

AS 2419.1:2021



STANDARDS
Australia



Fire hydrant installations

Part 1: System design, installation and commissioning



AS 2419.1:2021

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- Australian Stainless Steel Development Association
- Engineers Australia
- Facility Management Association of Australia
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- Hydraulic Consultants Association Australasia
- Insurance Council of Australia
- International Copper Association Australia
- Master Plumbers Australia and New Zealand
- National Fire Industry Association
- Plastics Industry Pipe Association of Australia
- Water Services Association of Australia

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Fire hydrant installations

Part 1: System design, installation and commissioning

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Preface

This Standard was prepared by the Standards Australia Committee FP-009, Fire Hydrant Installations, to supersede AS 2419.1:2017.

A list of all parts in the AS 2419 series can be found in the Standards Australia online catalogue.

The objective of this Standard is to specify the minimum requirements for the design, installation, and commissioning of fire hydrant systems which —

- (a) will facilitate the efficient extinguishment of fire within the boundaries of the site;
- (b) can be used to minimize fire spread within or between one building or site and another;
- (c) can be used by trained firefighting personnel; and
- (d) have inlet and outlet connections that are used with the local fire brigade's firefighting equipment.

The major changes in this edition are as follows:

- (i) Restructure of the document and content to improve its use and readability.
- (ii) Limit the scope to buildings having an effective height not more than 135 m to Class 7b or 8 buildings having a total volume not more than 108 000 m², and to buildings that do not include automatic racked storage systems.
- (iii) Include informative appendices to clarify the intent of sections and clauses.
- (iv) Include new technologies and industry best practices to enable competitive and cost-effective design and water conservation.
- (v) Divide the previous [Section 8](#) (Pipework and valves) into two sections.
- (vi) Acknowledge the benefits of installed sprinkler systems to control the development and spread of fire.
- (vii) Introduce a range of requirements for high-rise buildings based on internationally applied Standards.

Notes or footnotes to tables or figures that are expressed in mandatory terms are deemed to be requirements of this document.

Notes to clauses in this document are informative only and do not include requirements.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Introduction

The availability of fire hydrants is essential to fire protection. Fire hydrants are used to control the spread of fire, protect neighbouring properties, extinguish an outbreak of fire, or extinguish a fire controlled by an automatic fire protection system, such as a sprinkler, gaseous or foam system.

Fire hydrants are installed within buildings or sites for use by the fire brigade and other trained firefighting personnel. Fire hydrant systems are only used for firefighting purposes.

The provision of firefighting services across Australia varies greatly between rural and metropolitan areas. Should a fire occur in a large metropolitan area, a vast array of resources and large numbers of personnel can be mobilized if needed. This resource capability is not available, however, in rural and country areas, with many such areas having access to a single pumping appliance and a limited number of personnel. In developing a fire hydrant design, the resources available to the attending fire brigade should be taken into account so that the design developed meets their needs.

In designing a fire hydrant system, external hydrants are provided wherever possible so that the attending fire brigade can enter the building under the protection of a charged hose line. Where internal fire hydrants are required to be installed, consistent and repeating hydrant patterns should be applied across floors so that firefighters can move confidently throughout the building in the knowledge that a fire hydrant can be found where expected. The application of this design approach will enable firefighters to enter buildings under the protection of a charged line of hose and to readily access fire hydrants as firefighters move throughout the building.

The water supply is a fundamental consideration in the design of a fire hydrant installation and may comprise water from more than one source.

NOTES

Australian Standard®

Fire hydrant installations

Part 1: System design, installation and commissioning

Section 1 Scope and general

1.1 Scope

This document specifies the requirements for the design, installation, commissioning and testing of fire hydrant installations.

This document applies to on-site fire hydrant installations for —

- (a) class 7b or 8 buildings having a total volume not more than 108 000 m³;

NOTE 1 See [Appendix C](#) for guidance on Class 7b or 8 buildings having a total volume more than 108 000 m³.

- (b) buildings that do not include automatic racked storage systems;

NOTE 2 See [Appendix C](#) for guidance on buildings that include automatic racked storage systems.

- (c) buildings having an effective height not more than 135 m; and

NOTE 3 See [Appendix D](#) for guidance on buildings having an effective height more than 135 m.

- (d) buildings and associated areas that do not include special hazards.

NOTE 4 See [Appendix E](#) for buildings and associated areas that include special hazards.

This document may apply, either in part or in full, to any —

- (i) buildings outside the scope of this document; or
- (ii) sites, including any storage yard, marina, wharf, plant, or infrastructure.

This document does not apply to the design or performance of reticulated water supplies and street hydrants controlled by the network utility operator. However, this document does permit the use of street fire hydrants in lieu of on-site feed fire hydrants, provided they conform to the requirements for feed fire hydrants in relation to location, available pressure, and flow.

The flow requirements in this document, which are based on the floor area of a building, provide sufficient water to enable firefighting operations to commence at a single location within a building or site. Where a risk assessment of a building or site determines that multiple ignitions or rapid-fire growth and spread is probable, then additional provisions are considered.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1074, *Steel tubes and tubulars for ordinary service*

AS 1275, *Metric screw threads for fasteners*

AS 1281, *Cement mortar lining of steel pipes and fittings*

AS 1345, *Identification of the contents of pipes, conduits and ducts*

AS 1349, *Bourdon tube pressure and vacuum gauges*

AS 1432, *Copper tubes for plumbing, gasfitting and drainage applications*

AS 1530.4, *Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance test of elements of construction*

AS 1572, *Copper and copper alloys—Seamless tubes for engineering purposes*

AS 1579, *Arc-welded steel pipes and fittings for water and wastewater*

AS 1674.1, *Safety in welding and allied processes, Part 1: Fire precautions*

AS 1769, *Welded stainless steel tubes for plumbing applications*

AS 2118.1, *Automatic fire sprinkler systems, Part 1: General requirements*

AS 2118.4, *Automatic fire sprinkler systems, Part 4: Sprinkler protection for accommodation buildings not exceeding four storeys in height*

AS 2118.6, *Automatic fire sprinkler systems, Part 6: Combined sprinkler and hydrant systems in multistorey buildings*

AS 2129, *Flanges for pipes, valves and fittings*

AS 2304, *Water storage tanks for fire protection systems*

AS 2419.2, *Fire hydrant installations, Part 2: Fire hydrant valves*

AS 2419.3, *Fire hydrant installations, Part 3: Fire brigade booster connections*

AS 2941, *Fixed fire protection installations—Pumpset systems*

AS 3672, *Wrought steel threaded pipe fittings*

AS 3688, *Water supply and gas systems—Metallic fittings and end connectors*

AS 3735, *Concrete structures retaining liquids*

AS 4118.1.4, *Fire sprinkler systems, Part 1.4: Components—Valve monitors*

AS 4321, *Fusion-bonded medium density polyethylene coating and lining for pipes and fittings*

AS 4428.1, *Fire detection, warning, control and intercom systems—Control and indicating equipment, Part 1: Fire*

AS 4728, *Electric resistance welded steel pipe for pressure purposes*

AS 4794, *Non-return valves—Swing check and tilting disc*

AS 4809, *Copper pipe and fittings—Installation and commissioning*

AS 5200.053, *Plumbing and drainage products, Part 053: Stainless steel pipes and tubes for pressure applications*

AS 7240.2, *Fire detection and alarm systems, Part 2: Fire detection control and indicating equipment (ISO 7240-2:2017, MOD)*

AS/NZS 1167.1, *Welding and brazing—Filler metals, Part 1: Filler metal for brazing and braze welding*

AS/NZS 1477, *PVC pipes and fittings for pressure applications*

AS/NZS 1518, *External extruded high-density polyethylene coating system for pipes*

AS/NZS 1668.1, The use of ventilation and air conditioning in buildings, Part 1: Fire and smoke control in buildings

AS/NZS 2032, Installation of PVC pipe systems

AS/NZS 2033, Installation of polyethylene pipe systems

AS/NZS 2280, Ductile iron pipes and fittings

AS/NZS 2312, Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings

AS/NZS 2638 (all parts), Gate valves for waterworks purposes

AS/NZS 2845.1, Water supply—Backflow prevention devices, Part 1: Materials, design and performance requirements

AS/NZS 3013, Electrical installations—Classification of the fire and mechanical performance of wiring system elements

AS/NZS 3500 (all parts), Plumbing and drainage

AS/NZS 3862, External fusion-bonded epoxy coating for steel pipes

AS/NZS 4087, Metallic flanges for waterworks purposes

AS/NZS 4129, Fittings for polyethylene (PE) pipes for pressure applications

AS/NZS 4130, Polyethylene (PE) pipes for pressure applications

AS/NZS 4158, Thermal-bonded polymeric coatings on valves and fittings for water industry purposes

AS/NZS 4441, Oriented PVC (PVC-O) pipes for pressure applications (ISO 16422:2014, MOD)

AS/NZS 4680, Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

AS/NZS 4765, Modified PVC (PVC-M) pipes for pressure applications

AS/NZS 4792, Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process

AS ISO 7240.3, Fire detection and alarm systems, Part 3: Audible alarm devices

ASME B36.19M, Stainless steel pipe

ASTM A53, Standard specification for pipe, steel, black and hot-dipped, zinc-coated, welded and seamless

ASTM A106, Standard specification for seamless carbon steel pipe for high-temperature service

ASTM A135/A135M, Standard specification for electric-resistance-welded steel pipe

ASTM A234, Standard Specification For Piping Fittings Of Wrought Carbon Steel And Alloy Steel For Moderate And High Temperature Service

ASTM A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A403, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

ASTM A795/A795M, Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use

BS EN 10242, Threaded pipe fittings in malleable cast iron

FPAA101D. *Automatic Fire Sprinkler System Design and Installation – Drinking Water Supply*

FPAA101H. *Automatic Fire Sprinkler System Design and Installation – Hydrant Water Supply*

WSA 109, *Flanged gaskets and O-rings*

1.3 Terms and definitions

For the purposes of this document, the definitions given in the NCC Volume 1 and those below apply.

1.3.1

awning

roof-like structure, usually of limited extent, projecting from a wall of a building

Note 1 to entry: In this document, awning may include flexible membrane or similar.

