

UL 8

ISBN 0-7629-1038-0

Water Based Agent Fire Extinguishers

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety for Water Based Agent Fire Extinguishers, UL 8

Sixth Edition, Dated February 28, 2005

Revisions: This Standard contains revisions through and including January 31, 2007.

Summary of Topics

These revisions to ANSI/UL 8 include the following changes in requirements:

Revision to the operating temperature requirements to reflect minimum storage temperatures of minus 40 and minus 54°C.

Revision to the operation test requirements for wheeled extinguishers.

Revision to the discharge range test requirements.

Revision to the temperature and humidity requirements for the nameplate exposure and adhesion tests.

Text that has been changed in any manner is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with UL's Proposal(s) on this subject dated May 15, 2006 and August 11, 2006.

The revisions dated January 31, 2007 include a reprinted title page (page1) for this Standard.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net/ulforeword.html>

The master for this Standard at UL's Northbrook Office is the official document insofar as it relates to a UL service and the compliance of a product with respect to the requirements for that product and service, or if there are questions regarding the accuracy of this Standard.

UL's Standards for Safety are copyrighted by UL. Neither a printed copy of a Standard, nor the distribution diskette for a Standard-on-Diskette and the file for the Standard on the distribution diskette should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

Revisions of UL Standards for Safety are issued from time to time. A UL Standard for Safety is current only if it incorporates the most recently adopted revisions.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

UL will attempt to answer support requests concerning electronic versions of its Standards. However, this support service is offered on a reasonable efforts basis only, and UL may not be able to resolve every support request. UL supports the electronic versions of its Standards only if they are used under the conditions and operating systems for which it is intended. UL's support policies may change from time-to-time without notification.

UL reserves the right to change the format, presentation, file types and formats, delivery methods and formats, and the like of both its printed and electronic Standards without prior notice.

Purchasers of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgement (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

If a single-user version electronic Standard was purchased, one copy of this Standard may be stored on the hard disk of a single personal computer, or on a single LAN file-server or the permanent storage device of a multiple-user computer in such a manner that this Standard may only be accessed by one user at a time and for which there is no possibility of multiple concurrent access.

If a multiple-user version electronic Standard was purchased, one copy of the Standard may be stored on a single LAN file-server, or on the permanent storage device of a multiple-user computer, or on an Intranet server. The number of concurrent users shall not exceed the number of users authorized.

Electronic Standards are intended for on-line use, such as for viewing the requirements of a Standard, conducting a word search, and the like. Only one copy of the Standard may be printed from each single-user version of an electronic Standard. Only one copy of the Standard may be printed for each authorized user of a multiple-user version of an electronic Standard. Because of differences in the computer/software/printer setup used by UL and those of electronic Standards purchasers, the printed copy obtained by a purchaser may not look exactly like the on-line screen view or the printed Standard.

An employee of an organization purchasing a UL Standard can make a copy of the page or pages being viewed for their own fair and/or practical internal use.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

Copyright © 2007 Underwriters Laboratories Inc.

This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-3	January 31, 2007
4-8.	February 28, 2005
9	January 31, 2007
10-17	February 28, 2005
18-20B	January 31, 2007
21-33	February 28, 2005
34	January 31, 2007
35-48	February 28, 2005

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM
UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

No Text on This Page

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub



Underwriters' Laboratories of Canada
CAN/ULC-S554
Second Edition



Underwriters Laboratories Inc.
ANSI/UL 8
Sixth Edition

Water Based Agent Fire Extinguishers

February 28, 2005

(Title Page Reprinted: January 31, 2007)

This common standard has been jointly revised on January 31, 2007. For this purpose, ULC and UL are issuing amendment pages dated January 31, 2007.



ANSI/UL 8-2007

Approved
by
Standards Council
of Canada



Documents

Document Sharing Hub

Commitment for Amendments

This Standard is issued jointly by Underwriters Laboratories Inc. (UL) and Underwriters' Laboratories of Canada (ULC). Amendments to this Standard will be made only after processing according to the Standards writing procedures by UL and ULC.

UL and ULC are separate and independent entities and each is solely responsible for its operations and business activities. The UL trade names and trademarks depicted in this document are the sole property of Underwriters Laboratories Inc. The ULC trade names and trademarks depicted in this document are the sole property of Underwriters' Laboratories Canada.

