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AS 2118.6—2012

Automatic fire sprinkler systems

Part 6: Combined sprinkler and hydrant systems in
multistorey buildings



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Australian Standard[®]

Automatic fire sprinkler systems

Part 6: Combined sprinkler and hydrant systems in multistorey buildings

Originated as AS 2118.6—1995.
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PREFACE

This Standard was prepared by the Australian members of the Standards Australia Committee FP-004, Automatic Fire Sprinkler Systems, to supersede AS 2118.6—1995, *Automatic fire sprinkler systems, Part 6: Combined sprinkler and hydrant systems*.

This edition includes provision for 35 m pressure zones in addition to the 50 m pressure zones introduced in the first (1995) edition. Detailed steps and graphs are included in Appendix G.

The AS 2118 suite of sprinkler Standards has been restructured into two groups: Systems (AS 2118 series) and Component (AS 4118 series). The complete series comprises the following:

AS

- 2118 Automatic fire sprinkler systems
- 2118.1 Part 1: General systems
- 2118.2 Part 2: Drencher systems
- 2118.3 Part 3: Deluge systems
- 2118.4 Part 4: Sprinkler protection for accommodation buildings not exceeding four storeys in height
- 2118.5 Part 5: Home fire sprinkler systems
- 2118.6 Part 6: Combined sprinklers and hydrant systems in multistorey buildings (this Standard)

- 4118 Fire sprinkler systems
- 4118.1.1 Part 1.1: Components—Sprinklers and sprayers
- 4118.1.2 Part 1.2: Components—Alarm valves (wet)
- 4118.1.3 Part 1.3: Components—Water motor alarms
- 4118.1.4 Part 1.4: Components—Valve monitors
- 4118.1.5 Part 1.5: Components—Deluge and pre-action valves
- 4118.1.6 Part 1.6: Components—Stop valves and non-return
- 4118.1.7 Part 1.7: Components—Alarms valves (dry)
- 4118.1.8 Part 1.8: Components—Pressure-reducing valves
- 4118.2.1 Part 2.1: Piping—General

The use of Notes in this Standard are of an advisory nature only to give explanation or guidance to the user on recommended design considerations or technical procedures, or to provide an informative cross-reference to other documents or publications. Notes to clauses in this Standard do not form a mandatory part for compliance with this Standard.

This Standard incorporates commentary on some of the clauses. The commentary directly follows the relevant clause, is designated by 'C' preceding the clause number and is printed in italics in a panel. The commentary is for information only and does not need to be followed for compliance with the Standard.

The terms 'normative' and 'informative' have been used in the appendices of this Standard to define the application of the appendix 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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FOREWORD

The combined sprinkler and hydrant system for multistorey buildings greater than two storeys in height is based on the principles of a common reticulation system serving both sprinklers and hydrants. It provides an alternative design approach to the conventional separate sprinkler and separate hydrant systems specified under AS 2118.1 and AS 2419.1 respectively. However, a combined sprinkler and hydrant system is a choice; it is not mandatory to install a combined sprinkler and hydrant system in multistorey buildings.

Combined systems are designed and installed for economic reasons as in certain cases, combining sprinklers and hydrants in one system is a demonstrated cost-effective measure.

AS 2118.1 incorporates provisions for combined water supplies and piping serving fire sprinklers and fire hydrants in low-rise manufacturing and storage complexes. Such system arrangements have proved to be cost-effective for buildings of this character.

The combined sprinkler and hydrant system is extended in this Standard, which has to be read in conjunction with AS 2118.1 and AS 2419.1. It specifies dual water supplies and vertical ring main supply piping arranged in pressure zones accommodating both sprinkler and hydrant systems.

In line with AS 2118.1, this edition of AS 2118.6 includes provision for permanent on-site signage of key installation, pumpset and pressure-reducing valve settings to facilitate ongoing maintenance and servicing activities. It also includes provision of typical system schematics, together with floor-specific block plans aimed at facilitating fire fighting operations.

STANDARDS AUSTRALIA

Australian Standard

Automatic fire sprinkler systems

Part 6: Combined sprinkler and hydrant systems in multistorey buildings

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out minimum criteria for the design, installation and commissioning of combined sprinkler and hydrant systems (including fire hose reels where appropriate) in multistorey buildings greater than two storeys in height.

NOTES:

- 1 The installation of a combined system to this Standard is a choice; it is not mandatory to install a combined sprinkler and hydrant sprinkler system in multistorey buildings.
- 2 This Standard does not apply to buildings less than three storeys in height, for example, large floor area factories and warehouses where the sprinkler and hydrant systems are normally provided to AS 2118.1 and AS 2419.1 respectively. Such buildings may have an in-ground common fire ring main (see AS 2118.1).
- 3 This Standard should not be used for sprinkler systems classified as high hazard (see AS 2118.1 and Appendix M).