1.3.2

balcony

open or covered platform attached to an upper floor of a building, projecting from or recessed into the face of the wall, and protected by a railing or balustrade, accessible from an adjacent room

1.3.3

block plan

two-dimensional drawing, schematic drawing or both detailing the fire hydrant system serving the building or site

1.3.4

boost

boosted

increase pressure, and consequently increase flow, in a fire hydrant system when a fire brigade pumping appliance connects to and pumps into the fire brigade booster connections of the fire brigade booster assembly

1.3.5

building classification

Refer to the *NCC*

1.3.6

cabinet

<fire brigade booster assembly> recess or enclosure within or affixed to the facade of a building or to a freestanding structure located remotely from the building that is used to enclose the fire brigade booster assembly

1.3.7

effective height

Refer to the *NCC*

1.3.8

facade

exterior surface of a wall enclosing a building

Note 1 to entry: It is usually non-loadbearing.

Note 2 to entry: It may include a curtain wall, cladding or other exterior finish.

1.3.9

fire brigade

fire service

Refer to the *NCC*

1.3.10

fire brigade booster assembly

configuration of fire hydrant valves, fire brigade booster connections, pipes, valves, and fittings for use by the fire brigade

Note 1 to entry: This assembly allows the attending fire brigade pumping appliance to draw water from the available water source and subsequently pressurize or pump water through the installed fire hydrant system while using the on-board pump of the fire brigade pumping appliance.

Note 2 to entry: For information on fire brigade booster assemblies, see [Section 7](#) or refer to AS 2419.2 and AS 2419.3.

1.3.11

fire brigade booster connection

self-contained mechanical device incorporating an integral spring-loaded check valve and body installed on a fire main enabling a pumping appliance to pressurise or pump water into a fire hydrant system

Note 1 to entry: For information on fire brigade boosters, refer to AS 2419.3.

Note 2 to entry: These connections are provided with one, two, four or six inlet configurations.

1.3.12

fire brigade pumping appliance

fire brigade emergency vehicle with on-board pumping equipment that is able to be used with a fire hydrant system

1.3.13

fire compartment

Refer to the *NCC*

1.3.14

fire hydrant

fitting installed on a fire main with a single-valve outlet or two single-valve outlets for the connection of fire hoses

Note 1 to entry: For information on fire hydrant valves, refer to AS 2419.2.

Note 2 to entry: In this document, unless otherwise specified, fire hydrants are above-ground valve type only.

1.3.14.1

additional fire hydrant

internal attack fire hydrant located to provide fire hose coverage to a floor area not otherwise covered by attack fire hydrants located within a fire-isolated stair or adjacent to a non-fire-isolated stair

1.3.14.2

attack fire hydrant

fire hydrant located downstream of the fire brigade booster connections of a fire brigade booster assembly

Note 1 to entry: It is for use by fire brigade or other trained firefighting personnel to directly attack a fire through the direct connection of fire hoses

1.3.14.3

attack/feed fire hydrant

external attack fire hydrant located not more than 20 m from a hardstand that is used to supply a fire brigade pumping appliance

Note 1 to entry: It is used either as an attack fire hydrant when the fire hydrant system is boosted by a fire brigade pumping appliance or as a feed fire hydrant.

1.3.14.4**feed fire hydrant**

external fire hydrant located not more than 20 m from a hardstand that is used to supply a fire brigade pumping appliance through the direct connection of fire hoses between the fire hydrant and the fire brigade pumping appliance

1.3.15**fire hydrant system**

assembly of pipes, fire hydrant valves and other components dedicated to firefighting that permits the fire brigade to access a controlled supply of water

1.3.16**fire hydrant valve**

self-contained mechanical device incorporating a loose jumper valve, installed on a fire main and used for the transfer of water to firefighting equipment

Note 1 to entry: For more information on fire hydrant valves, refer to AS 2419.2.

Note 2 to entry: In this document a reference to a fire hydrant is also a reference to a fire hydrant valve.

1.3.17**fire load**

Refer to the *NCC*

1.3.18**fire main**

water service pipe connected to the water mains and installed within buildings or sites specifically for fire-fighting purposes

1.3.19**fire resistance level****FRL**

Refer to the *NCC*

1.3.20**fire wall**

Refer to the *NCC*

1.3.21**floor area**

Refer to the *NCC*

1.3.22**hardstand**

clearly identifiable all-weather surface, providing access and support for a fire brigade pumping appliance during firefighting operations

1.3.23**high-rise building**

multi-storey building having an effective height of not less than 25 m measured from the lowest exit at or near ground level to the floor of the topmost storey (or eight storeys) and served by passenger lifts

1.3.24**high voltage**

As defined in AS/NZS 3000

1.3.25**isolating valve**

valve used to isolate part of a water system from the remainder

1.3.26**jumper valve**

component of a screw down valve or tap that forms the closing member of the valve

1.3.27**large isolated building****LIB**

Refer to the *NCC*

1.3.28**listed**

approved for fire protection application by an internationally recognized testing laboratory or approval body

Note 1 to entry: A register of accredited products is issued by the CSIRO ActivFire Scheme.

Note 2 to entry: Examples of internally recognized testing laboratories or approval bodies are:

- (a) Factory Mutual Insurance Company (FM Global).
- (b) Underwriters Laboratories (UL).
- (c) Loss Prevention Council (LPG).
- (d) Verband der Schadenverhütung (VdS).

1.3.29**location****1.3.29.1****downstream**

in a direction away from the water supply or in the direction of flow

1.3.29.2**upstream**

in a direction towards the water supply or against the direction of flow

1.3.30**low water level**

lowest level of a static water source before a vortex is created, causing a pump to draw air and lose prime when draughting

Note 1 to entry: The low water level for an open water source (e.g. sea, river, lake, dam) is also the average low tide mark.

1.3.31**monitoring device Class A**

<fire service installation> device that detects changes in status of system components and protects against deliberate measures to tamper with the valve-monitoring device

Note 1 to entry: The device should meet the requirements of AS 4118.1.4.

1.3.32**monitoring device Class B**

<fire service installation> device that detects changes in status of system components but does not protect against deliberate measures to tamper with the valve-monitoring device

1.3.33**open yard**

designated area in industrial or commercial premises that may be used for combustible storage or processing of any kind and having an area more than 500 m²

1.3.34**may**

indicates the existence of an option

1.3.35**network utility operator**

Refer to the *NCC*

1.3.36**pressure****1.3.36.1****boost pressure**

pressure required at the fire brigade booster connection inlets to achieve the required firefighting pressure at the required flow rate at the most hydraulically disadvantaged fire hydrants when the fire hydrant system water supply is being boosted

1.3.36.2**design pressure**

pressure, at a defined reference point used in the system design, necessary to maintain the required flow and pressure at the most hydraulically disadvantaged number of fire hydrants that are required to operate simultaneously

1.3.36.3**hydrostatic test pressure**

maximum pressure applied internally to pipework of a fire hydrant system during commissioning to test for strength and water tightness

1.3.36.4**residual pressure**

water pressure calculated or measured at a point within a system at a particular flow rate

1.3.36.5**working pressure**

maximum internal pressure that may be sustained by a pipeline component for its estimated useful life under anticipated working conditions

1.3.37**private water supply**

privately operated network of mains connected to a controlled water source that supplies water within a range of operating pressures to an area or pressure zone of the private network

Note 1 to entry: Private water supplies typically provide the requirements of domestic, industrial process and firefighting water demands.

Note 2 to entry: A controlled water source may include tanks or reservoirs.

1.3.38**pump duty**

required head corresponding to the required flow

Note 1 to entry: Duty head is expressed in kPa and duty flow is expressed in L/s.

1.3.39**pumpset**

assembly comprising a pump, driver, coupling and ancillary components on a common mounting base together with an integral or separate fire pump controller

1.3.39.1**full-duty fire hydrant pumpset**

automatic starting, fixed, on-site fire hydrant pumpset that is capable of delivering firefighting pressures at a flow of not less than 10 L/s for each fire hydrant outlet required to flow

1.3.39.2**half-duty fire hydrant pumpset**

automatic starting, fixed, on-site fire hydrant pumpset that is capable of delivering the required pressure and flow of not less than 5 L/s for each fire hydrant required to flow

1.3.39.3**jockey pumpset****pressure maintenance pumpset**

fixed, on-site pumpset that is capable of automatically maintaining the minimum static pressure in the fire hydrant system

1.3.40**relevant authority**

agency authorized by legislation or regulation to issue determinations, orders, or other instructions in respect of any subject covered by this document

1.3.41**resistance to the incipient spread of fire**

Refer to the *NCC*

1.3.42**reticulated water supply**

network of town mains connected to a controlled water source, such as tanks or reservoirs, that supply water within a range of operating pressures to an area or pressure zone of the network

Note 1 to entry: Network utility operator design standards allow for a basic contribution to firefighting being made through the pipe sizes specified.

Note 2 to entry: Reticulated water supply networks operated by a public network utility operator typically have legislated obligations that do not extend to delivering pressure and flow conforming to AS 2419.1.

1.3.43**roof**

construction that encloses a building or part of a building from above

1.3.44**shall**

indicates that a statement is mandatory

1.3.45**should**

indicates a recommendation

1.3.46**site**

allocation of owned land or property

EXAMPLE Buildings, storage yards, marinas and their associated moored vessels, wharves, plant, and other infrastructure.

1.3.47**sole occupancy unit****SOU**

Refer to the *NCC*

1.3.48**street hydrant**

self-contained mechanical device installed on a reticulated water supply that is used for the transfer of water to firefighting equipment and other municipal purposes

Note 1 to entry: Street hydrant valves have various configurations including spring, screw-down, L-type and pillar.

Note 2 to entry: For more information on spring hydrants, refer to AS 3952.

1.3.49

suction connection

fitting provided to an on-site tank or another static water source that enables the attending fire brigade to draught from this water source

1.3.50

tank

container for storing water

1.3.50.1

break tank

tank incorporating an air gap to prevent back flow, that limits the effects of a fire hydrant system drawing from a reticulated water supply and that controls the suction pressure for pumps within a fire hydrant system

Note 1 to entry: For more information on break tanks, refer to AS 2304.

