UL 8

STANDARD FOR SAFETY

Water Based Agent Fire Extinguishers

ULNORM.COM : Click to view the full PDF of UL 8 2020

ULNORM.COM : Click to view the full PDF of UL 8 2020

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

Seventh Edition, Dated November 25, 2016

Summary of Topics

These revisions to ANSI/UL 8 dated December 23, 2020 includes Elastomeric Parts Test; 45.1 and 45.1.1

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated August 14, 2020.

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.

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.

Users 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 judgment (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.

ULNORM.COM : Click to view the full PDF of UL 8 2020

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 8 2020

ULC Standards
Normes ULC

ULC Standards
CAN/ULC-S554
Third Edition

Underwriters Laboratories Inc.
ANSI/UL 8
Seventh Edition

Water Based Agent Fire Extinguishers

November 25, 2016

(Title Page Reprinted: December 23, 2020)

This harmonized standard has been jointly revised on December 23, 2020 to reflect updates to the standard.

ULNORM.COM : Click to view the full PDF of UL 8 2020

Approved American National Standard
ANSI

ANSI/UL 8-2020

NATIONAL STANDARD OF CANADA
STANDARDS COUNCIL OF CANADA
CONSEIL CANADIEN DES NORMES
NORME NATIONALE DU CANADA

Commitment for Amendments

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

UL and ULC Standards 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 Standards trade names and trademarks depicted in this document are the sole property of ULC Standards.

ISSN 0317-526X Copyright © 2020 ULC Standards
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.

Comments or proposals for revisions on any part of the Standard may be submitted at any time. Proposals should be submitted via a Proposal Request in the On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com/canada.

Copyright © 2020 Underwriters Laboratories Inc.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard 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.

This ANSI/UL Standard for Safety consists of the Seventh Edition including revisions through December 23, 2020. The most recent designation of ANSI/UL 8 as an American National Standard (ANSI) occurred on December 23, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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 https://csds.ul.com.

To purchase UL Standards, visit UL's Standards Sales Site at http://www. shopulstandards.com/HowToOrder.aspx or call toll-free 1-888-853-3503.

ULNORM.COM : Click to view the full PDF of UL 8 2020

CONTENTS

Preface **7**

INTRODUCTION

1 Scope 9
2 Units of Measurement 9
3 Reference Publications 9
4 Components 9
5 Glossary 9

CONSTRUCTION

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

PERFORMANCE

26 General 18
27 Fire Tests 18
28 Tamper Indicator and Locking Device Test 18
28.1 Tamper Indicator 18
28.2 Locking Device and Tamper Indicator 18
29 Handle and Mounting Device Test 19
30 Operation Test 19
31 Discharge Duration Test 19
32 Rate of Flow Test 20
33 Discharge Range Test 20
34 Intermittent Discharge Test 20
35 Operating Temperature Limits Test 21
36 Temperature Cycling Test 21
37 30-Day Elevated Temperature Test 21
38 High-Temperature Exposure Test 21
39 Abnormal Operation Test 21
40 Hydrostatic Pressure Test 22

ULNORM.COM : Click to view the full PDF of UL 8 2020

40.1 Cylinders....22
40.2 Discharge valves, caps, and closures....23
40.3 Hose assemblies....23
40.4 Gas cartridges....23
40.5 Test method....23
41 Vibration Test....24
41.1 General....24
41.2 Mounting of test sample....24
41.3 Test orientation....25
41.4 Variable frequency test....25
41.5 Endurance test....25
42 Roadability and Rough Usage Tests....25
42.1 Roadability....25
42.2 Rough usage....26
42.3 Rough usage – operation....26
43 Siphon Tube Attachment Test – Polymeric Materials....26
43.1 General....26
43.2 Press-fit type siphon tube assemblies....27
43.3 Threaded siphon tube assemblies....27
44 Aging Tests – Polymeric Materials....27
44.1 General....27
44.2 Exposure to extinguishing agent test....28
44.3 Light and water test....28
45 Elastomeric Parts Test....29
46 Salt Spray Corrosion Test....30
47 10-Day Moist Ammonia Air Stress Cracking Test....31
48 Agent Exposure Test....31
48.1 Disposable (nonrechargeable) fire extinguishers....31
48.2 Rechargeable (refillable) fire extinguishers....31
49 Servicing Tests....32
50 One-Year Time Leakage Test....32
51 Calibration Test – Gauges and Indicators....32
52 Burst Strength Test – Gauges and Indicators....33
53 Water Resistance Test – Gauges and Indicators....33
54 Leakage Test – Gauges and Indicators....33
55 Cycling Test – Pressure Indicators....33
56 Vibration Test – Pressure Gauges and Indicators....34
57 Overpressure Test – Gauges....34
58 Impulse Test – Gauges....34
59 Pressure Gauge Relief Test....34
60 Nameplate Exposure Tests....34
61 Nameplate Adhesion Test....35
62 Nameplate Abrasion Test....35
63 Antioverfill Tube Test....36