ISSN 0317-526X

Copyright © 2007 Underwriters' Laboratories of Canada

All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior permission of the publisher.

In Canada, written comments are to be sent to the ULC Standards Department, 200 – 440 Laurier Avenue West, Ottawa, Ontario K1R 7X6.

ISBN 0-7629-1038-0

Copyright © 2007 Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

The most recent designation of ANSI/UL 8 as an American National Standard (ANSI) occurred on January 31, 2007.

This ANSI/UL Standard for Safety, which consists of the Sixth Edition with revisions through January 31, 2007, is under continuous maintenance, whereby each revision is ANSI approved upon publication.

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM
UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

CONTENTS

Preface	6
---------------	---

INTRODUCTION

1 Scope	7
2 Units of Measurement	7
3 Reference Publications	7
4 Components	7
5 Glossary	7

CONSTRUCTION

6 General	9
7 Cylinders	10
8 Joints	10
9 Caps, Valves, Closures, and Pressure Relief	11
10 Gaskets and "O" rings	11
11 Gas Cartridges, Cylinders, and Regulators	11
12 Pressure Gauges and Indicators	12
13 Puncturing Mechanisms	13
14 Tamper Indicators and Locking Devices	13
15 Hose	14
16 Couplings	14
17 Nozzles and Discharge Valves	14
18 Siphon Tubes	15
19 Strainers	15
20 Handles and Mounting Devices	15
21 Hose Retainers – Wheeled Extinguishers	16
22 Running Gear – Wheeled Extinguishers	16
23 Expellant Gases	16
24 Antioverfill tubes	16
25 Extinguishing Agent	16

PERFORMANCE

26 General	17
27 Fire Tests	17
28 Tamper Indicator and Locking Device Test	17
29 Handle and Mounting Device Test	18
30 Operation Test	18
31 Discharge Duration Test	18
32 Rate of Flow Test	19
33 Discharge Range Test	19
34 Intermittent Discharge Test	19
35 Operating Temperature Limits Test	19
36 Temperature Cycling Test	20
37 30-Day Elevated Temperature Test	20
38 High-Temperature Exposure Test	20
39 Abnormal Operation Test	20
40 Hydrostatic Pressure Test	20

40.1	Cylinders	20
40.2	Discharge valves, caps, and closures	22
40.3	Hose assemblies	22
40.4	Gas cartridges	22
40.5	Test method	23
41	Vibration Test	23
41.1	General	23
41.2	Mounting of test sample	24
41.3	Test orientation	24
41.4	Variable frequency test	24
41.5	Endurance test	24
42	Roadability and Rough Usage Tests	24
42.1	Roadability	24
42.2	Rough usage	25
42.3	Rough usage – operation	25
43	Siphon Pull Test – Polymeric Materials	26
44	Aging Tests – Polymeric Materials	26
44.1	General	26
44.2	Exposure to extinguishing agent test	27
44.3	Light and water test	28
45	Elastomeric Parts Test	28
46	Salt Spray Corrosion Test	29
47	10-Day Moist Ammonia Air Stress Cracking Test	29
48	Agent Exposure Test	30
48.1	Disposable (nonrechargeable) fire extinguishers	30
48.2	Rechargeable (refillable) fire extinguishers	30
49	Servicing Tests	31
50	One-Year Time Leakage Test	31
51	Calibration Test – Gauges and Indicators	31
52	Burst Strength Test – Gauges and Indicators	32
53	Water Resistance Test – Gauges and Indicators	32
54	Leakage Test – Gauges and Indicators	32
55	Cycling Test – Pressure Indicators	33
56	Vibration Test – Pressure Gauges and Indicators	33
57	Overpressure Test – Gauges	33
58	Impulse Test – Gauges	33
59	Pressure Gauge Relief Test	33
60	Nameplate Exposure Tests	34
61	Nameplate Adhesion Test	34
62	Nameplate Abrasion Test	34
63	Antioverfill Tube Test	35

PACKAGING

64	General	35
----	---------	----

MANUFACTURING AND PRODUCTION TESTS

65	General	36
66	Hydrostatic Pressure Test	36
66.1	Cylinders	36
66.2	Non-DOT or Non-TDGR gas cartridges	36
66.3	Hoses and couplings	37

67 Two-Year Leakage Test	37
--------------------------------	----

MARKING

68 General	37
69 Operating Instructions	38
70 Use Code Symbols	39
71 Recharging instructions	40
72 Identification of Contents	40
73 Inspection Instructions	41

RECORD TAGS AND MANUALS

74 Record Tag	41
75 Manuals	41

TABLES

FIGURES

ANNEX A

ANNEX B

Document Was Downloaded By Rice, Shi SHIMISHENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

Preface

This is the common UL and ULC Standard for Water Based Agent Fire Extinguishers. It is the Second edition of CAN/ULC-S554, and the Sixth edition of ANSI/UL 8.