1.3.50.2

full-capacity tank

tank sized to provide the required flow rate for not less than four hours and that serves as the primary water supply

1.3.50.3

gravity break tank

break tank in a fire hydrant system of a high-rise building, supplied from lower-level pumps or higher-level tanks, that provides gravity water supply to lower-level pressure zones at attack fire hydrant pressures and flows

Note 1 to entry: Where a gravity break tank is installed in a cascade fire hydrant system design, the tank delivers flows of not less than 10 L/s for each fire hydrant outlet required to flow and pressures of not less than 700 kPa to the pressure zones it serves.

1.3.50.4

high-rise water storage tank

tank having a minimum capacity of not less than 36 000 L installed in a building having an effective height more than 50 m

1.3.50.5

reduced-capacity tank

tank having a minimum capacity of not less than 24 000 L supplemented by automatic inflow from a secondary water supply, to deliver the required flow rate for not less than four hours, that serves as the primary water supply for the building

1.3.51

trained firefighting personnel

personnel who are not members of a fire brigade but who are trained to undertake firefighting as part of their duties on a building or site at which they are employed

1.3.52

unassisted

<fire hydrant system performance> without the assistance of on-site pumps or fire brigade pumping appliances

1.3.53

water source

reticulated water supply system, river, lake, dam, sea, reservoir or bore, from which water can be taken to supply a fire hydrant system

1.3.54**water supply**

water delivery components of a fire hydrant system that enable the system to provide the whole or partial performance necessary at the suction or upstream end of the system

Note 1 to entry: Components of a fire hydrant system may include on-site water storage.

1.3.54.1**make up water supply**

water provided to a water storage tank, through the automatic operation of a small float valve, to cater for evaporation and/or intermittent jockey pump usage

1.3.54.2**primary water supply**

water supply capable of delivering the minimum required flow rate and pressure for the required duration

Note 1 to entry: Points of connection to a primary water supply include street fire hydrants, feed fire hydrants, and tank suction connections.

1.3.54.3**secondary water supply**

water supply providing automatic inflow to reduced-capacity tanks that serve as the primary water supply

Section 2 System performance and design

2.1 General

A fire hydrant system designed in accordance with this document shall —

- (a) be a wet pipe system, except where a limited length of dry pipe is installed in accordance with [Clause 4.4](#) to allow a fire brigade pumping appliance to draught from a below-ground static water source;
- (b) be capable of delivering the pressure and flow for the number of fire hydrant outlets required to flow simultaneously; and
- (c) conform to the hydraulic design parameters for friction loss, velocity, flow and pressure specified in this section.

NOTE 1 For information on fire brigade operations and equipment, see [Appendix F](#).

NOTE 2 For information on system performance and design, see [Appendix G](#).

2.2 System performance

2.2.1 Classification of fire hydrants

All fire hydrants within the fire hydrant system shall be classified as either external or internal, and as feed, attack/feed or attack in accordance with [Clauses 2.2.2, 2.2.3](#) or [2.2.4](#).

2.2.2 External fire hydrants

Fire hydrants shall be classified as external fire hydrants if located —

- (a) in an area external to the enclosing walls of the building, where the building has enclosing walls;
- (b) on an area of a podium that is external to the enclosing walls of the building, and where external pedestrian access is provided to the fire hydrants from a hardstand;

NOTE For the purposes of this document, a podium is a part of a building that —

- (i) serves as a roof to part of a building;
 - (ii) has an FRL not less than 120/120/120 or that required by the Deemed-to-Satisfy provisions of the NCC, whichever is the greater;
 - (iii) meets the definition for open space in the Deemed-to-Satisfy provisions of the NCC;
 - (iv) has direct pedestrian access to a public road without entering the building; and
 - (v) has direct pedestrian access to the main building entry points.
- (c) in an area not covered by the roof and located outside the footprint of the building, where the building has no enclosing walls; and
 - (d) under an awning, roof overhang, or similar projection attached to the external wall of the building, under the awning or roof overhang where the awning or roof overhang has an effective depth not more than 3 m, and the area under the awning or roof overhang does not contribute to the fire load of the building.

2.2.3 Internal fire hydrants

Fire hydrants shall be classified as internal fire hydrants if located —

- (a) within the enclosing walls of a building or on the roof of a building, where the building has enclosing walls;
- (b) in an area covered by the roof or on the roof of a building, where the building has no enclosing walls;
- (c) on an area of a podium that is external to the enclosing walls of a building and where the area of the podium is not provided with external pedestrian access from a hardstand;
- (d) under an awning, roof overhang or similar projection having a depth more than 3 m;
- (d) under an awning, roof overhang or similar projection having a depth not more than 3 m, where the area under the awning, roof overhang or the projection contributes to the fire load of the building; and
- (e) under a balcony or similar horizontal floor projection.

2.2.4 Feed, attack, and attack/feed fire hydrants

Fire hydrants shall be in accordance with the following:

- (a) An external fire hydrant shall be classified as a feed fire hydrant where —
 - (i) the fire hydrant system does not incorporate a fire brigade booster assembly and the fire hydrant is located external to the building and not more than 20 m from a hardstand; or
 - (ii) the fire hydrant system incorporates a fire brigade booster assembly and the fire hydrant forms part of the booster assembly; and
 - (iii) the pressures and flows at the fire hydrant are in accordance with [Table 2.2.6\(A\)](#).
- (b) An external fire hydrant shall be classified as an attack fire hydrant where —
 - (i) the fire hydrant is located external to the building and downstream of the fire brigade booster assembly;
 - (ii) the fire hydrant is located —
 - (A) not more than 50 m from a hardstand; or
 - (B) not more than 100 m from a hardstand where located in accordance with [Clause 3.5.3.3](#).
 - (iii) the pressures and flows at the fire hydrant are in accordance with [Table 2.2.6\(B\)](#) or [Table 2.2.6\(F\)](#) in each case.
- (c) An external fire hydrant shall be classified as an attack/feed fire hydrant where —
 - (i) the fire hydrant is located external to the building and downstream of the fire brigade booster assembly;
 - (ii) the fire hydrant is located not more than 20 m from a hardstand; and
 - (iii) the pressures and flows at the fire hydrant are in accordance with [Tables 2.2.6\(A\) and \(F\)](#).

- (d) An internal fire hydrant shall be classified as an attack fire hydrant where —
- (i) the fire hydrant is located within the building and downstream of the fire brigade booster assembly; and
 - (ii) the pressures and flows at the fire hydrant are in accordance with [Tables 2.2.6\(B\), \(C\), \(D\), \(E\) and \(F\)](#), as applicable.

2.2.5 Number of fire hydrant outlets required to flow simultaneously

The number of fire hydrant outlets required to flow shall be determined in accordance with [Tables 2.2.5\(A\) and \(B\)](#) for buildings, [Table 2.2.5\(C\)](#) for open deck car parks, and [Table 2.2.5\(D\)](#) for open yards, as applicable.

Where any buildings on a site have multiple fire compartments, the fire hydrant system design shall satisfy the flow requirements specific to each fire compartment's floor area and classification. The flow requirements shall be achieved at each of the most hydraulically disadvantaged fire hydrant outlets required to flow within each fire compartment.

Simultaneous flows for firefighting within multiple fire compartments are not required to be provided for in the design.

NOTE Refer to the Deemed-to-Satisfy provisions of the NCC for requirements relating to fire compartment walls and/or floors with a fire resistance level not less than that required for a fire wall.

Table 2.2.5(A) — Determining the number of fire hydrant outlets required to flow simultaneously

Fire compartments	Number of building classifications	Basis for determining the number of fire hydrant outlets
Single	Single	Building classification and total floor area of the compartment
Single	Multiple	Building classification requiring the greatest number of fire hydrants and the total floor area of the compartment
Multiple	Single	Building classification and the floor area of the fire compartment

Table 2.2.5(B) — Number of fire hydrant outlets required to flow simultaneously — Class 2 to Class 9 buildings (excluding Class 7a open deck car parks)

NCC building classification	Fire compartment floor area, m ²	Number of fire hydrant outlets
NON-SPRINKLER-PROTECTED BUILDINGS		
2, 3, 5 and 9 (having a rise in storeys less than 2)	≤ 1 000	1
2, 3, 5 and 9 (having a rise in storeys less than 2)	> 1 000 ≤ 5 000	2
2, 3, 5 and 9 (having a rise in storeys of more than 2)	≤ 500	1
2, 3, 5 and 9 (having a rise in storeys of more than 2)	> 500 < 5 000	2
6, 7 and 8	≤ 500	1
6, 7 and 8	> 500 ≤ 5 000	2
All classes	> 5 000 ≤ 10 000	3

Table 2.2.5(B) (continued)

NCC building classification	Fire compartment floor area, m ²	Number of fire hydrant outlets
All classes	> 10 000	3, plus 1 additional fire hydrant for each additional 5 000 m ² or part thereof
SPRINKLER-PROTECTED BUILDINGS — Not more than 25 m in effective height		
All classes	≤ 1 000	1
All classes	> 1 000 ≤ 10 000	2
All classes	> 10 000	3
SPRINKLER-PROTECTED BUILDINGS — More than 25 m in effective height		
All classes	≤ 5 000	2
All classes	> 5 000	3

NOTE See [Table 2.2.5\(C\)](#) for the requirements for open deck car parks where the size of the largest storey, not the largest fire compartment, is used to determine the number of fire hydrants required to flow.

Table 2.2.5(C) — Number of fire hydrant outlets required to flow simultaneously — Class 7a open deck car parks

NCC building classification	Floor area of largest storey, m ²	Number of fire hydrant outlets
7a (open deck car park)	≤ 500	1
	> 500 ≤ 5 000	2
	> 5 000 ≤ 10 000	3
	> 10 000	3 plus 1 additional fire hydrant for each additional 5 000 m ² or part thereof

NOTE For the purpose of determining the number of fire hydrants required to flow simultaneously in an open deck carpark, the floor area of the largest single storey only may be used, irrespective of the openings formed by vehicular ramps between storeys.