1.2 OBJECTIVE

1.2.1 Objective of Standard

The objective of this Standard is to provide designers and installers with minimum criteria for the design and installation of systems that combine light and ordinary hazard fire sprinkler systems and hydrant systems in multistorey buildings greater than two storeys in height.

1.2.2 Objective of revision

This Standard is to be referenced in BCA to replace the 1995 edition which will be withdrawn 12 months from the date of publication of this Standard.

1.3 APPLICATION

A combined sprinkler and hydrant system to this Standard shall comply with the design criteria of AS 2419.1 for the hydrant part of the combined system and AS 2118.1 for the sprinkler part of the combined system.

1.4 NORMATIVE REFERENCES

The normative documents referenced in this Standard are listed in Appendix A.

1.5 DEFINITIONS

For the purpose of this Standard the definitions below apply.

1.5.1 Combined system

An integrated system of fire sprinklers and fire hydrants using combined piping reticulation and water supplies designed to simultaneously supply sufficient water to meet the flow and pressure requirements of both sprinkler and hydrant systems.

1.5.2 Fire main

Piping, valves, and fittings providing water supply from water sources to any sprinkler stop valve and any fire hydrant valve complying with AS 2419.2.

1.5.3 Sprinkler control assembly

A group of sprinkler installation water supply valves comprising isolating (main stop) valve, alarm (non-return) valve and associated drain and test valves, pressure gauges and pressure or flow switch.

1.5.4 Sprinkler main stop valve

The main sprinkler installation water supply isolating (stop) valve forming part of a sprinkler control assembly.

SECTION 2 SYSTEM DESIGN CRITERIA

2.1 GENERAL

A combined sprinkler and hydrant system designed in accordance with this Standard shall comply with—

- (a) applicable sections of AS 2118.1; and
- (b) applicable sections of AS 2419.1;
- (c) applicable sections of AS 2941.

NOTES:

- 1 For symbols used in this Standard, see Appendix B.
- 2 For a typical system design, see Appendix L.

C2.1 *A combined fire system for multistorey buildings is based on the principles of a common reticulation system serving both sprinklers and hydrants and, as a choice, provides an alternative design approach to the conventional separate sprinkler, and separate hydrant systems specified under AS 2118.1 and AS 2419.1 respectively. In addition to complying with this Standard, a combined system should also comply with AS 2118.1 for the sprinkler part, AS 2419.1 for the hydrant part and AS 2941 for components in the combined system.*

Often a combined system is chosen for economic reasons as, in certain cases, combining sprinklers and hydrants is a cost-effective measure.

2.2 LOCATION, ACCESS AND SIGNAGE

2.2.1 Sprinkler control assemblies and fire hydrants

2.2.1.1 General

Within a building sprinkler control assemblies and fire hydrants shall be located in an egress as provided for in the BCA.

NOTES:

- 1 For example, located—
 - (a) within a fire-isolated exit, or internally as may be required by AS 2419.1; or
 - (b) within a fire-isolated passageway, ramp or room directly accessible from a fire-isolated exit.
- 2 Sprinkler control assemblies and fire hydrants should be located so as not obstruct the minimum required egress width.
- 3 Typical locations are illustrated in Figure C1, Appendix C.

2.2.1.2 Typical locations—Positioning

Sprinkler control assemblies and fire hydrants shall be accessible for maintenance and shall be positioned as follows:

- (a) For fire hydrants, in accordance with AS 2419.1.
- (b) For each sprinkler control assembly, between 1150 mm and 1800 mm from floor level and located so as not to obstruct fire brigade access to any fire hydrant.

NOTE: A typical sprinkler control assembly and fire hydrant and a schematic of some are illustrated in Figures E1 and E2 respectively, Appendix E.

2.2.1.3 *Egress stairs*

In the case of stairs, sprinkler control assemblies shall be located where practicable such that one stair entry provides access to all sprinkler control assemblies.

NOTE: Typical arrangements are shown in Figure D1, Appendix D.

2.2.2 **Sprinkler stop valve signage**

A location plate shall be affixed externally to the exit door from which access to the sprinkler control assemblies/sprinkler stop valves can be gained.

The plate shall include the words 'COMBINED FIRE HYDRANT AND SPRINKLER STOP VALVE(S) INSIDE', which shall be not less than 35 mm high and in white on a black background.

