown in Figure C6. Figure C6 details a typical example of a fire brigade pumping appliance with a mid-mounted large bore suction connection draughting from an on-site tank.



Height (X)	Pump performance loss
3 m	Negligible loss
4.5 m	Approximately 1/7 capacity
6 m	Approximately 1/3 capacity
7 m	Approximately 1/2 capacity
8 m	Approximately 2/3 capacity

FIGURE C5 EXAMPLE OF REAR-MOUNTED PUMP, DRAUGHTING FROM STATIC WATER SUPPLY

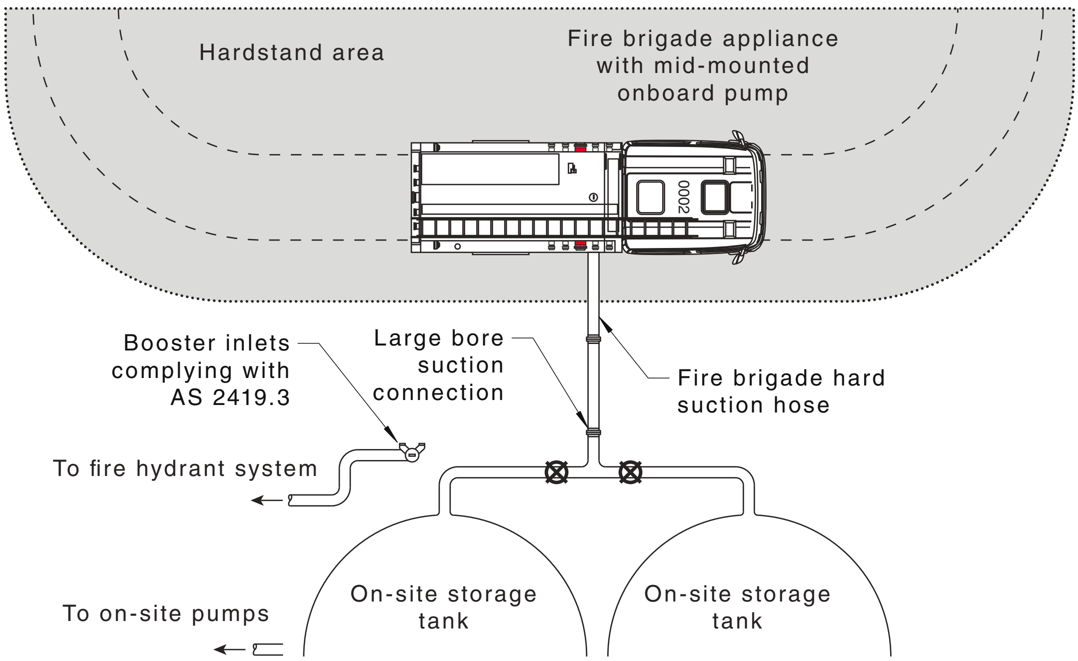


FIGURE C6 EXAMPLE OF MID-MOUNTED PUMP, DRAUGHTING FROM ON-SITE STORAGE TANK

C4.5 Implications for design

The fire hydrant system designer should have an understanding of the characteristics of the fire brigade pumping appliances likely to respond to the location where the fire hydrant system is to be installed. In this regard, it is particularly important to understand the capability of the fire brigade pumping appliance if a relay pump or on-site tank is to be installed.

Where an on-site tank provides the primary water supply for the site, it is recommended that the tank not be installed below ground. Where site or building constraints require the tank to be installed below ground, consultation with the fire brigade is recommended.

Where a river, lake, dam or the sea provides the primary water supply for the site, the fire hydrant system designer should ensure that the vertical lift required by a fire brigade pumping appliance does not exceed 3 m. Further to this, where fixed piping is provided, the volume of pipe should be limited so that the fire brigade can successfully draught from this source.

Where the fire hydrant system design requires the fire brigade to use hard suction hose, when determining the size of the hardstand area the designer needs to consider whether the pumping appliances that will respond to the building have a rear or mid-mounted pump suction. Pumping appliances with a mid-mounted pump suction will require a far greater area to manoeuvre than an appliance with a rear-mounted pump suction. Hardstand areas also need to be sized to allow fire brigade personnel to circulate around the fire brigade pumping appliance, remove equipment and connect the hoses. Figure C7 depicts the dimensions of a typical metropolitan fire brigade pumping appliance and the minimum clearances required to be provided around the appliance.

Due to the draughting limitations associated with fire brigade pumping appliances where negative suction conditions are associated with a static water supply, it is recommended that the fire hydrant system designer consult with the attending fire brigade to determine if the proposed design meets their operational needs.