Table 2.2.5(D) — Number of fire hydrant outlets required to flow simultaneously — Open yards

Yard area, m ²	Number of fire hydrant outlets
≤ 3 000	1
> 3 000 ≤ 9 000	2
> 9 000 ≤ 27 000	3
> 27 000	4

2.2.6 Pressure and flow

Fire hydrant systems shall be designed so that the number of feed fire hydrants, attack fire hydrants or attack/feed fire hydrant outlets required to flow simultaneously as specified in [Tables 2.2.5\(B\), \(C\) and \(D\)](#) deliver the required pressure and flow for not less than four hours in accordance with —

- (a) [Table 2.2.6\(A\)](#) for feed fire hydrants or attack/feed fire hydrants supplied from a public or private reticulated water supply system;

- (b) [Table 2.2.6\(B\)](#) for attack fire hydrants supplied from a public or private reticulated water supply system;
- (c) [Table 2.2.6\(C\)](#) for attack fire hydrants supplied from a fixed on-site half-duty fire hydrant pump;
- (d) [Table 2.2.6\(D\)](#) for attack fire hydrants supplied from a fixed on-site full-duty fire hydrant pump;
- (e) [Table 2.2.6\(E\)](#) for attack fire hydrants supplied from a gravity break tank; and
- (f) [Table 2.2.6\(F\)](#) for attack fire hydrants or attack/feed fire hydrants when boosted by a fire brigade pumping appliance.

Where the primary water supply is unable to provide the required unassisted pressure, flow or both as specified in [Table 2.2.6\(A\) or \(B\)](#) for the number of feed, attack or attack/feed fire hydrant outlets required to flow, on-site pumps in accordance with [Clause 2.2.12](#) or on-site tanks and pumps in accordance with [Clause 2.2.13](#) shall be installed.

Table 2.2.6(A) — Feed fire hydrant — Minimum unassisted outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate	Minimum required residual pressure, kPa	
	L/s	NSW	Other States and Territories
External feed or attack/feed fire hydrant located not more than 20 m from a hardstand	10	150	200
NOTE 1 Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously.			
NOTE 2 The different minimum required residual pressures in this table are partially attributable to the different size fire hoses used by fire brigades across Australia; in NSW, 70 mm fire hose is used while in other States and Territories 65 mm fire hose is used.			

Table 2.2.6(B) — Attack fire hydrant — Minimum unassisted outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa	
		NSW	Other States and Territories
External or internal attack fire hydrant	10	250	350
NOTE Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously.			

Table 2.2.6(C) — Half-duty fire hydrant pumps — Minimum outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa
External or internal attack fire hydrant supplied by an on-site half-duty fire hydrant pump.	5	700
NOTE 1 The minimum required flow = 5 L/s × number of hydrant outlets required to flow simultaneously, where the building has an effective height not more than 50 m.		
NOTE 2 The 5 L/s flow rate is a concession applied specifically to on-site half-duty fire hydrant pumps. The flow assigned also allows the attending fire brigade to commence initial firefighting activities prior to the fire hydrant system being boosted by a fire brigade pumping appliance.		

Table 2.2.6(D) — Full-duty fire hydrant pumps — Minimum outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa
External or internal attack fire hydrant supplied by an on-site full-duty fire hydrant pump.	10	700
NOTE Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously, where the building has an effective height more than 50 m.		

Table 2.2.6(E) — Gravity break tanks — Minimum outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa
Internal attack fire hydrant supplied from a gravity break tank.	10	700
NOTE Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously.		

Table 2.2.6(F) — Minimum fire hydrant outlet pressure and flow rate when boosted by a fire brigade pumping appliance

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa
Internal and external attack fire hydrants boosted by a fire brigade pumping appliance	10	700

2.2.7 Multiple firefighting systems

Except where [Clause 2.2.8](#) applies, where an additional firefighting system, other than hose reels (e.g. wall-wetting sprinklers, automatic fire sprinklers) draws from the same water source or uses common pipework, the water source and supply shall be capable of providing for the simultaneous operation of the systems at the required pressures and flows.

2.2.8 Class 7a car parks

Where the Class 7a part of a building does not include a car stacker and the Class 7a part of the building is sprinkler-protected throughout, the simultaneous flow requirements of [Clause 2.2.7](#) are not applicable to the Class 7a part of the building. In such cases, the pressure and flow requirements of the firefighting system having the highest demand shall be met.

NOTE For the purposes of this clause, a car stacker is a mechanical system that stacks three or more cars vertically.

2.2.9 Gravity break tanks

Where a gravity break tank is installed, each attack fire hydrant in the pressure zone it serves shall deliver not less than the minimum residual pressure and flow specified in [Table 2.2.6\(E\)](#) for not less than four hours.

2.2.10 Feed fire hydrants

2.2.10.1 General

Feed fire hydrants shall —

- (a) be located in accordance with [Clauses 3.5.3.1](#) and [3.5.3.2](#);

- (b) be capable of delivering the pressure and flow specified in [Table 2.2.6\(A\)](#), for the number of fire hydrant outlets required to flow; and
- (c) achieve Item (b) above without the use of fixed, on-site pumps.

2.2.10.2 Street fire hydrants

Where street hydrants are used to provide total or partial hydrant coverage, they may be included in the fire hydrant system design provided —

- (a) they meet the requirements of [Clause 3.5.2](#);
- (b) they achieve the pressure and flow for feed fire hydrants specified in [Table 2.2.6\(A\)](#); and
- (c) a location plan is installed in accordance with [Clause 11.7](#).

NOTE For the purposes of design, a street hydrant may be treated as providing either a single or dual fire hydrant flow outlet provided the required pressure and flow is available. Multiple, single-outlet street hydrants may also be combined to provide the number of feed fire hydrant outlets required to flow simultaneously as specified in [Clause 2.2.5](#), providing they meet all other requirements.

2.2.11 Attack fire hydrants

2.2.11.1 External attack fire hydrants

Where external attack fire hydrants are installed, they shall—

- (a) be located in accordance with [Clause 3.5.3](#);
- (b) be capable of delivering the pressure and flow to the attack fire hydrant outlets required to flow, in accordance with —
 - (i) [Table 2.2.6\(B\)](#) where unassisted pressures and flows are provided; or
 - (ii) [Table 2.2.6\(C\)](#) where fixed, on-site half-duty fire hydrant pumps are required to be installed; and
- (c) be capable of delivering the pressure and flow specified in [Table 2.2.6\(F\)](#) when boosted by a fire brigade pumping appliance.

2.2.11.2 Internal attack fire hydrants

Where internal attack fire hydrants are installed, they shall —

- (a) be located in accordance with [Clause 3.6.2](#);
- (b) be capable of delivering the pressure and flow to the attack fire hydrant outlets required to flow specified in —
 - (i) [Table 2.2.6\(B\)](#) where unassisted pressures and flows are provided;
 - (ii) [Table 2.2.6\(C\)](#) where half-duty fire hydrant pumps are installed; or
 - (iii) [Table 2.2.6\(D\)](#) where full-duty fire hydrant pumps are installed; and
- (c) be capable of delivering the pressure and flow specified in [Table 2.2.6\(F\)](#) when boosted by a fire brigade pumping appliance.

NOTE For more information on half-duty and full-duty fire hydrant pumps, see [Section 6](#).

2.2.11.3 External attack/feed fire hydrants

External attack fire hydrants may be classified as external attack/feed fire hydrants and not subject to the unassisted pressure requirements of [Table 2.2.6\(B\)](#) provided they are —

- (a) located not more than 20 m from a hardstand that is constructed in accordance with [Clause 3.3](#);
- (b) capable of meeting the requirements of [Clause 2.2.10.1](#); and
- (c) capable of delivering the pressure and flow specified in [Table 2.2.6\(F\)](#) when boosted by a fire brigade pumping appliance.

2.2.12 On-site pumps

Where the primary water supply (typically a reticulated water supply) is unable to deliver the pressure specified in —

- (a) [Table 2.2.6\(A\)](#) to the most hydraulically disadvantaged feed fire hydrant outlets required to flow and the building has an effective height not more than 25 m, a fire brigade booster assembly and single half-duty fire hydrant pumpset shall be provided. The pumpset provided shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(C\)](#) for the number of attack fire hydrant outlets required to flow.
- (b) [Table 2.2.6\(B\)](#) to the most hydraulically disadvantaged attack fire hydrant outlets required to flow and—
 - (i) the building has an effective height not more than 25 m, a single on-site half-duty fire hydrant pumpset shall be provided. The pumpset provided shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(C\)](#) for the number of attack fire hydrant outlets required to flow; and
 - (ii) the building has an effective height more than 25 m and not more than 50 m, not less than two on-site half-duty fire hydrant pumpsets shall be provided. Each pumpset provided shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(C\)](#) for the required number of hydrant outlets required to flow.

NOTE 1 For more information on the requirement to install a fixed on-site pump or on-site tank and pumps see [Appendix G](#).

NOTE 2 See [Clause 6.5](#) for more information on the requirements for full-duty fire hydrant pumps in buildings having an effective height more than 50 m.

2.2.13 On-site tanks and pumps

Where the primary water supply is unable to deliver the pressure or flow specified in [Table 2.2.6\(A\)](#) to the most hydraulically advantaged feed fire hydrant outlets required to flow (typically the feed fire hydrant outlets of a fire brigade booster assembly) and—

- (a) the building has an effective height not more than 50 m, a tank suction booster assembly, on-site tank and not less than two on-site half-duty fire hydrant pumpsets shall be provided. Each pumpset shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(C\)](#) for the required number of attack fire hydrant outlets;
- (b) the building has an effective height more than 50 m, a tank suction booster assembly, on-site tank and not less than two full-duty fire hydrant pumpsets shall be provided. Each pumpset shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(D\)](#) for the required number of hydrant outlets.

NOTE 1 For more information on the requirement to install an on-site tank and pumps, see [Appendix G](#).

NOTE 2 For more information on the requirements for full-duty fire hydrant pumps in buildings having an effective height more than 50 m, see [Clause 6.5](#).

2.2.14 Fire brigade booster assembly

2.2.14.1 Feed fire hydrants

Where an H-pattern, in-line, I-pattern, or tank model fire brigade booster assembly is installed, the feed fire hydrants of the booster assembly shall —

- (a) be capable of meeting the requirements of [Clause 2.2.10.1](#); and
- (b) be located in accordance with [Clause 7.3](#).