This common Standard was prepared by Underwriters Laboratories Inc., Underwriters' Laboratories of Canada and the manufacturing industry. The efforts and support of the Extinguisher Technical Harmonization Committee are gratefully acknowledged.

This Standard was formally approved by the ULC Committee on Portable Fire Extinguishers. The First edition of this Standard was published as a ULC Standard and the Second edition was approved and published as a National Standard of Canada

The Annexes in this Standard are for information purposes only.

Note: Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

Level of harmonization

This standard used an ISO format, but is not based on, nor shall it be considered equivalent to, an ISO standard. This standard is published as an identical standard.

An identical standard is a standard that is the same in technical content except for conflicts in Codes and Governmental Regulations. Presentation shall be word for word except for editorial changes.

Interpretations

The interpretation by the SDO of an identical or equivalent standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the SDO. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the SDOs to more accurately reflect the intent.

UL Effective Date

As of August 14, 2007 all products Listed or Recognized by UL must comply with the requirements in this Standard.

A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved Standard.

Document Was Downloaded By Rice, Shi SHIMISHIENG
For Use By KUANTECH CO LTD
12039 : 8/2/2007 - 4:31 AM
UL COPYRIGHTED MATERIAL -

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents

Document Sharing Hub

INTRODUCTION

1 Scope

1.1 These requirements cover the construction and performance, exclusive of performance during fire tests, of portable water based agent fire extinguishers. These fire extinguishers are intended to be utilized in accordance with the Standard for Portable Fire Extinguishers, NFPA 10 and with the National Fire Code of Canada.

1.2 The requirements for performance during fire testing of water based agent fire extinguishers are specified in the Binational Standard for Rating and Fire Testing of Fire Extinguishers, ANSI/UL 711 CAN/ULC-S508.

1.3 As used in these requirements, the term "extinguisher" refers to all extinguishers or any part thereof covered by these requirements, unless specifically noted otherwise.

2 Units of Measurement

2.1 The metric unit shall be designated as the official unit for purposes of this standard. Where values of measurement are specified in both SI and English units, either unit is used. In cases of dispute, the metric unit shall be used.

3 Reference Publications

3.1 See Annex A for a list of publications referenced in this standard. Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard. When the latest edition of a standard is not the applicable standard, the appropriate edition is indicated accordingly in Annex A.

4 Components

4.1 Except as indicated in 4.2, a component of a product covered by this standard shall comply with the requirements for that component. A component shall comply with both the Underwriters Laboratories Inc. and the Underwriters' Laboratories of Canada standards for the component.

4.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

5 Glossary

5.1 For the purpose of this standard, the following definitions apply.

5.2 AGENT CONCENTRATE – A concentrated agent that is intended to be diluted with water to form a mixture used to extinguish fires.

5.3 AGENT SOLUTION – A mixture of the agent concentrate with water.

5.4 CARTRIDGE OPERATED EXTINGUISHER – A fire extinguisher in which the extinguishing agent and expellant gas are in separate cylinders.

5.5 DISPOSABLE (NONRECHARGEABLE) FIRE EXTINGUISHER – A fire extinguisher not capable of nor intended to undergo complete maintenance including internal inspection of cylinder, replacement of parts and seals and hydrostatic testing.

5.6 EFFECTIVE DISCHARGE – The time of discharge of extinguishing agent from the extinguisher until gas point.

5.7 EXPELLANT GAS – A compressed or pressurized gas used to propel the extinguishing agent from a single cylinder.

5.8 EXTINGUISHER, DRY CHARGE TYPE – An extinguisher in which the foam concentrate or additive concentrate is not mixed with the water until the extinguisher is activated. The water is stored in the extinguisher cylinder, and the concentrate is stored in a separate part of the extinguisher.