2.2.3 **System signage**

The separate signage requirements of AS 2118.1, AS 2419.1 and AS 2941 shall be replaced by a combined system signage (including the wording specified below) at the following locations:

- (a) 'COMBINED FIRE HYDRANT AND SPRINKLER BOOSTER' at the fire brigade booster.
- (b) 'COMBINED FIRE HYDRANT AND SPRINKLER PUMP ROOM' at the pump room.
- (c) 'SPRINKLER CONTROL ASSEMBLY' at each sprinkler valve set.

2.2.4 **System schematic**

A system schematic shall be provided at the following locations:

- (a) The fire brigade booster(s) location.
- (b) Fire control room.
- (c) Fire pump room.
- (d) Internally at each level providing access to sprinkler assemblies.

The system schematic shall be in the form of a permanent and waterproof diagram, and shall contain, as a minimum, the location of the following system elements:

- (i) Sprinkler control assemblies.
- (ii) All water supply isolation valves.
- (iii) Fire main isolation valves.
- (iv) Fire hydrants.
- (v) Fire hose reels where connected to the combined system.
- (vi) Capacity and location of water storage tanks.
- (vii) Location of pumps.
- (viii) Year of installation.
- (ix) Identification of the area(s) protected, related hazard classification(s), design density(ies), and pressure and flow requirements for sprinkler and hydrant systems.
- (x) Number of hydrants required to operate simultaneously.
- (xi) Pressures(s) and flow(s) required for the combined system relative to the system test points.
- (xii) Location of all fire brigade booster(s).

NOTE: A typical system schematic is illustrated in Figure F1, Appendix F.

2.2.5 Floor block plans

A floor block plan shall be provided at each control assembly on each floor and shall include—

- (a) a layout of the area each control assembly serves;
- (b) the location of all isolation valves in the area served;
- (c) the location of all fire hydrants and hose reels where connected to the combined system in the area served; and
- (d) the location of any pumpsets in the area served.

2.2.6 Pressure schedules and labels

2.2.6.1 *General*

Pressure gauge schedules, expressed in kilopascals, shall be located in each pump room. They shall be in the form of permanent charts that are water resistant and fade resistant, and include the following:

- (a) Standing ('no flow') water supply pressures.
- (b) Pump shut-off pressure(s).
- (c) All pressure-reducing valve operating pressures, where applicable.
- (d) Ring main pressure maintenance (jockey) pump cut-in and cut-out pressures.
- (e) Pump cut-in pressure(s).
- (f) Pump pressure-relief valve(s) operating pressure(s).

NOTE: A typical pressure gauge schedule is shown in Figure 2.2.6.

2.2.6.2 *Labels—Control assemblies*

Labels shall be located at each control assembly and indicate the following (see Figure 2.2.6):

- (a) Standing installation pressure downstream of control assembly.
- (b) Maximum and minimum standing pressure upstream of control assembly.

2.2.6.3 *Labels—Pressure-reducing stations*

Labels shall be located at each pressure-reducing station and indicate the following:

- (a) Upstream pressure.
- (b) Downstream (reduced) pressure.
- (c) Relief valve operating pressure.

2.2.7 Valve list

A water supply valve list, including valve unique number, location and whether monitored or locked, shall be located in each pump room.

Items	Pressure kPa		
	Normal	Minimum	Maximum
First water supply			
Second water supply (dual water supply only)			
Electric pump delivery pressure at shut-off (churn without water flow)			
Diesel pump delivery pressure at shut-off (churn without water flow)			
System pressure-reducing valve (upstream)			
System pressure-reducing valve (downstream)			

Pumps	Cut-in pressure kPa	Cut-out pressure kPa
Pressure maintenance (jockey) pump		
Electric pump		N/A
Diesel pump		N/A

Pressure-relief valves	Opening kPa	Closing kPa
System pressure-reducing valve—Relief valve setting		
Pump pressure-relief valve		

Control assembly label		
Pressure gauge—control assemblies	Maximum kPa	Minimum kPa
Standing installation pressure downstream of control assembly		
Standing pressure upstream of control assembly		

Pressure-reducing station label		
Pressure-reducing valve	Maximum kPa	Minimum kPa
Standing pressure upstream of pressure-reducing valve		
Standing pressure downstream of pressure-reducing valve		
Relief valve operating pressure		

FIGURE 2.2.6 TYPICAL PRESSURE SCHEDULE

2.3 LOCATION AND ACCESS TO FIRE MAIN ISOLATING VALVES

Within a building access to a fire main isolating valve shall be from within a ‘fire-isolated exit’.