2.2.14.2 Suction connections

Where the primary water supply serving the fire hydrant system is from an on-site tank, seawater, river, lake or dam, the following shall be provided to allow the attending fire brigade to draught from this supply:

- (a) Hardstands in accordance with [Clause 3.3](#).
- (b) Either —
 - (i) fixed large-bore suction connections in accordance with [Clauses 4.4](#), [5.3.1](#) and [5.3.1.2](#); or
 - (ii) fixed large-bore suction connections in accordance with [Clauses 4.4](#), [5.3.1](#), and [5.3.1.2](#) and small-bore suction connections in accordance with [Clauses 5.3.1](#) and [5.3.1.3](#), where applicable.

NOTE 1 Where a suction connection is provided in an area serviced by a rural or country fire service, Item (b) (ii) should be provided except where the relevant fire service advises otherwise.

NOTE 2 If seawater, river, lake, dam, or below-ground tank water is proposed to be incorporated into the fire hydrant system design, the local fire brigade should be consulted.

2.2.14.3 Fire brigade booster connection inlets

Where a fire brigade booster assembly is installed, the number of fire brigade booster connection inlets provided shall allow fire brigade pumping appliances, when connected to these inlets, to deliver the pressure and flow specified in [Table 2.2.6\(F\)](#) for the number of fire hydrant outlets required to flow as specified in [Tables 2.2.5\(B\), \(C\), and \(D\)](#), as applicable.

NOTE 1 For more information on the minimum number of boost inlet connections, see [Section 7](#).

NOTE 2 For information on the required pressure and flow when commissioning a fire hydrant system with a fire brigade booster assembly, see [Clause 12.4.3](#).

2.2.15 Half-duty fire hydrant pumps

Where on-site half-duty fire hydrant pumps are installed, each attack fire hydrant when pressurized by the pump shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(C\)](#) for the number of fire hydrant outlets required to flow as specified in [Table 2.2.5\(B\), \(C\), or \(D\)](#), as applicable.

2.2.16 Full-duty fire hydrant pumps

Where full-duty fire hydrant pumps are installed, each attack fire hydrant when pressurized by the pump shall be capable of delivering the pressure and flow specified in [Table 2.2.6\(D\)](#) for the number of fire hydrant outlets required to flow as specified in [Table 2.2.5\(B\), \(C\), or \(D\)](#), as applicable.

2.3 Hydraulic design parameters

2.3.1 General

Hydraulic calculations of a fire hydrant system shall be undertaken to demonstrate that the specified number of fire hydrant outlets required to flow simultaneously in accordance with [Table 2.2.5\(B\), \(C\) or \(D\)](#) are capable of delivering the residual pressure at each fire hydrant, at the flow rates specified in [Table 2.2.6\(A\), \(B\), \(C\), \(D\), \(E\) or \(F\)](#), as applicable.

2.3.2 Design pressures

Pressures within a fire hydrant system shall meet the following requirements:

- (a) The minimum discharge pressure at any hydrant outlet under design flow conditions shall be not less than those specified in [Clause 2.2.6](#).
- (b) The maximum discharge pressure at any hydrant outlet under design flow conditions shall not exceed 1 200 kPa.
- (c) The maximum static pressure at any fire hydrant outlet at no flow, with the pump running, shall not exceed 1 300 kPa.
- (d) The maximum pressure in the supply pipework to pressure zones shall not exceed 2 400 kPa.

2.3.3 Design velocity

The water velocity in pipework shall not exceed 4 m/s.

2.3.4 Hydraulic loss — Backflow prevention and metering

The hydraulic losses due to any backflow prevention device, strainer and water meter, associated pipework and fittings shall be included in flow and pressure calculations of the fire hydrant system design.

NOTE Refer to [Appendix G](#) for further information.

2.3.5 Hydraulic loss — Pipes, valves, and fittings

The total hydraulic loss due to friction in pipes, valves and fittings between the outlet connection of the fire brigade booster connection conforming to AS 2419.3 and the inlet connection of the fire hydrant valve conforming to AS 2419.2 of the most hydraulically disadvantaged fire hydrant valve shall not exceed 150 kPa when the required number of the most hydraulically disadvantaged fire hydrants are each discharging 10 L/s.

2.3.6 Ring main design

Where a ring main is installed, the total flow shall be taken in one direction through the ring main for velocity calculations in the system.

NOTE For hydraulic loss calculations in the system, flow may be taken through all paths of the ring main.

2.3.7 Fire brigade boost pressure

The fire brigade boost pressure is the pressure required at fire brigade booster connections to achieve the required pressure and flow rate at the most hydraulically disadvantaged fire hydrants in each

pressure zone when the fire hydrant system is being boosted by the fire brigade pumping appliance or other portable pumping appliance.

NOTE See [Clause 12.4.3](#) for more information on the required boost pressure when commissioning a fire hydrant system.

Section 3 Hydrant classification, location, and coverage

3.1 General

Fire hydrant systems designed and installed in accordance with this document shall provide fire hydrant coverage to—

- (a) all parts of the floor area of the building;
- (b) all parts of open yards; and
- (c) all parts of a marina gangway, walkway, or finger.

NOTE 1 Fire hydrants may be above-ground, with outlets suitable for connection of a fire hose, or in-ground street fire hydrants, with connections suitable for attachment of a fire brigade standpipe to which the fire hose may be connected.

NOTE 2 For information on fire brigade operations, equipment, and pumping appliances, see [Appendix F](#).

NOTE 3 For information on location of fire hydrants, see [Appendix H](#)

NOTE 4 For information on fire hydrants in streets and access-ways within private properties, see [Appendix I](#).

3.2 Fire hydrants

3.2.1 Classification

All fire hydrants within the fire hydrant system shall be classified as either external or internal, and as feed, attack/feed, or attack, in accordance with [Clause 2.2.1](#).

3.2.2 Features, accessibility, and clearances

3.2.2.1 General

All fire hydrants shall —

- (a) incorporate fire hydrant valves conforming to AS 2419.2;
- (b) have the centre line of the fire hydrant valve or outlet not less than 750 mm and not more than 1 200 mm above the ground, finished floor level or platform;
- (c) have the fire hydrant valve outlet horizontal or sloping not more than 35° below the horizontal;
- (d) have a 65 mm nominal diameter hose connection;
- (e) be identified by a metal or ultraviolet (UV) resistant disc of not less than 20 mm diameter displaying the fire hydrant number as shown on the block plan;
- (f) be equipped with protective caps and secured in accordance with AS 2419.2; and
- (g) be fitted with a fire hydrant valve security device as determined by the relevant authority.

NOTE 1 Where vandalism is deemed a legitimate risk, the hydrant outlet valve should be locked in the closed position by a fire hydrant valve security device that permits fire brigade access.

NOTE 2 The local fire brigade may nominate preferred fire hydrant valve security devices such as an oval spindle in accordance with AS 2419.2, an anti-tamper plug in accordance with AS 2419.4, valve handle lock-outs, lockable straps/chains, lockable valve enclosure devices, or lockable cabinets with or without frangible panels.

3.2.2.2 Clearances

All fire hydrants shall have —

- (a) a clearance of not less than 1 m directly in front of the fire hydrant outlet for the connection and laying of fire hose, except where the provisions of [Clause 7.3.3](#) apply;
- (b) a clearance of not less than 500 mm from any point of a door-swing arc and the fire hydrant outlet where installed in a fire isolated stair.
- (c) a clearance of not less than 100 mm around the handwheel of the fire hydrant valve, in both the fully closed and fully open positions, to allow for the turning on and off of the fire hydrant valve; and
- (d) a clearance around the fire hydrant valve outlet of not less than 300 mm through an arc of 225° in the plane of the valve outlet, to facilitate the use of a hose spanner for the connection and disconnection of fire hose.

3.2.2.3 External on-site fire hydrants

External, on-site fire hydrants shall be above-ground and have two outlets each individually valve-controlled.

3.2.2.4 Orientation of external fire hydrants

External fire hydrants shall be orientated as follows:

- (a) Where external feed fire hydrants are installed, the hydrant outlets shall face the hardstand.
- (b) Where external attack fire hydrants are installed remotely from the building, the hydrant outlets shall face the building.
- (c) Where external attack fire hydrants are installed adjacent to the external wall of the building, the hydrant outlets shall face away from the external wall of the building.

3.2.2.5 Internal fire hydrants

Where internal fire hydrants are installed, each internal fire hydrant shall be above ground and—

- (a) have a single valve-controlled outlet if located within the area enclosed by the walls of a building;
- (b) have two outlets each individually valve-controlled if located at ground level and under a balcony, awning, roof overhang, horizontal or similar projection; or
- (c) have two outlets each individually valve-controlled if located on a podium as specified in [Clause 2.2.2](#).

3.2.2.6 Orientation of internal fire hydrants

Where an internal fire hydrant is located in a fire-isolated stair, passageway or ramp, the internal fire hydrant outlet shall —

- (a) face the descending stair, passageway, or ramp to facilitate the laying of firefighting hose within that area, where the landing on which the internal fire hydrant is located provides direct access to both an ascending and descending stair, passageway, or ramp; and
- (b) face the stair, passageway, or ramp to facilitate the laying of firefighting hose within that area, where the landing on which the internal fire hydrant is located provides access to only an ascending or descending stair, passageway, or ramp.

3.3 Hardstands

Any required hardstand and its vehicular approaches shall —

- (a) have a loadbearing capacity and unobstructed height to permit the operation and positioning of fire brigade pumping appliances;
- (b) have an all-weather surface for use by the fire brigade pumping appliance during firefighting operations and during rain periods;
- (c) be sized to allow the attending fire brigade to effectively position the fire brigade pumping appliances;
- (d) be identified by signage or permanent surface markings or both, where not otherwise obvious or where the hardstand may otherwise be obstructed by any parked vehicle or other temporary obstacle or barrier;
- (e) provide unobstructed access to any suction connection; and
- (f) incorporate a gradient less than 1 in 8.

NOTE 1 Refer to the fire brigade for information on the fire brigade pumping appliance specifications and requirements for a hardstand.

NOTE 2 The designated hardstand should provide a minimum safe working space for firefighters to exit the fire brigade pumping appliance and to use firefighting equipment. See [Appendix F](#) for dimensions of a fire crew workspace.