5.9 EXTINGUISHER, LIQUID CHARGE TYPE – An extinguisher in which a mixture of the foam concentrate or additive concentrate and water is stored in the extinguisher cylinder.

5.10 GALVANIC COMPATIBILITY – Fire extinguisher cylinder and component parts which are not susceptible to 10-day stress corrosion cracking, or corrosion from combination of dissimilar materials.

5.11 GAS POINT – The point in time when the discharge changes from extinguishing agent to a gas and extinguishing agent combination.

5.12 PORTABLE FIRE EXTINGUISHER – A fire extinguisher carried or on wheels and operated by hand.

5.13 PRESSURE GAUGE – A gauge that shows the pressure in the cylinder and the operating range of the extinguisher based upon the operating temperature-pressure relationship in appropriate pressure units.

5.14 PRESSURE INDICATOR – An indicator that shows that the extinguisher is pressurized with its rated expellant gas pressure.

5.15 RECHARGEABLE (REFILLABLE) FIRE EXTINGUISHER – A fire extinguisher capable of undergoing complete maintenance including internal inspection of cylinder, replacement of parts and seals and hydrostatic testing.

5.16 STORED PRESSURE TYPE FIRE EXTINGUISHER – A fire extinguisher in which both the extinguishing agent and expellant gas are in a single cylinder.

5.17 WATER BASED AGENT – Water or water agent solution.

CONSTRUCTION

6 General

6.1 The construction of an extinguisher shall be such that the method of operation is obvious after observing the operating instructions.

6.2 The construction of an extinguisher shall be such that after discharge of the agent is initiated, the operator of the extinguisher is not required to take further manual actions to maintain the maximum flow of agent, other than holding the operating device in the fully opened position. The extinguisher shall be usable by one operator, without assistance from a second individual.

6.3 A disposable extinguisher shall not be rechargeable.

6.4 An extinguisher having a volume in excess of 2.3 L (140 in³) shall stand in the upright position without support.

6.5 A material for an extinguisher part, the deterioration of which causes the extinguisher to become inoperable or cause risk of injury to persons, shall not be susceptible to stress corrosion.

6.6 A polymeric or other nonmetallic part, other than an "O" ring or gasket, shall be evaluated on the basis of:

- a) Mechanical strength, including resistance to impact, see Handle and Mounting Device Test, Clause 29; Hydrostatic Pressure Test, Clause 40; Vibration Test, Clause 41; Roadability and Rough Usage Tests, Clause 42; Burst Strength Test – Gauges and Indicators, Clause 52; Nameplate Exposure Tests, Clause 60;
- b) Moisture absorption; see Salt Spray Corrosion Test, Clause 46; One-Year Time Leakage Test, Clause 50, Nameplate Exposure Tests, Clause 60;
- c) Flammability, see 6.7;
- d) Resistance to deterioration due to aging, see Aging Tests – Polymeric Materials, Clause 44; One-Year Time Leakage Test, Clause 50; Nameplate Exposure Tests, Clause 60;
- e) Exposure to light and water, see 44.3 and Nameplate Exposure Tests, Clause 60; and
- f) Exposure to the extinguishing agent, see 44.2.

6.7 With reference to flammability, polymeric materials shall be classified as type HB, V-0, V-1, V-2, 5VA, or 5VB, in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94. Other nonmetallic materials shall have equivalent characteristics.

6.8 An extinguisher shall operate as intended from the minimum storage temperature to 49°C (120°F), inclusive. Currently recognized minimum storage temperatures are 4°C (40°F) or lower. See Operating Temperature Limits Test, Clause 35.

6.9 The edges and surfaces of a valve, cap, closure, hose, cylinder, handle, or mounting device shall not be sufficiently sharp to constitute a risk of injury to persons in intended maintenance and use.

6.10 Whenever reference measurements are required to determine that a part as described in 6.9 is not sufficiently sharp to constitute a risk of injury to persons, the method described in the Standard for Test for Sharpness of Edges on Equipment, UL 1439, is to be employed.

6.11 A hand portable extinguisher shall have a gross weight not exceeding 27 kg (60 lb).

6.12 A pressurizing adaptor for a rechargeable stored pressure type extinguisher shall have threads or other mechanical means for securement to the valve assembly.