2.4 ACCESS TO FIRE HYDRANTS

Fire hydrants shall not be located within a locked enclosure. Where located in an enclosure, hydrants shall remain accessible at all times.

2.5 PROTECTION OF SUPPLY PIPING

Piping between the source of water supply and the ring main(s) shall be subject to the fire resistance and mechanical protection requirements of AS 2118.1 and AS 2419.1.

2.6 FIRE MAIN (RING) RETICULATION

2.6.1 General

The combined sprinkler and hydrant system shall incorporate ring main(s) that comply with the following:

- (a) One ring for each pressure zone.
- (b) The vertical piping of ring main(s) shall be located within fire isolated exits or shafts.
- (c) Adjoining pressure zones shall not share common horizontal interconnections. Each interconnection shall be located within the pressure zone it shares.
- (d) The velocity in each ring main shall not exceed 4 m/s with the total flow taken in one direction only.
- (e) Ring main piping shall be not less than DN 100.

NOTES:

- 1 Ring main pipe sizing should be determined by hydraulic calculation in accordance with AS 2118.1.
- 2 It is not intended that the 'flow taken in one direction' requirement of Item (d) be applied to friction loss calculations.
- 3 For information on sprinkler and hydrant demand point calculations, see Appendix J.

2.6.2 Pressure zones

Pressure zones not exceeding 35 m in height shall be provided to prevent—

- (a) the pressure at any sprinkler head exceeding the limitations imposed by AS 2118.1; and
- (b) the pressure at any fire hydrant exceeding the limitations imposed by AS 2419.1.

NOTE: Figures G1, G2 and G3, Appendix G, illustrate pressure zones not exceeding 35 m in height and Figures G4, G5 and G6, Appendix G, illustrate pressure zones from 35 m to a maximum of 50 m in height.

Where higher pressure sprinklers and hardware, including pressure-reducing hydrant valves, are listed for higher working pressures, the pressure zones may be increased up to a maximum of 50 m in height.

CAUTION: 50 m pressure zone arrangements require appropriate fire brigade boosting capability. Confirm availability with attending fire brigade before selecting this design option.

C2.6.2 *The static pressure head of 35 m and the requirement for a firefighting tip hydrant outlet pressure of 700 kPa results in pressure zones of approximately 1045 kPa. This is consistent with the requirements of AS 2118.1 for 1200 kPa, which allows for a safety factor for sprinklers, which are generally manufactured to working pressure of approximately 1200 kPa. Where sprinklers are listed for higher working pressures, the static head within a pressure zone may be increased to a maximum of 50 m, which allows for higher pressures acceptable to the fire brigade when using pressure-reducing valves for hydrants that limit the outlet pressure to a maximum of 1200 kPa.*

The vertical portions of the ring mains shall be located within separate fire-rated exits (stairways) or fire-rated riser shafts. In the case of adjoining pressure zones that do not share a common horizontal interconnection, each interconnection shall be located within its own pressure zone.

2.6.3 Pressure zone isolating valves

Each pressure zone shall incorporate isolating valves arranged so that—

- (a) not less than 75% of fire hydrants in that zone; and
 - (b) not less than 50% of fire hydrants at each floor level,
- can remain operable upon isolation of any section of the ring main.

Isolating valves shall be monitored, as required by Clause 2.13, and located such that no more than four storeys of sprinklers would be isolated.

NOTE: For an illustration of a typical system layout, see Appendix L.

2.6.4 Sprinkler floor-isolating valves

Each floor served by sprinklers shall be provided with a monitored isolating valve (see Clause 2.13) so that it can be separately isolated for maintenance.

2.6.5 Sprinkler drain-down valves

Suitable sprinkler drain-down valves and drain piping shall be provided to allow for any one level to be separately drained for maintenance. (See also Clauses 3.2 and 3.3.)

2.7 PRESSURE-REDUCING VALVES

Where pressure-reducing valves are incorporated, they shall comply with the requirements of AS 4118.1.6, and shall be provided with a monitored isolating valve, as required by Clause 2.13, on each side of the pressure-reducing valve.

NOTE: For an illustration of a pressure-reducing station layout, see Figure H1, Appendix H.

2.8 WATER SUPPLIES

2.8.1 General

All combined sprinkler and hydrant systems shall be provided with at least one water supply (single supply) arranged to facilitate verification testing (see AS 2118.1).

Systems that are installed in buildings exceeding 25 m in effective height shall be provided with two acceptable water supplies (dual supply).

Except as provided for in this Standard, the duration and capacity of the water supply for tanks shall be the combination of that required in AS 2118.1 and AS 2419.1.