3.4 Location of fire hydrants

Fire hydrant systems shall be designed so that fire hydrants are located —

- (a) *externally* — in accordance with [Clauses 2.2.2, 2.2.4, 3.5, 3.7](#) and [3.9](#) to [3.11](#), as applicable; and
- (b) *internally* — in accordance with [Clauses 2.2.3, 2.2.4, 3.6](#) to [3.8](#) and [3.11](#), as applicable, where external fire hydrants do not provide coverage to all parts of the building.

3.5 External fire hydrants

3.5.1 General

Where external fire hydrants are installed, fire hydrant coverage shall meet the following requirements:

- (a) Except where the feed fire hydrants of a booster assembly are used in accordance with [Clause 3.5.4](#), fire hydrant coverage from fire brigade pumping appliances fed from external feed fire hydrants may be used to achieve coverage to the lowest four storeys included in the calculation of the rise in storeys in compliance with the Deemed-to-Satisfy provisions of the NCC, and the storey immediately below these storeys, provided all parts of the building are covered.
- (b) Fire hydrant coverage from an external attack fire hydrant shall be used to achieve coverage to the lowest four storeys included in the calculation of the rise in storeys in compliance with the Deemed-to-Satisfy provisions of the NCC and the storey immediately below these storeys, provided all parts of the building are covered.
- (c) Where all parts of the building are not covered by external fire hydrants in accordance with Items (a) or (b), coverage from a fire brigade pumping appliance fed from an external feed

fire hydrant or coverage from external attack fire hydrants shall only be used to achieve fire hydrant coverage —

- (i) to the lowest storey included in the calculation of the rise in storeys in compliance with the Deemed-to-Satisfy provisions of the NCC;
- (ii) to the storey immediately below the storey detailed in Item (i);
- (iii) to a mezzanine or mezzanines included within the fire compartment of the storey detailed in Item (i); and
- (iv) to the storey immediately above the storey detailed in Item (i), provided they are located in the same fire compartment.

Internal fire hydrants located in accordance with [Clause 3.6.2](#) shall be installed to provide coverage to those parts of the building not protected by external fire hydrants in accordance with Item (c).

NOTE Where fire hydrant coverage provided in accordance with Items (a) and (b) requires firefighters to enter a fire-isolated stair at ground level and exit the fire-isolated stair at the storey immediately below (i.e. basement 1 or lower ground Level 1) and the building has internal fire hydrants installed above and below these levels, internal fire hydrants should also be provided in the fire isolated stairs at each of these levels to facilitate fire brigade intervention activities.

3.5.2 Street hydrants

Where street fire hydrants are incorporated into a fire hydrant system design in lieu of the installation of on-site feed fire hydrants, the following shall apply:

- (a) Street hydrants shall —
 - (i) be classified as a feed fire hydrant;
 - (ii) be capable of delivering not less than the minimum flow and pressure for feed fire hydrants as specified in [Table 2.2.6\(A\)](#) for the number of fire hydrant outlets required to flow; and
 - (iii) only be used if located in a position that allows for the hydrant to conform to the location requirements for external feed fire hydrants detailed in [Clauses 3.5.3.1](#) and [3.5.3.2](#), except that the requirement of [Clause 3.5.3.1\(e\)](#) pertaining to bollards does not apply.
- (b) Not more than two street fire hydrants shall be used to provide fire hydrant coverage to a building.
- (c) Where multiple buildings are located on a site, more than two street fire hydrants may be used to provide fire hydrant coverage to the site provided not more than two street fire hydrants are used to protect each building.
- (d) A location plan indicating the location of street hydrants shall be provided in accordance with [Clause 11.7](#).
- (e) Where an on-site feed fire hydrant is installed, its location shall be included on the plan as required by Item (d).
- (f) Where a fire brigade booster assembly is installed, street hydrants shall not be used.
- (g) The requirements of [Clause 3.2.2](#) do not apply to street hydrants.

NOTE 1 Except where a fire brigade accesses a street hydrant, street hydrants typically cannot legally be accessed nor operated by third parties without prior approval from the network utility operator. It is recommended that any connection and access approvals required from the network utility operator be obtained prior to consideration of using street hydrants in lieu of an on-site hydrant arrangement, in order to meet the physical commissioning test requirements of [Section 12](#).

NOTE 2 Pressure results determined for the design flows from the reticulated water supply via street hydrants should be adjusted to consider the suitability of these hydrants for use as part of a fire hydrant system. Friction losses should be taken into account for the design flows through the hydrant riser from the main, the hydrant valve and typical standpipe fittings used by fire brigades.

3.5.3 Location

3.5.3.1 General

External fire hydrants shall be installed as follows:

- (a) Each external fire hydrant shall be located in a position that provides pedestrian access to the building.
- (b) Each external fire hydrant shall be located in a position —
 - (i) not less than 10 m from the building or fire compartment it is protecting, unless the fire hydrant is protected in accordance with [Clause 3.5.5](#);
 - (ii) not less than 10 m from any high voltage main electrical distribution equipment such as transformers and distribution boards;
 - (iii) not less than 10m from any Electric Vehicle Charging Station regardless of voltage unless protected by a wall or other construction having an FRL as defined in [Clause 3.5.5.2](#);
 - (iv) not less than 10 m from a stored quantity of dangerous goods (e.g. LPG, petroleum, propane);
 - (v) not less than 10 m from external combustible storage (e.g. palletized combustible storage items); and
 - (vi) not less than 3 m from the vent terminal of any gas assembly or gas measurement system.

NOTE For gas assembly and gas measurement systems, refer to AS/NZS 5601.1.

- (c) An external fire hydrant shall have an area extending 500 mm each side of the fire hydrant hand wheel and 1 m in front of the fire hydrant that is free from obstruction.
- (d) Where a fire hydrant is installed in a car park, or in an area where vehicles manoeuvre or park and the vehicles are able to come not more than 1 m from the fire hydrant, bollards shall be provided to protect the fire hydrant and allow for the connection and laying of fire hose.

3.5.3.2 External feed fire hydrants

The location and coverage provided from external feed fire hydrants shall meet the following requirements:

- (a) Each external feed fire hydrant shall be located not more than 20 m from a fire brigade pumping appliance located on a hardstand.
- (b) All parts of a building or open yard that are protected by an external feed fire hydrant shall be not more than 70 m from a fire brigade pumping appliance located on a hardstand and connected to the external feed fire hydrant.

3.5.3.3 External attack fire hydrants

The location and coverage provided from external attack fire hydrants shall meet the following requirements:

- (a) Each external attack fire hydrant shall be —
 - (i) located not more than 50 m from a fire brigade pumping appliance located on a hardstand; or
 - (ii) located less than 100 m from a fire brigade pumping appliance located on a hardstand when providing fire hydrant protection —
 - (A) from a podium (see [Clause 2.2.2](#));
 - (B) to a building that is provided with a sprinkler system conforming to AS 2118.1, AS 2118.4, AS 2118.6, FPAA 101D or FPAA 101H; and
 - (C) to a Class 9c building.
- (b) All parts of a building or open yard that are protected by an external attack fire hydrant located in accordance with Item (a)(i) shall be not more than 70 m from the external attack fire hydrant.
- (c) All parts of a building or open yard that are protected by an external attack fire hydrant, located in accordance with Item (a)(ii), shall be not more than 40 m from the external attack fire hydrant.

3.5.3.4 External attack/feed fire hydrants

The location and coverage provided from external attack/feed fire hydrants shall meet the following requirements:

- (a) An external attack/feed fire hydrant shall be located not more than 20 m from a fire brigade pumping appliance located on a hardstand.
- (b) An external attack/feed fire hydrant shall be located so that it may be used, when required, as either an attack or feed fire hydrant.
- (c) Fire hydrant coverage shall be determined from both the attack/feed fire hydrant and the location of the fire brigade pumping appliance.
- (d) All parts of a building or open yard that are protected by an external attack/feed fire hydrant shall be not more than 70 m from —
 - (i) the external attack/feed fire hydrant; and
 - (ii) a fire brigade pumping appliance located not more than 20m from the external attack/feed fire hydrant and not less than 10m from the building.

3.5.4 Fire brigade booster assembly — Feed fire hydrants

Coverage from a fire brigade pumping appliance fed from the feed fire hydrants located at the booster assembly shall only be used to achieve fire hydrant coverage to —

- (a) the lowest storey included in the calculation of the rise in storeys in compliance with the Deemed-to-Satisfy provisions of the NCC, provided all parts of this storey are protected;
- (b) the storey immediately below the storey detailed in Item (a), provided all parts of this storey are protected;

- (c) a mezzanine included within the fire compartment of the storey detailed in Item (a), provided all parts of the mezzanine are protected; and
- (d) the storey immediately above the storey detailed in Item (a), provided the storey is located within the same fire compartment and all parts of this storey are protected.

3.5.5 Protection of fire hydrants

3.5.5.1 Sprinkler-protected buildings

The requirements of [Clause 3.5.5.2](#) do not apply to external fire hydrants located not more than 10 m from the building, provided the building is sprinkler-protected throughout by a sprinkler system or a combination of sprinkler systems conforming to AS 2118.1, AS 2118.4 AS 2118.6, FPAA101D or FPAA101H.

3.5.5.2 Non-sprinkler-protected buildings

Where external fire hydrants are located not more than 10 m from a non-sprinkler-protected building, they shall be protected —

- (a) if located within or affixed to the external wall of a building by walls, floors and/or ceilings, as applicable, that —
 - (i) have an FRL not less than 90/90/90;
 - (ii) extend for a distance of not less than 2 m each side of the centre-line of the fire hydrant riser; and
 - (iii) extend to a height not less than 3 m above ground level.
- (b) if located not more than 3.5 m from the external wall and remote from the building, by either —
 - (i) the external wall of the building that conforms to Item (a); or
 - (ii) a freestanding wall or similar construction that —
 - (A) has an FRL not less than 90/90/90;
 - (B) extends not less than 2 m each side of the centre-line of the fire hydrant riser;
 - (C) extends to a height not less than 3 m above ground level; and
 - (D) is located immediately behind the fire hydrant and between the building and the fire hydrant.
- (c) if located not less than 3.5 m but not more than 10 m from the external wall of the building, by a freestanding wall or similar construction that —
 - (i) has an FRL not less than 90/90/90;
 - (ii) extends for a distance of not less than 1 m each side of the centre-line of the fire hydrant valve outlet;
 - (iii) extends for a height of not less than 2 m above ground level; and
 - (iv) is located immediately behind the fire hydrant and between the building and the fire hydrant.

