

SINGAPORE STANDARD

**Code of practice for fire hydrant, rising
mains and hose reel systems**

(Formerly CP 29)



Published by

Enterprise
Singapore

SS 575 : 2012

(ICS 13.220)

SINGAPORE STANDARD

Code of practice for fire hydrant, rising mains and hose reel systems

All rights reserved. Unless otherwise specified, no part of this Singapore Standard may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from Enterprise Singapore. Request for permission can be sent to: standards@enterprisesg.gov.sg.

ISBN 978-981-4353-36-6

This Singapore Standard was approved by the Building and Construction Standards Committee on behalf of the Singapore Standards Council on 10 August 2012.

First published, 1984

First revision, 1998

Second revision and re-numbered as SS 575, 2012

The Building and Construction Standards Committee, appointed by the Standards Council, consists of the following members:

	Name	Capacity
Chairman	: Mr Goh Peng Thong	<i>Member, Standards Council</i>
1st Dy Chairman	: Er. Lee Chuan Seng	<i>Member, Standards Council</i>
2nd Dy Chairman	: Mr Tan Tian Chong	<i>Member, Standards Council</i>
Secretary	: Ms Wang Wei Ting	<i>SPRING Singapore</i>
Members	: Mr Boo Geok Kwang	<i>Singapore Civil Defence Force</i>
	Er. Chan Ewe Jin	<i>Institution of Engineers, Singapore</i>
	Mr Chan Kok Way	<i>Individual Capacity</i>
	Er. Chee Kheng Chye	<i>Housing & Development Board</i>
	Mr Chng Chee Beow	<i>Real Estate Developers' Association of Singapore</i>
	Mr Paul Fok	<i>Land Transport Authority</i>
	Mr Anselm Gonsalves	<i>National Environment Agency</i>
	Mr Desmond Hill	<i>Singapore Contractors Association Ltd</i>
	Er. Ismadi Mohd	<i>Ministry of Manpower</i>
	Mr Benedict Lee Khee Chong	<i>Singapore Institute of Architects</i>
	Ms Andris Leong	<i>Building and Construction Authority</i>
	Assoc Prof Leong Eng Choon	<i>Nanyang Technological University</i>
	Dr Lim Lan Yuan	<i>Association of Property and Facility Managers</i>
	Er. Lim Peng Hong	<i>Association of Consulting Engineers Singapore</i>
	Mr Larry Ng Lye Hock	<i>Urban Redevelopment Authority</i>
	Assoc Prof Gary Ong Khim Chye	<i>National University of Singapore</i>
	Mr Davis Ong Wee Choon	<i>Singapore Manufacturing Federation</i>
	Dr Tam Chat Tim	<i>Individual Capacity</i>
	Er. Tang Pei Luen	<i>JTC Corporation</i>
	Mr Teoh Wooi Sin	<i>Singapore Institute of Surveyors and Valuers</i>
Co-opted Member	: Prof Choo Yoo Sang	<i>National University of Singapore</i>

The Technical Committee on Building Maintenance and Management appointed by the Building and Construction Standards Committee and responsible for the preparation of this standard consists of representatives from the following organisations:

	Name	Capacity
Chairman	: Dr Lim Lan Yuan	<i>Member, Building and Construction Standards Committee</i>
Dy Chairman	: Er. Tang Pei Luen	<i>Member, Building and Construction Standards Committee</i>
Secretary	: Ms Barbara Bok	<i>SPRING Singapore</i>
Members	: Mr Eric Chan Kim Mun	<i>Association of Property and Facility Managers</i>
	Assoc Prof Chandra Sekhar	<i>National University of Singapore</i>
	Mr Bernard Cheng Kwang Meng	<i>SETSCO Services Pte Ltd</i>
	Mr Chue Fook Chee	<i>CNA Group Ltd</i>
	Er. Fan Foo Whai	<i>Housing & Development Board</i>
	Mr David Goh	<i>Fire Safety Managers' Association (Singapore)</i>
	Dr Kang Kok Hin	<i>Institution of Facilities Management</i>
	Mr Kua Soo Chong	<i>EM Services Pte Ltd</i>
	Er. Callan Lam	<i>Association of Consulting Engineers Singapore</i>
	Mr Lee Wee Keong	<i>Singapore Civil Defence Force</i>
	Mr Leo Hee Long	<i>Energy Market Authority</i>
	Mr Lim Chong Yong	<i>Building and Construction Authority</i>
	Mr John Min	<i>Singapore Institute of Building Limited</i>
	Er. Ng Eng Kiong	<i>Singapore Green Building Council</i>
	Mr Ramahad Singh	<i>Public Utilities Board</i>
	Dr Sun Qiqing	<i>TÜV SÜD PSB Pte Ltd</i>
	Mr Tan Ann Kiong	<i>Singapore Contractors Association Ltd</i>
	Mr Tan Chee Hoon	<i>Public Utilities Board</i>
	Er. Joseph Toh	<i>Institution of Engineers, Singapore</i>
Co-opted Members	: Mr K Ramanathan	<i>Individual Capacity</i>
	Er. Yeow Mei Leng	<i>Individual Capacity</i>