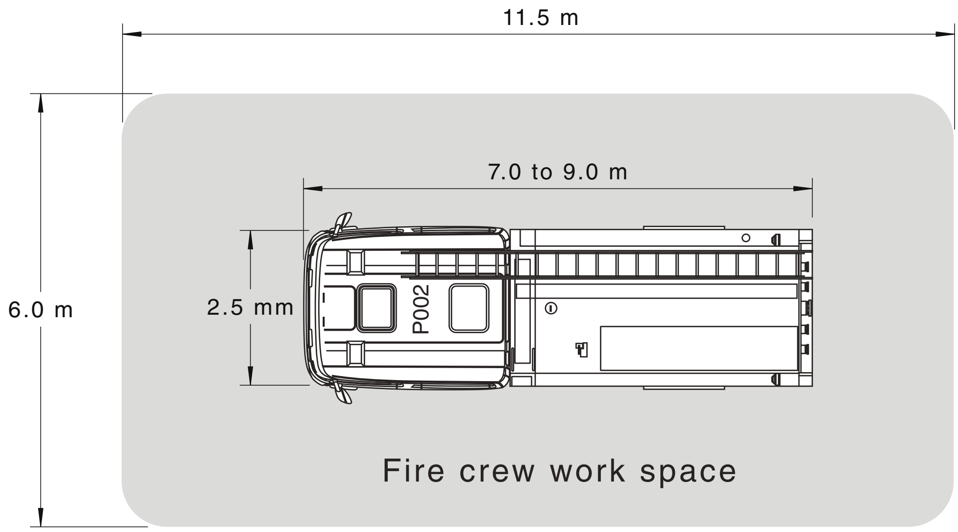


FIGURE C7 DIMENSIONS OF A TYPICAL METROPOLITAN FIRE BRIGADE PUMPING APPLIANCE

APPENDIX D

GUIDANCE ON SYSTEM PERFORMANCE AND DESIGN

(Informative)

D1 SCOPE

This Appendix provides guidance on the application of the design criteria specified in Sections 1 and 2.

D2 GENERAL

The information in this Paragraph applies to Clause 1.1.

A fire hydrant system designed in accordance with the principles of this Standard should be compatible with the equipment of the attending fire brigade or fire service.

The design requirements detailed in this Standard have been developed to address a single fire at a specific location within a building or open yard. Notwithstanding this comment, as the flow rates detailed are primarily based on a building's floor area and not the actual fuel loading within the building, the flow rates may, in some instances, not provide the required quantity of water. Therefore, an understanding of the fuel loading within the building is considered essential in developing a fire hydrant system appropriate to the risks within the building.

D3 CLASSIFICATION OF FIRE HYDRANTS

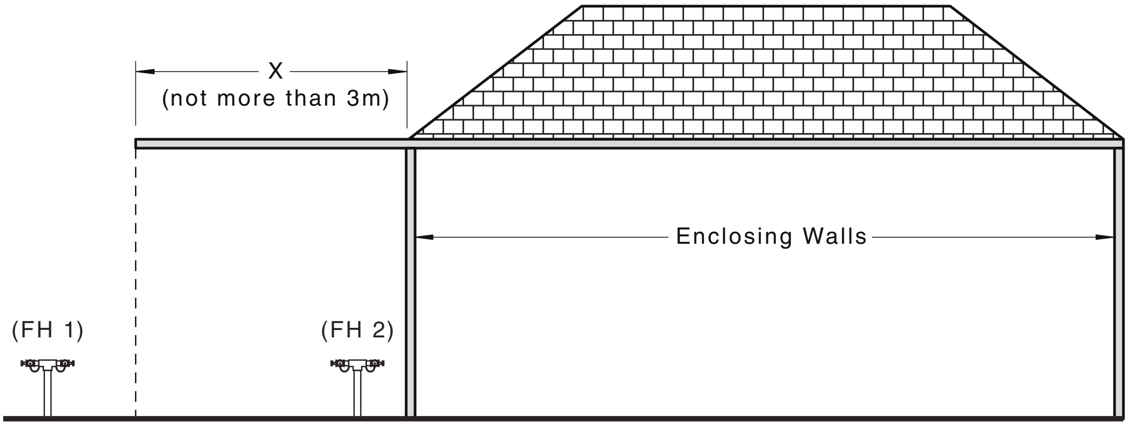
D3.1 External fire hydrants

The information in this Paragraph applies to Clause 1.4.1.

The intent of Clause 1.4.1 is to set out the criteria for the classification of an external fire hydrant.

A fire hydrant that conforms to the criteria of Clause 1.4.1 is considered to be an external fire hydrant for the purpose of determining fire hydrant coverage.

Figure D1 shows the application of the design principles set out in Items (a) and (d) of Clause 1.4.1.