3.6 Internal fire hydrants

3.6.1 General

Where internal fire hydrants are installed, fire hydrant coverage shall meet the following requirements:

- (a) Coverage from an internal hydrant shall be provided to those parts of the building not covered by external hydrants.
- (b) Coverage from an internal hydrant shall be provided to those parts of the building not able to be protected by the feed fire hydrants of a fire brigade booster assembly, subject to the limitations of [Clause 3.5.4](#).
- (c) Internal fire hydrants installed in accordance with [Clause 3.6.2](#) shall provide coverage only to the storey on which they are located, except where specified otherwise by Item (d) or the Deemed-to-Satisfy provisions of the NCC.
- (d) Internal fire hydrants installed in accordance with [Clause 3.6.2\(c\)](#) shall provide coverage only to the storey they are dedicated to protect except where otherwise permitted by the Deemed-to-Satisfy provisions of the NCC.
- (e) All parts of the floor shall be not more than 40 m from an internal fire hydrant installed in accordance with [Clause 3.6.2](#) except where otherwise specified in Item (f).
- (f) Where travel distances throughout the building are in compliance with the Deemed-to-Satisfy provisions of the NCC, all parts of the floor shall be not more than 45 m from an internal fire hydrant installed in accordance with [Clause 3.6.2](#).
- (g) Where a Class 2, Class 3 or Class 4 part of a building is sprinkler-protected throughout and fire hydrant coverage is not achieved to all parts of a sole occupancy unit in a Class 2, Class 3 or Class 4 part of a building in accordance with Item (e), additional fire hydrants shall be installed in accordance with [Clause 3.6.3](#).

NOTE Where internal fire hydrants are installed, the Deemed-to-Satisfy provisions of the NCC in certain circumstances permit internal fire hydrants to provide coverage to storeys on which they are not located e.g. a multi-level sole occupancy unit in a Class 2 or 3 building.

3.6.2 Location

Except where permitted by [Clause 3.6.3](#), internal hydrants shall be located in accordance with the following:

- (a) Where fire-isolated exits are provided or external stairs and/or ramps are used in lieu of fire-isolated stairs in compliance with the Deemed-to-Satisfy provisions of the NCC, internal fire hydrants shall be located —
 - (i) in every required fire-isolated exit, external stair, or ramp at every storey, except where installed in accordance with Item (c);
 - (ii) in every required fire-isolated exit, external stair or ramp at each storey, other than where coverage is provided in accordance with [Clause 3.5.1](#), regardless of the number of fire hydrants needed to provide coverage; or
 - (iii) in every required fire-isolated exit, external stair or ramp at each storey, other than where coverage is provided in accordance with [Clause 3.5.4](#), regardless of the number of fire hydrants needed to provide coverage.
- (b) Where required non-fire-isolated exits are provided, internal fire hydrants shall be located not more than 4 m from a required exit, except that internal fire hydrants need not be located adjacent to each required non-fire-isolated exit, provided fire hydrant coverage to all parts of the floor is achieved.

- (c) Where an internal fire hydrant is installed at a level that differs from the FFL of the storey it is dedicated to protect in accordance with Item (d), not less than one fire hydrant shall serve every level except where permitted otherwise by the Deemed-to-Satisfy provisions of the NCC.
- (d) An internal fire hydrant may be installed on a stair landing that is different from the finished floor level (FFL) of the storey it is dedicated to protect, provided —
 - (i) the stair landing does not differ in height from the FFL of the relevant storey by less than one flight of stairs below the FFL or more than two risers above the FFL for storeys above ground (i.e. ascending stairs); and
 - (ii) the stair landing does not differ in height from the FFL of the relevant storey by less than one flight of stairs above the FFL or more than two risers below the FFL for storeys below ground (i.e. descending stairs).

NOTE Where fire hydrant coverage provided in accordance with Items (a) and (b) requires firefighters to enter a fire-isolated stair at ground level and exit the fire-isolated stair at the storey immediately below (i.e. basement 1 or lower ground Level 1) and the building has internal fire hydrants installed above and below these levels, internal fire hydrants should also be provided in the fire isolated stairs at each of these levels to facilitate fire brigade intervention activities.

3.6.3 Additional internal fire hydrants

Where a Class 2, 3 or 4 part of a building is sprinkler-protected throughout and additional fire hydrants are required by [Clause 3.6.1\(g\)](#), the following shall apply:

- (a) Additional fire hydrants shall be in a path of travel leading from the sole occupancy unit (SOU) to an exit, but not within the SOU.
- (b) Additional fire hydrants shall be located not more than 25 m from an internal fire hydrant within a fire isolated stair.
- (c) No point on the floor of the SOU required to be protected shall be more than 30 m from additional fire hydrants located in accordance with Items (a) and (b).
- (d) The location of additional fire hydrants shall be indicated on a location plan in accordance with [Clause 11.6](#).

3.7 Fire compartments

Each fire compartment within a building shall contain a fire hydrant, unless covered by external fire hydrants or a fire hydrant within a fire-isolated exit.

3.8 Rooftop plant rooms

Enclosed rooftop plant rooms (excluding lift machine rooms) that are more than 250 m² floor area shall be served by fire hydrants in accordance with [Clause 3.6](#).

3.9 Open yard protection

Fire hydrants shall be provided and located so that all storage, production equipment and plant in the protected area is not more than 70 m from an external fire hydrant outlet.

NOTE For information on how to address an area that contains special hazards, see [Appendix E](#).

3.10 Marinas

Fire hydrant coverage to a marina shall be in accordance with the following:

- (a) Where fire brigade pumping appliances supplied from a feed fire hydrant, attack/feed fire hydrant or street hydrant provide fire hydrant coverage to a marina, all parts of the gangways, walkways and fingers shall be not more than 60 m from the fire brigade pumping appliance.
- (b) Where fire hydrant coverage cannot be provided to all parts of the gangways, walkways and fingers of a marina in accordance with Item (a), attack fire hydrants shall be located at the entrance to each walkway and at intervals of not more than 30 m along the walkways so that all parts of the marina gangways, walkways, and fingers are not more than 30 m from the attack fire hydrants, measured on the marina structure.
- (c) Where both attack and feed fire hydrants are provided to protect a marina, they shall be dual outlet fire hydrants.

NOTE For additional information and guidance on fire protection of marinas, see [Appendix J](#).

3.11 Method of measurement and limitations

3.11.1 General

Fire hydrant coverage shall be determined as follows:

- (a) Distances shall be measured along the most direct laid on-ground or floor route to, and within, the protected building, car park, marina, or open yard.
- (b) Distances shall be measured along a continuous path of travel providing pedestrian access between the following:
 - (i) A fire brigade pumping appliance located on a hardstand and an external feed fire hydrant or external attack/feed fire hydrant.
 - (ii) A fire brigade pumping appliance located on a hardstand, connected to an external feed fire hydrant or external attack/feed fire hydrant, and the protected building.
 - (iii) A fire brigade pumping appliance located on a hardstand and a fire brigade booster assembly.
 - (iv) An external attack fire hydrant and the protected building.
- (c) Distances within the protected building shall be measured along paths of travel specified in the Deemed-to-Satisfy provisions of the NCC.
- (d) Where fire hydrant coverage requires ascending or descending a ramp or stair, the distance shall be measured along the path of travel that the stairway or ramp follows. For a stairway, the path shall be taken as a line along the nosings of the treads at the outer perimeter of the stair enclosure. For a ramp, the path shall be taken along the outer perimeter of the ramp.

NOTE 1 For more information on the method of measurement on stair and ramp landings, see [Appendix H](#).

- (e) The horizontal distance from an external fire hydrant, a fire brigade booster assembly or a fire brigade pumping appliance to the external wall or facade of the building or to a projection from the building shall be measured as follows:
 - (i) From the external wall or facade of the building for a building with an awning, roof overhang or similar projection that is not more than 3 m in depth, and where the area under the awning, roof overhang or other projection does not contribute to the fire load of the building, see [Figure H.9.1\(B\)](#) (a).

- (ii) From the edge of the awning, roof overhang or projection for a building with an awning, roof overhang or similar projection that is more than 3 m in depth, and where the area under the awning, roof overhang or other projection does not contribute to the fire load of the building, see [Figure H.9.1\(B\)](#) (b).
- (iii) From the edge of the awning, roof overhang or projection for a building with an awning, roof overhang or similar projection of any depth, and where the area under the awning, roof overhang or other projection does contribute to the fire load of the building, see [Figure H.9.1\(B\)](#) (c).
- (iv) From the edge of the roof for a building without external walls.
- (v) For a building with a balcony, horizontal projection, or similar projection —
 - (A) where the protected building is of Type A construction (described in the Deemed-to-Satisfy provisions of the NCC) and the balcony, horizontal projection or similar projection is not more than 3 m in depth, measured from the external wall or facade of the building, see [Figure H.9.1\(C\)](#) (a);
 - (B) where the protected building is of Type A construction (described in the Deemed-to-Satisfy provisions of the NCC) and the balcony, horizontal projection or similar projection is more than 3 m in depth, measured from the edge of the balcony, horizontal projection or projection, see [Figure H.9.1\(C\)](#) (b); and
 - (C) where the protected building is of Type B or C construction (described in the Deemed-to-Satisfy provisions of the NCC) measured from the edge of the balcony, horizontal projection or similar projection, see [Figure H.9.1\(C\)](#) (c).
- (f) The horizontal distance from external fire hydrants, fire brigade booster assemblies or fire brigade pumping appliances to the risks detailed in [Clauses 3.5.3.1](#) and [7.3.3](#), and all similar risks shall be measured in a direct line.
- (g) Where external attack fire hydrants are located adjacent to the external wall or facade of the building, the fire hydrant coverage measurements shall be taken through a point 1 m from the face of the door that the fire hose is to be taken through, on the centre-line of that door.
- (h) Fire hydrant coverage measurements shall be taken through the centre of all doors.
- (i) Fire hydrant coverage in a car park shall be determined with all car parking spaces empty.

