



Fire hydrant installations

Part 1: System design, installation and commissioning



This Australian Standard® was prepared by Committee FP-009, Fire Hydrant Installations. It was approved on behalf of the Council of Standards Australia on 29 September 2017. This Standard was published on 6 November 2017.

The following are represented on Committee FP-009:

- Association of Accredited Certification Bodies
 - Association of Hydraulic Services Consultants Australia
 - Australasian Fire and Emergency Service Authorities Council
 - Australian Building Codes Board
 - Australian Chamber of Commerce and Industry
 - Australian Fire Safety Practitioner's Accreditation Board
 - Australian Industry Group
 - Australian Institute of Building Surveyors
 - Australian Stainless Steel Development Association
 - Australian Steel Institute
 - Copper Development Centre Australia
 - Department of Defence, Australia
 - Engineers Australia
 - Fire Protection Association Australia
 - Insurance Council of Australia
 - Plastics Industry Pipe Association of Australia
 - Property Council of Australia
 - Water Services Association of Australia
-

This Standard was issued in draft form for comment as DR AS 2419.1:2016.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting **www.standards.org.au**

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard[®]

Fire hydrant installations

Part 1: System design, installation and commissioning

Originated as AS 2419—1980.
Revised and redesignated AS 2419.1—1988.
Fourth edition 2005.
Fifth edition 2017.

COPYRIGHT

© Standards Australia Limited

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 7635 935 5

PREFACE

This Standard was prepared by the Standards Australia Committee FP-009, Fire Hydrant Installations, to supersede AS 2419.1—2005.

This Standard is part of a series on fire hydrant installation, which is comprised of the following parts:

AS

2419 Fire hydrant installations

2419.1 Part 1: System design, installation and commissioning (this Standard)

2419.2 Part 2: Fire hydrant valves

2419.3 Part 3: Fire brigade booster connections

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

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

The objective of this edition is to incorporate changes that reflect current practice, and to restructure, refine and expand the content of the Standard to clarify the intent of the normative provisions.

The changes in this revision include the following:

- (i) A restructure of the document and content to make it easier to use and to improve its readability.
- (ii) Inclusion of informative appendices to clarify the intent of sections and clauses.
- (iii) Inclusion of new technologies and industry best practices to enable competitive and cost-effective design and water conservation.
- (iv) The separation of the previous Section 8, 'Pipework and valves', into two sections.
- (v) Acknowledgment of the life safety benefits of installed sprinkler systems.
- (vi) The introduction of a range of provisions for high rise buildings based on internationally applied Standards.

Statements expressed in mandatory terms in notes to tables are deemed to be requirements of this Standard.

Notes to the text contain information and guidance. They are not an integral part of the Standard.

Illustrations in this Standard are purely diagrammatic and are intended to show functional requirements only, not methods of construction.

The terms 'normative' and 'informative' have been used in 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.