Where connections are made to town mains water supplies (direct or indirect from tanks), the installation shall comply with AS/NZS 3500.1 for cross-connection control and backflow prevention.

NOTE: For typical water supply and valve arrangements, see Appendix K.

A combined sprinkler and hydrant system shall have—

- (a) a minimum operating pressure of 700 kPa at the highest hydrant of each zone; and
- (b) a maximum operating pressure of 1200 kPa at the bottom of each 35 m high zone; or
- (c) an operating pressure not exceeding the maximum working pressure of high pressure sprinklers or reducing hydrant valves, whichever is the lesser at the bottom of each 50 m high zone.

CAUTION: 50 m pressure zone arrangements require appropriate fire brigade boosting capability. Confirm availability with attending fire brigade before selecting this design option.

Where pumps are installed, the 'cut-in' pressure setting(s) shall be a minimum of the duty point of the highest hydrant or the duty point of the most hydraulically disadvantaged sprinklers.

NOTE: See Figure I1, Appendix I.

2.8.2 Combined system pressure

Where the town water supply cannot provide the required pressure for the combined system, not less than two pumps shall be provided in accordance with AS 2118.1 and AS 2419.1.

2.8.3 Combined system flow

The combined system water flow rate shall be the aggregate of the fire hydrant flow in accordance with the requirements of AS 2419.1, and the sprinkler flow in accordance with the requirements of AS 2118.1.

Where the acceptable source of supply (e.g. a town main water supply) is not capable of providing the combined flow rate, additional on-site water storage shall be provided.

NOTES:

- 1 For water supply tank sizing, see Appendix M.
- 2 For worked examples, see Appendix J.

2.8.4 Supply-demand graph

A graphic representation of the complete hydraulic characteristics of the combined system and each water supply shall be plotted for each pressure zone on semi exponential graph paper (N1.85).

NOTE: For worked examples, see Appendix J.

2.8.5 Source, capacity and duration of an acceptable water supply

The system water supply shall be sourced from one of the following:

- (a) One on-site storage tank (single water supply) or two separate or compartmented storage tanks (dual water supply, see Clause 2.8.1). Each single water supply tank (break tank) capacity shall be not less than one-third of that required for the combined flow for the specified period, subject to the provision of automatic inflow to make up for the reduction within the specified period. Dual or compartmented dual water supply tanks capacity shall each be not less than two-thirds of that required for the combined flow for the specified period, without the provision of automatic make-up inflow.

Notwithstanding any calculated tank capacity, the minimum sprinkler component for each tank supply shall be 25 000 L and the minimum hydrant component shall be 25 000 L; that is, no combined system tank shall have a capacity of less than 50 000 L. No two tanks for a dual supply system shall have a combined capacity of less than 100 000 L.

- (b) One town main (single water supply) or two town mains (dual water supply) that form part of an interconnected town main system. For a single water supply, the town main shall be capable of providing water to the installation at the necessary pressure and flow to permit proper operation, with or without pumps. For a dual water supply, each town main shall be capable of providing water to the installation at the necessary pressure and flow to permit proper operation, with or without pumps, and stop valves shall be arranged so that, in the event of a failure of one town main within the overall system, the other supply remains operative.

- (c) For a dual water supply, one town main and one on-site storage tank of two-thirds capacity of that required for the combined flow for the specified period, without the provision of automatic inflow to compensate for the reduced tank capacity. Each supply shall be capable of providing water at the necessary pressure and flow to permit proper operation with or without pumps.
- (d) For a single water supply, one on-site break tank of one-third capacity of that required for the combined flow, subject to the provision of automatic inflow to make up for the reduction within the specified period.

Notwithstanding any calculated tank capacity, the minimum sprinkler component for each tank supply shall be 25 000 L and the minimum hydrant component shall be 25 000 L; that is, no combined system tank shall have a capacity of less than 50 000 L.

NOTES:

- 1 For typical water supply source illustrations, see Figures K1, K2 and K3, Appendix K.
- 2 For tank capacity calculations, see Appendix M.
- 3 The system water supplies should be capable of providing the maximum flow rate of the combined systems. Appendix J provides methods for determination of supply demand.
- 4 The town main system should be fed from a source of at least 1 ML.
- 5 Except where varied by this Standard where a tank is required, its capacity should be for the sprinkler system as specified in AS 2118.1 and for the hydrant system as specified in AS 2419.1.

2.8.6 Fire brigade tank suction connections

Except where suction tank capacity exceeds that required for 60 min combined system flow, fire brigade tank suction connections are not permitted.