The Working Group appointed by the Technical Committee to assist in the preparation of this standard comprises the following experts who contributed in their *individual capacity*:

	Name
Convenor	: Er. Yeow Mei Leng
Members	: Er. Matthew Kwek Yoong Yoong
	Cpt Lim Boon Hsing
	Er. Ng Han Siong
	Er. Siew Yee Cheong
	Er. Wong Tak Ming Denis

The organisations in which the experts of the Working Group are involved are:

Association of Consulting Engineers Singapore

Housing & Development Board

Institution of Engineers, Singapore

Singapore Civil Defence Force

The Institution of Fire Engineers (Singapore Branch)

Contents

	Page
Foreword _____	8

CLAUSES

1	Section One - General	
1.1	Scope _____	9
1.2	Normative references _____	9
1.3	Rules and regulations _____	10
1.4	Definitions _____	11
1.5	Design, installation and as-built plans _____	14
2	Section Two – Locations and other provisions of fire hydrants and rising mains/downcomers	
2.1	Fire hydrants _____	15
2.2	Rising mains/downcomers _____	17
2.3	Breeching inlets _____	19
2.4	Landing valves _____	21
3	Section Three – Design considerations for fire hydrants and rising mains/downcomers	
3.1	Water supply and pumping arrangements _____	24
3.2	Gravity feed _____	27
3.3	Automatic air release valve for rising mains _____	27
3.4	Electrical earthing _____	28
3.5	Pipes, valves and fittings _____	28
4	Section Four – Water supplies and storage	
4.1	Minimum capacity _____	29
4.2	50 % availability _____	29
4.3	Non-domestic purposes _____	29
4.4	Tank construction _____	29
4.5	Automatic inflow _____	29
4.6	Tank refill time _____	29
4.7	Overflow and air gaps _____	30
4.8	Tank compartments _____	30
4.9	Drain valves _____	30
4.10	Water level indicators _____	30
4.11	Access openings and ladders _____	30
4.12	Tank signage _____	30
4.13	Effective capacity _____	31
4.14	Vortex inhibitors _____	31

	Page	
5	Section Five – Fire pumps	
5.1	Fire pumpsets _____	35
5.2	Electrical wiring _____	37
5.3	Electric motor driven pumps _____	38
5.4	Compression ignition drivers _____	43
6	Section Six – Hose reels	
6.1	Conformity to standards _____	54
6.2	Provision and siting _____	54
6.3	Installation of hose reels _____	55
6.4	Water supply for hose reels _____	56
6.5	Hose reels notices _____	57
7	Section Seven – Components and materials	
7.1	Conformity to standards _____	57
8	Section Eight – Hydraulic calculations	
8.1	Formulae _____	58
8.2	Pressure loss in pipe fittings _____	58
9	Section Nine – Installation	
9.1	Work on site _____	59
9.2	External pipework _____	60
9.3	Underground pipework _____	60
9.4	Internal pipework _____	60
9.5	Support of fire hydrant pipework _____	60
9.6	Protection of buildings under construction _____	60
10	Section Ten – Initial inspections and acceptance tests	
10.1	Pre-test preparation of the system _____	60
10.2	Hydrostatic test _____	61
10.3	Fire hydrants _____	61
10.4	Tests on dry rising mains _____	61
10.5	Tests on wet rising mains _____	62
10.6	Commissioning tests _____	62
10.7	Hose reel tests _____	62
10.8	Test records _____	63

	Page
11 Section Eleven – Maintenance of systems and rectification of defects	
11.1 Fire hydrants _____	63
11.2 Rising mains _____	63

TABLES

3.1 Water supply and storage requirements (assisted water supply) for private hydrant ____	25
3.2 Water flow rates for wet rising mains _____	26
4.1 Values of dimensions `A` and `B` as defined in Figure 4.1 _____	33
5.1 Minimum metering device size _____	37
8.1 Equivalent length of pipes for fittings _____	59

FIGURES

2.1a Details of typical installation of double outlet pillar hydrant in turf area _____	16
2.1b Details of valve pit _____	17
2.2 Mounting height of breeching inlet _____	20
2.3 Recess clearance of landing valve _____	23
4.1 Vertical cross-section showing effective capacity of storage _____	32
4.2 Vortex plate size and location _____	34

Foreword

This Singapore Standard was prepared by a Working Group appointed by the Technical Committee on Building Maintenance and Management which is under the purview of the Building and Construction Standards Committee.

This Code is intended to provide good guidance on fire hydrants, rising mains and hose reel systems in the area of fire protection. The information therein serves to promote the understanding of such systems by architects, engineers, contractors and owners.