CONTENTS

| | <i>Page</i> |
|--|-------------|
| FOREWORD..... | 6 |
| SECTION 1 SCOPE AND GENERAL | |
| 1.1 SCOPE..... | 7 |
| 1.2 NORMATIVE REFERENCES | 7 |
| 1.3 DEFINITIONS..... | 9 |
| 1.4 CLASSIFICATION OF FIRE HYDRANTS..... | 15 |
| SECTION 2 SYSTEM PERFORMANCE AND DESIGN | |
| 2.1 GENERAL..... | 17 |
| 2.2 SYSTEM PERFORMANCE..... | 17 |
| 2.3 HYDRAULIC DESIGN PARAMETERS | 24 |
| SECTION 3 HYDRANT LOCATION, COVERAGE AND RELATED PROVISIONS | |
| 3.1 GENERAL..... | 26 |
| 3.2 FIRE HYDRANTS | 26 |
| 3.3 HARDSTAND AREAS | 27 |
| 3.4 LOCATION OF FIRE HYDRANTS | 27 |
| 3.5 EXTERNAL FIRE HYDRANTS..... | 28 |
| 3.6 INTERNAL FIRE HYDRANTS..... | 32 |
| 3.7 FIRE COMPARTMENTS | 33 |
| 3.8 ROOFTOP PLANT ROOMS..... | 33 |
| 3.9 OPEN YARD PROTECTION..... | 33 |
| 3.10 MARINAS..... | 33 |
| 3.11 METHOD OF MEASUREMENT AND LIMITATIONS | 34 |
| SECTION 4 WATER SOURCES AND SUPPLY | |
| 4.1 WATER SOURCES..... | 36 |
| 4.2 WATER SUPPLY..... | 37 |
| 4.3 CONNECTIONS TO WATER SOURCES OR SUPPLIES | 42 |
| 4.4 FIXED SUCTION | 44 |
| SECTION 5 WATER STORAGE TANKS | |
| 5.1 GENERAL..... | 45 |
| 5.2 TANK CONSTRUCTION | 45 |
| 5.3 TANK ACCESSORIES | 46 |
| SECTION 6 PUMPSETS | |
| 6.1 GENERAL..... | 49 |
| 6.2 WHEN A PUMPSET IS REQUIRED | 49 |
| 6.3 PUMPSET DESIGN CRITERIA | 49 |
| 6.4 FIRE HYDRANT PUMPSET(S)—CONFIGURATION | 50 |
| 6.5 HIGH-RISE BUILDING PUMPS..... | 51 |
| 6.6 AUTOMATIC INFLOW WATER SUPPLY PUMPSET(S) | 53 |
| 6.7 FIXED ON-SITE PUMPSET(S) IN PARALLEL WITH THE FIRE BRIGADE BOOSTER ASSEMBLY | 53 |
| 6.8 FIXED ON-SITE PUMPSET(S) IN SERIES WITH THE FIRE BRIGADE BOOSTER ASSEMBLY | 53 |
| 6.9 PUMP CONTROL..... | 54 |