***C2.8.6** Combined system tanks are sized to provide hydrant water for a limited flow first attack only, after which all hydrant water should come from the off-site hydrant supply via the fire brigade booster facility.*

2.8.7 Fire mains (feed)

A separate fire main (feed) shall supply each zone.

NOTE: See Figures G1, G2, G4 and G5, Appendix G.

In the case of systems using pressure-reducing arrangements, duplicate fire mains (feed) shall supply the highest pressure zone.

NOTE: See Figure G3 and G6, Appendix G.

2.9 FIRE BRIGADE BOOSTER

The system shall be provided with a fire hydrant booster assembly in accordance with the requirements of AS 2419.1. The number of feed fire hydrants and booster inlets shall provide for the combined system demand.

NOTE: For a typical system layout incorporating fire brigade booster connections. See Figure L1, Appendix L.

2.10 RELAY PUMPS

The system shall be provided with relay pumps in accordance with the requirements of AS 2419.1. Relay pumps shall provide for the combined system demand.

CAUTION: 50 m pressure zone arrangements require appropriate fire brigade boosting capability. Confirm availability with attending fire brigade before selecting this design option.

2.11 FIRE ALARM INITIATION

The sprinkler fire alarm shall be initiated via a flow switch or pressure switch and arranged in accordance with the requirements of AS 2118.1.

2.12 FIRE ALARM SIGNALLING

Alarm signalling equipment shall comply with AS 4428.6. Each fire alarm initiating device, in accordance with AS 2118.1 and shall be wired to a fire indicator panel (FIP). The location of the FIP shall be in accordance with the requirements of AS 1670.1. Upon actuation of the sprinkler system, an alarm signal shall be automatically transmitted to an alarm monitoring and dispatch centre in accordance with AS 1670.3 and AS 2118.1.

The sprinkler alarm on each floor shall provide a separate indication at the FIP, clearly identified as a sprinkler alarm for that particular floor.

Wiring between each switch and the FIP shall be Classification of not less than WS52W to AS/NZS 3013.

2.13 FAULT MONITORING OF ISOLATING VALVES

Each sprinkler isolating valve, fire main isolating valve and any valve capable of isolating the water supply to the system, shall be monitored separately at the FIP. Monitoring shall comply with the requirements of AS 2118.1 and AS 2419.1.

The following isolating valves shall be monitored:

- (a) Pressure zone isolating valves as required by Clause 2.6.3.
- (b) Sprinkler floor-isolating valves as required by Clause 2.6.4.
- (c) Isolating valves provided either side of pressure-reducing valve as required by Clause 2.7.
- (d) Any valve capable of isolating the water supply to the system.

NOTE: Valves required as a condition of connection to a water main by the water authority are excluded from the provisions of this Clause.

SECTION 3 PIPES, VALVES AND FITTINGS

3.1 GENERAL

Pipes, valves and fittings shall comply with the requirements of AS 2118.1, AS 2419.1 and AS 4118 series.

NOTE: Piping, valves and fittings should be appropriately rated to ensure that they are capable of withstanding the pressures to which they will be subjected during commissioning, normal operation, testing and fire brigade operations.

3.2 PIPING

3.2.1 Fire main and fittings

Fire mains and fittings shall meet the requirements of AS 2419.1.

3.2.2 Sprinkler pipe and fittings

Piping and fittings downstream of the sprinkler control assembly stop valve shall meet the requirements of AS 2118.1.

3.3 VALVES, MONITORS AND BOOSTERS

Valves and ancillaries in the system shall comply with the requirements of AS 4118 series as follows:

- (a) Stop valves and non-return valves shall comply with the requirements of AS 4118.1.6.
- (b) Pressure-reducing valves shall comply with the requirements of AS 4118.1.8.
- (c) Valve monitors shall comply with the requirements of AS 4118.1.4.
- (d) Hydrant valves shall comply with AS 2419.2.
- (e) Hydrant/sprinkler booster assemblies shall comply with the requirements of AS 2419.3.

SECTION 4 ACCEPTANCE TESTING

4.1 GENERAL

The tests detailed in this Section shall be conducted at the acceptance testing and commissioning stage.

NOTES:

- 1 A combined system to this Standard should be designed so that the water used for acceptance testing and maintenance of the system is not wasted, rather it is re-used for some useful purpose. In the case where on-site water storage is part of the system, the water used for acceptance testing and maintenance of the system should be returned to the storage tank, or used to augment rainwater supplies or for other site uses.
- 2 The water used for testing should not be used for domestic purposes such as human consumption.