7 Cylinders

7.1 The requirements in this clause do not apply to a cylinder marked as complying with U.S. Department of Transportation (DOT), or Canada Transportation of Dangerous Goods Regulations (TDGR), or ASME specifications, unless otherwise specifically indicated.

7.2 An extinguisher cylinder under the jurisdiction of the DOT or TDGR shall comply with the appropriate DOT or TDGR specifications for shipping containers.

7.3 An extinguisher cylinder shall be fabricated of a material having rigidity, durability, and resistance to corrosion equivalent to:

- a) An aluminum alloy such as 6061-T6 or 6351-T6, see the Specification for Aluminum and Aluminum-Alloy Sheet and Plate, ASTM B209, having a minimum thickness of 0.71 mm (0.028 in);
- b) An aluminum alloy, such as 1100, 1170, or 3003 having a minimum thickness of 0.71 mm (0.028 in);
- c) A mild steel alloy, such as SAE 1010, having a minimum thickness of 0.71 mm (0.028 in); or
- d) An austenitic stainless steel alloy having a maximum of 0.03 percent carbon content and a minimum thickness of 0.63 mm (0.025 in).

7.4 A cylinder assembled complete with permanently attached fittings shall be resistant to any corrosive influence of the extinguishing agent. See Agent Exposure Test, Clause 48.

7.5 The material of the dome and bottom of a metal cylinder shall be of the same material as the cylinder.

7.6 All joints in metal cylinders shall be threaded, brazed, or welded.

Exception: Brazed joints shall not be used on stainless steel cylinders.

7.7 For the purpose of these requirements, thickness measurements of the sidewall are to be measured on uncoated metal. The thickness of the dome and of the bottom is to be measured at several points after forming and before coating.

8 Joints

8.1 The minimum width of a brazed joint on a cylinder wall shall be at least four times the thickness of the sidewall.

9 Caps, Valves, Closures, and Pressure Relief

9.1 The inside diameter of a fill opening of a rechargeable-type extinguisher shall be:

- a) A minimum 19 mm (3/4 in) for an extinguisher having a capacity of 19 L (5 gal) or less;

Exception: For coated cylinders, a minimum 38 mm (1-1/2 in) fill opening is required.

- b) A minimum 64 mm (2-1/2 in) for an extinguisher having a capacity above 19 L (5 gal).

9.2 A collar with external threads shall be constructed so that the cap does not contact the dome or the bottom when the gasket is removed.

9.3 A threaded cap, closure, or valve shall engage the collar or the threaded opening by not less than four full threads with the gasket in place.

9.4 A cap, plug, or other component, except a pressure gauge or indicator, shall be provided with a means of relieving pressure when it is removed while the agent chamber is still under pressure. The pressure shall be relieved with a minimum of two threads engaged.

9.5 Closures of rechargeable extinguishers shall resist, without evidence of damage to the threads, a closing torque of 35 N·m (25 lbf-ft).

9.6 When pressure relief is required under the jurisdiction of the Department of Transportation (DOT) or Canada Transportation of Dangerous Goods Regulations (TDGR), it shall be in accordance with the Compressed Gas Association pamphlet CGA S-1.1 Pressure Relief Device Standards.

10 Gaskets and “O” rings

10.1 A gasket or an “O” ring shall be retained in a recess or the equivalent, in the cap, collar, or valve. A gasket or an “O” ring of a rubber-like material shall be of thickness to provide a compression-type seal and shall fit snugly against the cap or head. See Elastomeric Parts Test, Clause 45.

11 Gas Cartridges, Cylinders, and Regulators

11.1 A gas cartridge and a cylinder under the jurisdiction of the Department of Transportation (DOT) or Canada Transportation of Dangerous Goods Regulations (TDGR) shall be constructed, tested, marked, and charged in accordance with the applicable shipping container specifications of the DOT or TDGR.

11.2 A gas cylinder assembly shall be provided with a pressure-relief device as required by applicable DOT or TDGR regulations. A gas cylinder assembly not under the jurisdiction of the DOT or the TDGR shall be provided with a pressure relief appropriate for the cylinder used.

11.3 Gas cartridges shall be provided with an anti-recoil cap for use in storage and transit.

11.4 Gas cartridges or cylinder assemblies shall be securely attached to the extinguisher.