| | | |
|---|--|-----|
| 6.10 | ELECTRIC DRIVER ISOLATING SWITCHES..... | 54 |
| 6.11 | PUMP ROOM OR ENCLOSURE | 54 |
| SECTION 7 FIRE BRIGADE BOOSTER ASSEMBLY | | |
| 7.1 | GENERAL..... | 57 |
| 7.2 | WHEN A FIRE BRIGADE BOOSTER ASSEMBLY IS REQUIRED | 57 |
| 7.3 | LOCATION..... | 57 |
| 7.4 | TYPES OF FIRE BRIGADE BOOSTER ASSEMBLIES..... | 59 |
| 7.5 | FIRE BRIGADE BOOSTER ASSEMBLY DESIGN AND ARRANGEMENT..... | 59 |
| 7.6 | PROTECTION OF FIRE BRIGADE BOOSTER ASSEMBLIES..... | 68 |
| SECTION 8 PIPEWORK DESIGN AND INSTALLATION | | |
| 8.1 | GENERAL..... | 71 |
| 8.2 | GROUND CONDITIONS | 71 |
| 8.3 | FIRE MAINS..... | 71 |
| 8.4 | EXTERNAL PIPEWORK | 71 |
| 8.5 | INTERNAL PIPEWORK..... | 72 |
| 8.6 | RING MAIN..... | 72 |
| 8.7 | ISOLATING VALVES..... | 73 |
| 8.8 | INTERCONNECTIONS..... | 74 |
| 8.9 | SYSTEM MONITORING | 74 |
| 8.10 | TEST FACILITY | 75 |
| 8.11 | FIRE HOSE REEL SERVICE ISOLATING VALVES | 76 |
| 8.12 | HIGH-RISE DESIGN CRITERIA | 76 |
| 8.13 | PRESSURE MANAGEMENT..... | 77 |
| SECTION 9 PIPES, VALVES AND FITTINGS | | |
| 9.1 | GENERAL..... | 78 |
| 9.2 | PIPES, VALVES AND FITTINGS..... | 78 |
| 9.3 | PIPE, VALVES AND FITTINGS SPECIFICATIONS | 78 |
| 9.4 | VALVE SPECIFICATIONS..... | 80 |
| 9.5 | METAL PIPE JOINTS | 81 |
| 9.6 | PLASTICS PIPE JOINTS..... | 82 |
| 9.7 | PIPE MARKING | 82 |
| 9.8 | CORROSION PROTECTION | 83 |
| SECTION 10 PIPE SUPPORTS | | |
| 10.1 | GENERAL..... | 84 |
| 10.2 | PIPE SUPPORT DESIGN | 84 |
| 10.3 | MATERIALS FOR PIPEWORK SUPPORT | 85 |
| 10.4 | PROTECTION OF PIPE SUPPORTS | 85 |
| 10.5 | REQUIREMENTS FOR PIPE-SUPPORT COMPONENTS..... | 85 |
| 10.6 | SPACING OF SUPPORTS..... | 90 |
| 10.7 | LOCATION OF SUPPORTS..... | 91 |
| 10.8 | FIXING OF PIPE SUPPORTS | 93 |
| 10.9 | THRUST BLOCKS AND ANCHORS | 93 |
| 10.10 | PENETRATION OF PIPEWORK THROUGH STRUCTURES..... | 93 |
| SECTION 11 ANCILLARY EQUIPMENT, SIGNAGE AND BASELINE DATA | | |
| 11.1 | GENERAL..... | 95 |
| 11.2 | CABINETS, ENCLOSURES OR RECESSES..... | 95 |
| 11.3 | SIGNAGE..... | 99 |
| 11.4 | PRESSURE GAUGES | 102 |
| 11.5 | BLOCK PLAN (BASELINE DATA) | 103 |
| 11.6 | LOCATION PLAN—ADDITIONAL FIRE HYDRANT(S) (BASELINE DATA).. | 109 |

| | | |
|--------------------------|---|-----|
| 11.7 | LOCATION PLAN—STREET FIRE HYDRANTS (BASELINE DATA) | 109 |
| 11.8 | PIPEWORK IDENTIFICATION | 109 |
| SECTION 12 COMMISSIONING | | |
| 12.1 | GENERAL | 110 |
| 12.2 | HYDROSTATIC TESTING—FEED FIRE HYDRANT SYSTEMS | 110 |
| 12.3 | HYDROSTATIC TESTING—ATTACK FIRE HYDRANT SYSTEMS | 110 |
| 12.4 | FLOW AND PRESSURE PERFORMANCE TESTING | 111 |
| 12.5 | ACCEPTANCE TESTING REQUIREMENTS | 112 |
| 12.6 | INSPECTION | 113 |
| 12.7 | CERTIFICATION | 113 |
| APPENDICES | | |
| A | MEANS OF DEMONSTRATING CONFORMANCE WITH THIS STANDARD . | 114 |
| B | SPECIAL HAZARD AREAS | 118 |
| C | FIRE BRIGADE OPERATIONS AND EQUIPMENT—GUIDANCE FOR DESIGNERS OF FIRE HYDRANT INSTALLATIONS | 120 |
| D | GUIDANCE ON SYSTEM PERFORMANCE AND DESIGN | 134 |
| E | GUIDANCE ON FIRE HYDRANT LOCATION AND RELATED PROVISIONS | 151 |
| F | PRIVATELY OWNED STREET FIRE HYDRANTS | 173 |
| G | DESIGN GUIDANCE—MARINAS | 174 |
| H | GUIDANCE ON WATER SOURCES AND WATER SUPPLY | 177 |
| I | DETERMINATION OF WATER SYSTEM SUPPLY PRESSURE | 188 |
| J | WATER STORAGE TANKS | 196 |
| K | GUIDANCE ON PUMPSET AND PIPEWORK DESIGN | 201 |
| L | FACILITIES FOR TESTING ON-SITE FIRE HYDRANT PUMPS | 219 |
| M | DESIGN GUIDANCE—FIRE BRIGADE BOOSTER ASSEMBLY | 220 |
| N | FIRE HOSE COUPLINGS USED IN AUSTRALIA | 228 |
| O | CORROSION PROTECTION | 229 |
| P | COMMISSIONING—HYDROSTATIC TEST PROCEDURES | 232 |
| Q | COMMISSIONING—HYDROSTATIC TEST—ALTERNATIVE PROCEDURE FOR POLYETHYLENE PIPE | 237 |
| R | COMMISSIONING—FLOW AND PRESSURE PERFORMANCE TESTING | 239 |
| S | ADJUSTMENT FOR WATER SUPPLY PRESSURE VARIATION | 248 |
| BIBLIOGRAPHY | | 251 |