4.2 PRE-TEST PREPARATION

Upon completion, a combined system shall be flushed to remove any debris that may have accumulated within the pipework during construction of the installation. All required cabinets, doors, hold-open devices, signs, plans, padlocks, straps and any required on-site documentation shall be complete.

4.3 HYDROSTATIC TEST

The ring main shall be tested to not less than 1700 kPa at the lowest level of the pipework or 1.5 times the maximum working pressure, whichever is the greater, at the highest hydrant in each pressure zone, whichever results in the greater testing pressure. The test shall be applied for a duration of not less than 2 h.

4.4 PROVING OF WATER SUPPLIES

Flow tests shall be carried out to prove that the water supply is capable of meeting the combined flow and pressure requirements of the system.

Performance testing (on-site proving of system design flow and pressure) shall be based on the requirements of combined sprinkler and hydrant demand at the hydraulically most unfavourable and favourable locations.

The flow-measuring device shall be either a proprietary device installed in accordance with the manufacturer's instructions, or a differential device manufactured and installed in accordance with the requirements of AS 2941.

The flow-measuring device shall be installed at any point on the system downstream of the datum point to which the hydraulic calculations are referenced. The test pressure gauge shall be installed at or immediately adjacent to the system hydraulic calculation datum point (see Note 1). Alternatively, flow measurement may be achieved by means of measuring equipment attached to the most hydraulically disadvantaged hydrant valve.

NOTES:

- 1 For typical locations, see Appendix G.
- 2 Test water discharged through fire hydrants should be returned to tank via temporary hose connections or similar means.

Alternative locations for flow tests (on-site proving of system design flow and pressure) shall be based on a single fire scenario for combined simultaneous sprinkler and hydrant operation at the most hydraulically unfavourable location, referred to as—

- (a) the storey (fire compartment) where served from a single sprinkler control valve assembly, or
- (b) the storey (fire compartment) and at the most hydraulically unfavourable sprinkler control valve location, where multiple sprinkler control assemblies are serving that storey as separate installations.

Where more than one hazard class is involved, whether on the same or separate installations, testing facilities shall be provided to enable the full range of flows to be measured.

In systems drawing from a pump suction tank, except where hydraulically precluded due to tank elevation, waste water from the water supply flow test, pressure-relief, and circulation relief facilities shall be piped to the tank.

NOTES:

- 1 Typical return-to-tank arrangements are illustrated in Appendix G.
- 2 When water supplies are marginal, care should be taken to ensure that pressure losses in the drainpipe are not so high as to restrict the flow across the testing facility.
- 3 The discharge of water for testing of the hydrants via fire authority hoses is subject to the relevant authority of the various State authorities (e.g. council, water or environmental authorities). Where water discharge is not permitted at roof or street level according to the required hydraulically disadvantaged location, proving of water supply/pressure by prior alternative arrangement with all relevant authorities will be necessary.

***C4.4** Where pumps are installed, the hydraulic calculation datum is usually at the pump discharge and it is often more convenient to install the flow-measuring device somewhere on the pumped supply, upstream of the pump discharge non-return valve. This has the advantage of preventing backflow from the installation, increasing the flow readings during testing. In all cases, care should be taken to ensure that the test results are not distorted by such backflow.*

4.5 RECORDING OF TEST RESULTS

Test results shall be recorded in accordance with the requirements of AS 2118.1, and AS 2419.1.

APPENDIX A

NORMATIVE REFERENCES

(Normative)

AS

- 1670 Fire detection, warning control and intercom systems—System design, installation and commissioning
- 1670.1 Part 1: Fire
- 1670.3 Part 3: Fire alarm monitoring
- 2118—1999 Automatic fire sprinkler systems
- 2118.1 Part 1: General systems
- 2419 Fire hydrant installations
- 2419.1 Part 1: System design, installation and commissioning
- 2419.2 Part 2: Fire hydrant valves
- 2419.3 Part 3: Fire brigade booster connections
- 2941 Fixed fire protection installations—Pumpset systems
- 4118 Fire sprinkler systems (all parts)

AS/NZS

- 3013 Electrical installations—Classification of the fire and mechanical performance of wiring system elements
- 3500 Plumbing and drainage
- 3500.1 Part 1: Water services

HB

- 20 Graphical symbols for fire protection drawings

APPENDIX B
SYMBOLS USED IN THIS STANDARD
(Normative)