The revision is to bring the standard up-to-date with the Fire Code and the relevant overseas standards and practices, in the following areas:

1. Terms and definitions
2. Design considerations for hydrants and rising mains
3. Water supplies and storage
4. Fire water pumpsets
5. Omission of Annex A which will be covered under the Fire Code.

In preparing this standard, reference was made to the following publications:

1. AS 2419.1 : 2005 Fire hydrant installations – Part 1: System designs, installation and commissioning
2. AS 2941 : 2008 Fixed fire protection installations – Pumpset systems
3. BS 5306-0 : 2011 Code of practice for fire extinguishing installations and equipment on premises – Part 0: Guide for selection of installed systems and other fire equipment
4. BS 5306-1: 2006 Code of practice for Fire extinguishing installations and equipment on premises – Part 1: Hydrant systems, hose reels and foam inlets
5. NFPA 14 : 2007 Installation of standpipe and hose systems
6. SS CP 48 : 2005 Code of practice for water services
7. SS CP 52 : 2004 Code of practice for automatic fire sprinkler systems
8. SS 532 : 2007 Code of practice for the storage of flammable liquids
9. Code of practice for fire precautions in buildings (Singapore Civil Defence Force)

Table 4.1, Figure 4.2 and Subclause 4.14 are reproduced from AS 2419.1 : 2005 with permission of SAI Global under licence 1202-c039. Australian Standards can be purchased at <http://www.saiglobal.com>.

Acknowledgement is made for the use of information from these publications.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

Note

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Code of practice for fire hydrant, rising mains and hose reel systems

Section One – General

1.1 Scope

This Code shall apply to the planning, installation, testing and upkeep of fire hydrant, wet and dry rising mains and hose reel systems on building premises. It does not apply to street fire hydrants used in lieu of on-site fire hydrants or to supplement the coverage afforded by street fire hydrants.

1.2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 143 and 1256	Threaded pipe fittings in malleable cast iron and cast copper alloy
BS 1212-1	Float operated valves – Specification for piston type float operated valves (copper alloy body) (excluding floats)
BS 1212-2	Float operated valves – Specification for diaphragm type float operated valves (copper alloy body) (excluding floats)
BS 1212-3	Float operated valves – Specification for diaphragm type float operated valves (plastics bodied) for cold water services only (excluding floats)
BS 2869	Fuel oils for agricultural, domestic and industrial engines and boilers
BS 5041-1	Fire hydrant system equipment – Part 1: Landing valves for wet risers
BS 5041-2	Fire hydrant systems equipment – Part 2: Landing valves for dry risers
BS 5041-3	Fire hydrant systems equipment – Part 3: Inlet breechings for dry riser inlets
BS 5041-4	Fire hydrant systems equipment – Part 4: Boxes for landing valves for dry risers
BS 5041-5	Fire hydrant systems equipment – Part 5: Boxes for foam inlets and dry riser inlets
BS 5163 series	Valves for waterworks purposes
BS EN 694	Fire-fighting hoses – Semi-rigid hoses for fixed systems
BS EN 671-1	Fixed fire fighting systems – Hose systems – Part 1: Hose reels with semi-rigid hose
BS EN 837-1	Pressure gauges – Bourdon tube pressure gauges – Dimensions, metrology, requirements and testing
BS EN 1092 series	Flanges and their joints

BS EN 1947	Fire-fighting hoses – Semi-rigid delivery hoses and hose assemblies for pumps and vehicles
BS EN 1982	Copper and copper alloys – Ingots and castings
BS EN 10226-1	Pipe threads where pressure tight joints are made on the threads – Taper external threads and parallel internal threads – Dimensions, tolerances and designation
BS EN 10241	Steel threaded pipe fittings
BS EN 10255	Non-alloy steel tubes suitable for welding and threading – Technical delivery conditions
BS EN 13709	Industrial valves – Steel globe and globe stop and check valves
BS EN 50342-1	Lead-acid starter batteries – General requirements and methods of test
BS EN 50342-2	Lead-acid starter batteries – Dimensions of batteries and marking of terminals
BS EN 60034 series	Rotating electrical machines
BS EN 60623	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Vented nickel-cadmium prismatic rechargeable single cells
BS EN 60947 series	Low-voltage switchgear and controlgear
SS CP 5	Code of practice for electrical installations
SS CP 48	Code of practice for water services
SS CP 52	Code of practice for automatic fire sprinkler system
SS 299-1	Fire resistant cables – Performance requirements for cables required to maintain circuit integrity under fire conditions
SS 508-3	Graphical symbols – Safety colours and safety signs – Safety signs used in workplaces and public areas
SS 532	Code of practice for the storage of flammable liquids
SS 555 series	Code of practice for protection against lightning
	Code of practice for fire precautions in buildings