FOREWORD

The availability of fire hydrants is essential to fire protection. Fire hydrants may be 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 properties for use by the fire brigade and other trained personnel. Fire hydrant systems should only be used for firefighting purposes.

In developing a fire hydrant system design, the fire hydrant system designer needs to consider how the attending fire brigade will access the installed fire hydrants in the event of a fire. Fire hydrants installed in locations that are not readily accessible to the area they are protecting are fire hydrants that are unlikely to be used in the event of a fire. In this regard the fire hydrant system designer should seek to provide external hydrants to serve the ground floor of a building and then locate internal fire hydrants, in compliant locations, progressively throughout the building.

The application of this design approach will consequently ensure that firefighters are able to enter the building under the protection of a charged line of hose, if required, and readily access fire hydrants as they 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.

Fire hydrant systems need to be regularly inspected, tested and maintained to ensure continued readiness for use.

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 or fire service need to be considered to ensure the design developed is appropriate.

Fire hydrant systems need to be designed, installed and commissioned by persons who have acquired through training, qualification, experience, or a combination of these, the knowledge and skill enabling them to correctly perform the required tasks.

STANDARDS AUSTRALIA

Australian Standard Fire hydrant installations

Part 1: System design, installation and commissioning

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the design, installation, commissioning and testing of fire hydrant installations. It applies to on-site fire hydrant installations, that is, fire hydrant installations used to protect buildings, structures, storage yards, marinas and associated moored vessels, wharves and plant.

Where a street fire hydrant(s) is to be used in lieu of an on-site feed fire hydrant(s), this Standard specifies requirements for its location, available pressure and flow as conditions for its inclusion in the designed fire hydrant installation.

This Standard is not applicable to the design or performance of water agency town mains and street hydrants.

The flow requirements detailed in this Standard, having been based on the floor area or volume of a building, are intended to 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 that rapid fire growth and spread is probable, then additional provisions have to be considered for inclusion.

This Standard does not specify requirements for fire hydrant installations in special hazard areas.

NOTES:

- 1 For guidance on means of demonstrating compliance with this Standard, see Appendix A.
- 2 For information and guidance on fire hydrant installations in special hazard areas, see Appendix B.
- 3 In circumstances where this Standard does not apply, the principles detailed in this Standard may be used as guidance for the design of a fire hydrant system in consultation with the relevant stakeholders.
- 4 Manufacturers making a statement of compliance with this Australian Standard on a product or on packaging or promotional material are advised to ensure that such compliance is capable of being verified.