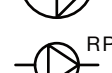
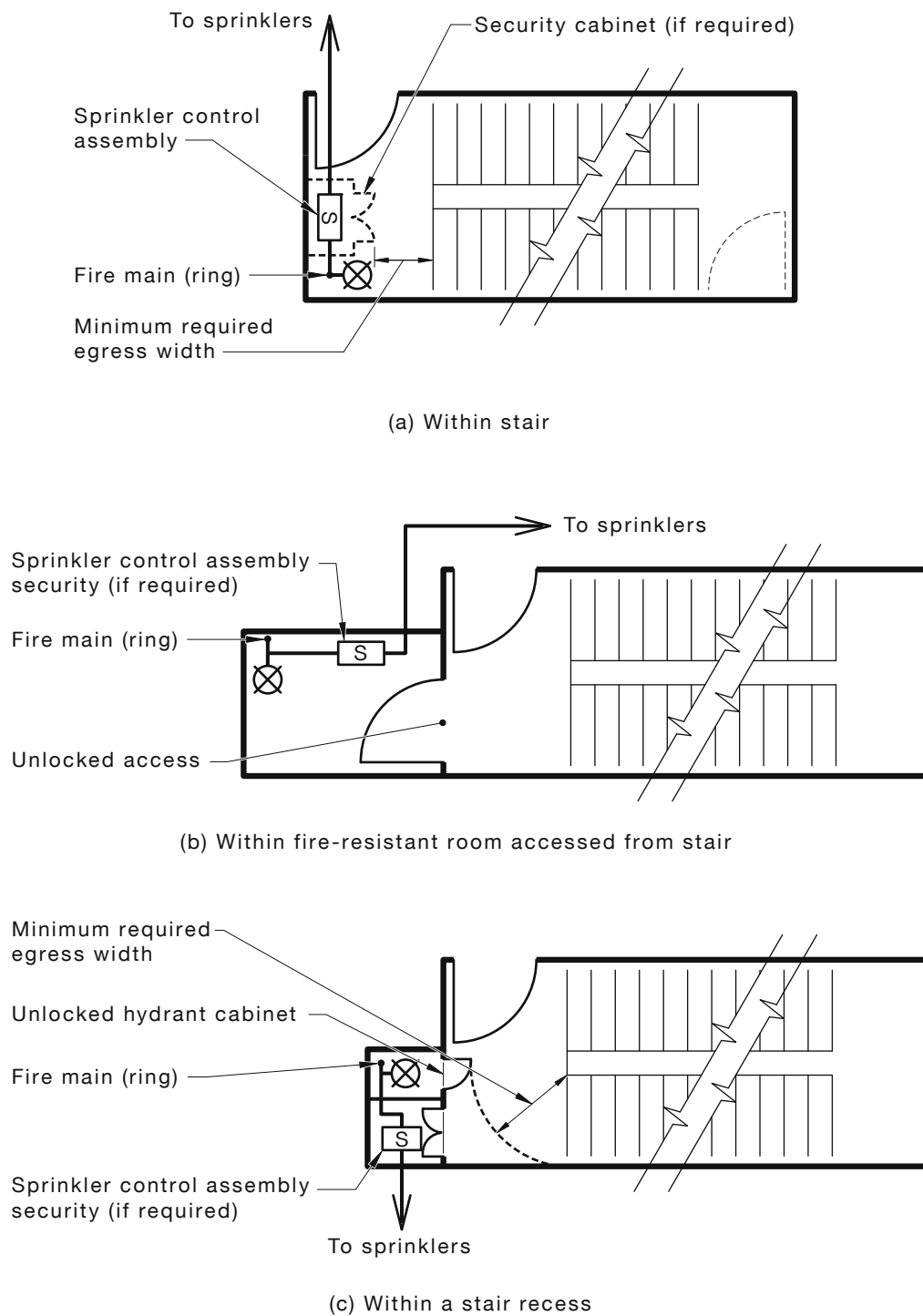
	Sprinkler
	Sprinklers
	Pressure-relief valve
	Pressure-reducing valve— $\left\{ \begin{array}{l} \text{High pressure} \\ \text{Low pressure} \end{array} \right.$
	Stop valve—normally open (monitored)
	Stop valve—normally closed (monitored)
	Stop valve—normally open
	Stop valve—normally closed
	Non-return valve (direction of flow →)
	Pump (general symbol)
	Relay pumpset
	Float valve
	Fire hydrant
	Fire brigade booster valve inlets
	Pressure switch
	Flow switch
	Pressure gauge
	Sprinkler control assembly
	Flow measuring connection

FIGURE B1 LEGEND OF SYMBOLS

APPENDIX C
TYPICAL SYSTEM LAYOUTS
(Informative)



NOTE: See Clause 2.2.1.

FIGURE C1 LOCATIONS OF SPRINKLER CONTROL ASSEMBLIES
AND FIRE HYDRANTS