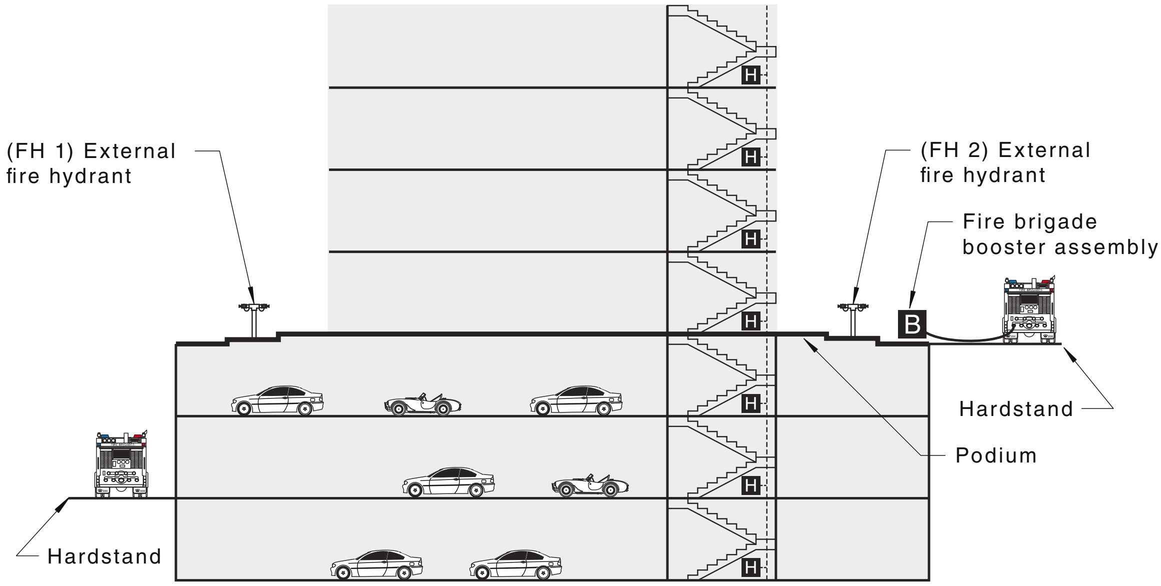
LEGEND:
X = Awning, roof, overhang or similar projection is not more than 3 m in depth.
FH1 = Not more than 70 m may be applied from this fire hydrant for determining fire hydrant coverage, as the fire hydrant is located external to the enclosing walls of the building. See Clause 3.5.3 for location requirements and Clause 3.5.5 for the protection requirements for an external fire hydrant.
FH2 = Not more than 70 m may be applied from this fire hydrant for determining fire hydrant coverage, if the awning roof, overhang or the like is not more than 3 m in depth and the area under the awning roof overhang or the like does not contribute to the fire load of the building. See Clause 3.5.3 for location requirements and Clause 3.5.3 for the protection requirements for an external fire hydrant.

FIGURE D1 EXAMPLE OF EXTERNAL FIRE HYDRANTS

The determination of whether the area under an awning, roof overhang or similar projection contributes to the fire load of the building has to be made by the 'relevant authority' tasked with overseeing the building, project or development.

NOTE: For the purpose of Clause 1.4.1, a 'relevant authority' is considered to be an independent agency authorized by legislation or regulation to issue determinations, orders or other instructions in respect of any subject covered by this Standard.

Figure D2 shows the application of the design principles detailed in Clause 1.4.1(b) pertaining to a fire hydrant located on a podium.



LEGEND:
FH1 = Not more than 40 m hose coverage may be applied from this fire hydrant for determining fire hydrant coverage, as it is located on a podium and is more than 50 m but not more than 100 m from a hardstand area. For this provision to be applied, the podium has to conform to the requirements of Clause 1.4.1(e). For other limitations, see Clause 3.5.3.3.
FH2 = Not more than 70 m hose coverage may be applied from this fire hydrant for determining fire hydrant coverage, as it is located on a podium and is not more than 50 m from a hardstand area. For this provision to be applied, the podium has to conform to the requirements of Clause 1.4.1. For other limitations, see Clause 3.5.3.3.

FIGURE D2 EXAMPLE OF EXTERNAL FIRE HYDRANTS LOCATED ON A PODIUM

D3.2 Internal fire hydrants

The information in this Paragraph applies to Clause 1.4.2.

The intent of Clause 1.4.2 is to set out the criteria for the classification of an internal fire hydrant.

A fire hydrant that conforms to the criteria detailed in Clause 1.4.2 is considered to be an internal fire hydrant for the purpose of determining hose lay coverage.

Figure D3 shows the application of the design principles of Items (a), (c) and (d) of Clause 1.4.2. In relation to Item (c), where an awning, roof overhang or similar projection has a depth greater than the 3 m as detailed in Clause 1.4.1 and the area under the awning does not contribute to the fire load of a building, a fire hydrant located under the awning, roof overhang or similar projection is considered to be an internal fire hydrant for the purpose of determining hose lay coverage.

In relation to Item (d), where an awning, roof overhang or similar projection of any depth and the area under the awning contribute to the fire load of a building, a fire hydrant located under the awning, roof overhand or similar projection is considered to be an internal fire hydrant for the purpose of determining hose lay coverage.