1.2 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

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

AS

| | |
|------|---|
| 1074 | Steel tubes and tubulars for ordinary service |
| 1275 | Metric screw threads for fasteners |
| 1281 | Cement mortar lining of steel pipes and fittings |
| 1345 | Identification of the contents of pipes, conduits and ducts |

| | |
|----------|---|
| AS | |
| 1349 | Bourdon tube pressure and vacuum gauges |
| 1432 | Copper tubes for plumbing, gasfitting and drainage applications |
| 1530 | Methods for fire tests on building materials, components and structures |
| 1530.4 | Part 4: Fire-resistance test of elements of construction |
| 1572 | Copper and copper alloys—Seamless tubes for engineering purposes |
| 1579 | Arc-welded steel pipes and fittings for water and wastewater |
| 1603 | Automatic fire detection and alarm systems |
| 1603.11 | Part 11: Visual warning devices |
| 1674 | Safety in welding and allied processes |
| 1674.1 | Part 1: Fire precautions |
| 1769 | Welded stainless steel tubes for plumbing applications |
| 2118 | Automatic fire sprinkler systems |
| 2118.1 | Part 1: General requirements |
| 2118.4 | Part 4: Sprinkler protection for accommodation buildings not exceeding four storeys in height |
| 2118.6 | Part 6: Combined sprinkler and hydrant systems in multistorey buildings |
| 2304 | Water storage tanks for fire protection systems |
| 2419 | Fire hydrant installations |
| 2419.2 | Part 2: Fire hydrant valves |
| 2419.3 | Part 3: Fire brigade booster connections |
| 2484 | Fire—Glossary of terms |
| 2484.2 | Part 2: Fire protection and firefighting equipment |
| 2941 | Fixed fire protection installations—Pumpset systems |
| 3672 | Wrought steel threaded pipe fittings |
| 3688 | Water supply and gas systems—Metallic fittings and end connectors |
| 3735 | Concrete structures retaining liquids |
| 4118 | Fire sprinkler systems |
| 4118.1.4 | Part 1.4: Components—Valve monitors |
| 4321 | Fusion-bonded medium density polyethylene coating and lining for pipes and fittings |
| 4428 | Fire detection, warning, control and intercom systems—Control and indicating equipment |
| 4428.1 | Part 1: Fire |
| 4728 | Electric resistance welded steel pipe for pressure purposes |
| 4794 | Non-return valves—Swing check and tilting disc |
| 4809 | Copper pipe and fittings—Installation and commissioning |
| 5200 | Plumbing and drainage products |
| 5200.053 | Part 053: Stainless steel pipes and tubes for pressure applications |
| AS/NZS | |
| 1167 | Welding and brazing—Filler metals |
| 1167.1 | Part 1: Filler metal for brazing and braze welding |
| 1477 | PVC pipes and fittings for pressure applications |

| | |
|--------|---|
| 1518 | External extruded high-density polyethylene coating system for pipes |
| 1668 | The use of ventilation and air conditioning in buildings |
| 1668.1 | Part 1: Fire and smoke control in buildings |
| 2032 | Installation of PVC pipe systems |
| 2033 | Installation of polyethylene pipe systems |
| 2280 | Ductile iron pipes and fittings |
| 2312 | Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings |
| 2638 | Gate valves for waterworks purposes (series) |
| 2845 | Water supply—Backflow prevention devices |
| 2845.1 | Part 1: Materials, design and performance requirements |
| 3500 | Plumbing and drainage (series) |
| 3862 | External fusion-bonded epoxy coating for steel pipes |
| 4129 | Fittings for polyethylene (PE) pipes for pressure applications |
| 4130 | Polyethylene (PE) pipes for pressure applications |
| 4158 | Thermal-bonded polymeric coatings on valves and fittings for water industry purposes |
| 4441 | Oriented PVC (PVC-O) pipes for pressure applications (ISO 16422:2014, MOD) |
| 4680 | Hot-dip galvanized (zinc) coatings on fabricated ferrous articles |
| 4765 | Modified PVC (PVC-M) pipes for pressure applications |
| 4792 | Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process |

ABCB

National Construction Code (NCC)

ASME

B36.19M Stainless steel pipe

ASTM

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

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

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

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

A403 Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

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

1.3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 2484.2, AS/NZS 3500.0 and those below apply.