NOTE 2 Refer to the NCC for further information on Type A, B or C construction and the use of internal fire hydrants to provided fire hydrant coverage to a sole-occupancy unit in a Class 2 to 9 building

3.11.2 Doorways

Firefighting hose lay measurements—

- (a) shall be taken through the pedestrian entry and exit doors of the building;
- (b) shall not be taken through the revolving doors of a building; and
- (c) may be taken through roller shutter doors and sliding doors, provided these doors are permitted by the NCC for the purpose of egress.

NOTE Refer to the Deemed-to-Satisfy provisions of the NCC for requirements relating to acceptable doors.

3.11.3 Obstructions

Fire hydrant coverage throughout the building shall be measured around obstructions such as storage racking, shelving, internal walls, partitions, doors, fixed seating or any other fixed obstruction that would restrict normal fire hydrant coverage.

3.11.4 Measurements from a fire brigade pumping appliance

Where a fire brigade pumping appliance is to be connected to a street fire hydrant, external feed fire hydrant, external attack/feed fire hydrant or a fire brigade booster assembly for measurement purposes in determining fire hydrant coverage, it shall —

- (a) be located on a designated hardstand;
- (b) be located not less than 10 m from the protected building, substations, LPG, and gas storage;
- (c) not be located under an awning, roof overhang or similar projection;
- (d) not be located under a balcony, horizontal projection or similar projection;
- (e) not be located within the building; and
- (f) be positioned in a single location.

Section 4 Water sources and supply

4.1 Water sources

4.1.1 General

Water for use in a fire hydrant system shall be drawn from one or more of the following sources:

- (a) Reticulated water supply system.
- (b) River, reservoir, lake, dam or sea.
- (c) Stored rainwater.

NOTE 1 For information on water sources and supplies, see [Appendix K](#).

A bore shall only be used to provide water —

- (i) for the initial filling of an on-site tank; or
- (ii) to a make-up water supply that caters for evaporation and/or intermittent jockey pump usage only.

NOTE 2 Where a bore is used for the purposes of Items (i) or (ii), evidence should be provided of its suitability. In making this evaluation, the impact of neighbouring bores on the suitability and reliability of the bore in question should be taken into account.

4.1.2 Adequacy of water sources

Where a river, reservoir, lake, dam, or seawater is used as a water source, evidence of the reliability and suitability of the water source shall be provided. The water source selected shall be capable of providing —

- (a) the required flow rate for not less than four hours, except where required by the Deemed-to-Satisfy provisions of the NCC; or
- (b) the required automatic inflow to the primary water supply tanks.

NOTE 1 Where an electricity network substation is located, the NCC permits a water storage duration for a fire hydrant system to be less than four hours.

NOTE 2 The evidence of reliability and suitability may be in the form of a hydrogeology report or similar technical document.

NOTE 3 Where the capacity of a natural water source is subject to seasonal variation, it should not be used to provide a primary water supply. Such a water source may be used as a secondary water supply to provide automatic inflow to water storage tanks that provide the primary water supply.

4.1.3 Water quality

4.1.3.1 General

The materials in the fire hydrant system shall be compatible with the physical, chemical, and biological characteristics of the water used in the fire hydrant system.

NOTE 1 The water and materials used should support the long-term operation of the fire hydrant system.

NOTE 2 Water in a fire hydrant system should be suitable for human contact; such water includes drinking water and Class A recycled water.

NOTE 3 Only fresh water should be used to flush and charge a fire hydrant system when corrosive or saline (e.g. sea) water has been used during firefighting.

4.1.3.2 Water types

One or more of the following types of water shall be used in a fire hydrant system:

- (a) Water from a reticulated water supply.
- (b) Rainwater.
- (c) Class A recycled water.
- (d) Sea, river, lake, or dam water.
- (e) Bore water (treated and untreated).

4.2 Water supply

4.2.1 Primary water supply requirements

The primary water supply, or the primary water supply supplemented by a secondary water supply that provides automatic inflow to the primary water supply, shall deliver the following:

- (a) The minimum required flow rate for the fire hydrant system for not less than four hours.
- (b) The required assisted or unassisted pressures for the fire hydrant.

4.2.2 Primary water supply options

The primary water supply shall be provided from one of the following water supply options:

- (a) Reticulated water supply (street fire hydrants or directly connected pipework, or both).
- (b) Reticulated water supply with one on-site pump.
- (c) Reticulated water supply with an on-site break tank and pumps as specified in [Clauses 4.2.6.5 and 6.4.2](#).
- (d) Private on-site water mains capable of delivering the unassisted pressures and flows for the fire hydrant system.
- (e) Private on-site water mains with not less than two pumps.
- (f) A reduced-capacity partitioned tank in accordance with [Section 5](#) and provided with automatic inflow from a secondary water supply, fire brigade suction connections, fire brigade booster connections, and not less than two pumps.
- (g) One full-capacity partitioned tank in accordance with [Section 5](#) and provided with fire brigade suction connections, fire brigade booster connections, and not less than two pumps.
- (h) Two tanks in accordance with [Section 5](#) and provided with fire brigade suction connections, fire brigade booster connections, and not less than two pumps.
- (i) Elevated private reservoir or gravity tank capable of providing the unassisted pressures and flows for the fire hydrant system.
- (j) Elevated private reservoir or gravity tank with not less than two pumps.
- (k) River, reservoir, lake, or sea, on or within the site boundary, with not less than two vertical turbine pumps.

4.2.3 Multiple firefighting systems

Where multiple firefighting systems draw from the same water source, the water supply shall be capable of meeting the simultaneous demands for the required durations for each system as specified in [Clause 2.2.7](#).

4.2.4 Recycling

Where on-site water storage tanks are part of the fire hydrant system, the system shall be designed so that water used for commissioning and maintenance testing is capable of being returned to the water storage tanks as specified in [Clause 8.10](#), except where the water storage tanks also serve the domestic supply.

NOTE Water that has been in a fire hydrant supply system is not considered suitable for domestic uses such as drinking.

4.2.5 Secondary water supply requirements

Where reduced-capacity tanks are installed to serve as the primary water supply for the fire hydrant systems, automatic inflow shall be provided from a reticulated water supply, private water supply, other on-site tanks, river, reservoir, lake, dam, or sea so that the water supply requirements of [Clause 4.2.1](#) are met.

A means of measuring the inflow shall be provided in accordance with [Clause 8.10.4](#).

NOTE Pumps that provide automatic inflow to reduced-capacity tanks should have the same reliability as other primary water supply pumps detailed in [Section 6](#) and be capable of being controlled by a float valve.

4.2.6 On-site water storage tanks

4.2.6.1 General

Where an on-site water storage tank is provided it shall –

- (a) be either a full-capacity tank, reduced-capacity tank, high-rise water storage tank, break tank or gravity break tank, as applicable; and
- (b) conform to all applicable requirements of this section and [Section 5](#).

4.2.6.2 When an on-site water storage tank is required

On-site water storage tanks shall be provided where —

- (a) the available reticulated water supply is unable to serve as the primary water supply and provide —
 - (i) the required flow rate for the fire hydrant system; or
 - (ii) the required pressure to the most hydraulically advantaged feed fire hydrants of the fire hydrant system;
- (b) the on-site reservoir or dam is unable to serve as the primary water supply and provide the required flow rate for the fire hydrant system for not less than four hours;
- (c) the available river, lake or seawater is unable to serve as the primary water supply and provide the required flow rate for the fire hydrant system for not less than four hours;
- (d) the water supply as per Items (a), (b) or (c) is unable to provide for the simultaneous demand of the fire hydrant system and the operation of another firefighting system as required by [Clause 2.2.7](#);

- (e) the draughting requirements of [Clause 4.4](#) cannot be met by the provision of fixed suction connections drawing from an on-site reservoir or dam as required by Item (b) or an available river, lake, dam, or seawater as required by Item (c); or
- (f) the building has an effective height more than 50 m.

4.2.6.3 Full-capacity water storage tanks

Full-capacity tanks shall be sized to provide the minimum required firefighting flow rate for not less than four hours.

4.2.6.4 Reduced-capacity water storage tanks

The size of an on-site water storage tanks may be reduced, provided a secondary water supply can provide automatic inflow to an on-site water storage tank serving as the primary water supply. The reduced-capacity water storage tanks shall —

- (a) be capable of providing the minimum required flow rate for not less than four hours with the automatic inflow; and
- (b) have a capacity of not less than 24 000 L or deliver the minimum required flow rate for not less than 20 min duration, whichever is greater, except where [Clause 4.2.6.6](#) applies.

NOTE: For buildings having an effective height more than 50 m, see [Clause 4.2.6.6](#).

4.2.6.5 Break tanks

Where a break tank is installed, it shall —

- (a) have a capacity of not less than 20 min at the required flow rate specified in [Table 2.2.6\(A\) or \(B\)](#), as applicable;
- (b) be provided with not less than two half-duty fire hydrant pumps except where the provisions of [Clause 6.4.2](#) apply; and
- (c) be capable of delivering the minimum required flow rate as specified in [Table 2.2.6\(A\) or \(B\)](#), as applicable, for not less than four hours with the automatic inflow.

NOTE See [Clause 6.4.2](#) for information on the provision of one pump where a break tank is installed.

4.2.6.6 High-rise water storage tanks

Where a building has an effective height more than 50 m, on-site water storage tanks shall be provided. Water storage tanks shall —

- (a) serve as the primary water supply for the full-duty pumps required for the building in accordance with [Clause 6.2.2](#); and
- (b) have a minimum capacity of not less than 36 000 L or be capable of delivering the minimum required flow rate for the building as specified in [Table 2.2.6\(D\)](#) for not less than 30 min, whichever is the greater.

NOTE See [Clause 6.5](#) for more information on water supply configurations for full-duty pumps.

4.2.6.7 Gravity break tank

Where a gravity break tank is installed as part of a cascade fire hydrant system to control and manage pressure, the gravity break tank shall —

- (a) have a capacity of not less than 20 min at the required flow rate;