PACKAGING

64 General....36

MANUFACTURING AND PRODUCTION TESTS

65 General....36
66 Hydrostatic Pressure Test....37
66.1 Cylinders....37
66.2 Non-DOT or Non-TDGR gas cartridges....37

ULNORM.COM : Click to view the full PDF of UL 8 2020

66.3 Hoses and couplings....37
67 Two-Year Leakage Test....37

MARKING

68 General....38
69 Operating Instructions....39
70 Use Code Symbols....40
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 Reference Standards

ANNEX B French translations of required markings

ULNORM.COM : Click to view the full PDF of UL 8 2020

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 8 2020

Preface

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

This harmonized Standard was prepared by Underwriters Laboratories Inc., ULC Standards and the Extinguisher Technical Harmonization Committee.

This Standard was formally approved by the ULC Committee on Portable Fire Extinguishers.

Only metric SI units of measurement are used in this Standard. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

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 standards development organization 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 standards development organization. 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 standards development organizations to more accurately reflect the intent.

ULNORM.COM : Click to view the full PDF of UL 8 2020

No Text on This Page

ULNORM.COM : Click to view the full PDF of UL 8 2020

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.

ULNORM.COM : Click to view the full PDF of UL 8 2020

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.

ULNORM.COM : Click to view the full PDF of UL 8 2020

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 in^3) 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.

ULNORM.COM : Click to view the full PDF of UL 8 2020

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).

ULNORM.COM : Click to view the full PDF of UL 8 2020

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.

11.5 Gas cylinders of the seated-valve type shall be provided with a pressure-relief disc held in place by a nut which vents and prevents recoil.

11.6 A seated-valve type gas cylinder assembly shall be provided with a corrosion-resistant locking device to reduce the risk of unintentional discharge. An appropriate sealing device that is breakable by a force not exceeding 65 N (15 lb-f), as installed with no external load on the locking device, shall be provided to retain the locking device and to indicate tampering with or use of the gas cylinder assembly.

11.7 A valve of the handwheel-type shall be constructed so that not more than 1-1/2 turns are required to achieve the maximum flow of agent.

11.8 The regulator used on a wheeled extinguisher shall be factory preset and pinned or otherwise locked to reduce the risk of tampering or field adjustment. The regulator shall comply with the Standard for Compressed Gas Regulators, UL 252.

ULNORM.COM : Click to view the full PDF of UL 8 2020

12 Pressure Gauges and Indicators

12.1 A rechargeable extinguisher, including a wheeled extinguisher, of the stored pressure type employing a single chamber for both the agent solution and the expellant gas shall be equipped with a pressure gauge to show the amount of pressure in the chamber whether the valve is open or closed. The operating range of the gauge shall reflect the operating temperature-pressure relationship of the extinguisher, except that the minimum operating pressure line is able to be higher than the pressure that corresponds to the minimum operating temperature. A bourdon tube type pressure gauge shall have a pressure relief that vents in the event of a bourdon tube leak.

12.2 An extinguisher having a disposable, nonrefillable, sealed chamber is not required to be equipped with a pressure gauge when a pressure indicator is used to verify that the extinguisher is charged with the correct expellant gas pressure.

12.3 The pressure gauge face shall indicate the appropriate units for which the gauge is calibrated, such as psig, or kPa, or bar, or any combination of pressure units.

12.4 The maximum indicated gauge pressure shall be between 150 and 250 percent of the indicated charging pressure at 21°C (70°F). The gauge dial shall indicate, in green, the operable pressure range of the extinguisher. The zero, charging, and maximum indicated gauge pressures shall be shown in numerals and with marks. The background of the gauge face outside of the operable pressure range shall be red. The arc of the dial from the zero pressure point to the lower end of the operable range shall read "Recharge." The arc of the dial from the higher end of the operable range to the maximum indicated pressure shall read "Overcharged." All numerals, letters, and characters in the recharge, operable, and overcharge portions of the dial shall be white. Pointers shall be yellow, and the tip of the pointer shall end in the arc of the pressure indicating dots, and shall have a maximum tip radius of 0.25 mm (0.010 in). The minimum length of the pointer, from the centerpoint of the dial to the tip, shall be 9.53 mm (0.375 in) measured at the zero pressure point. The minimum length of the arc from zero pressure to the indicated charging pressure shall be 12.7 mm (0.50 in) measured at the outer edge of the gauge dial face, from the centerline of the zero pressure mark to the centerline of the indicated charging pressure mark.

12.5 The mark used to indicate the charging pressure at 21°C (70°F) shall be not less than 0.6 mm (0.025 in) and not more than 1.0 mm (0.040 in) wide.

12.6 The pressure gauge face shall be marked, "Use With [a] Only."

[a] For example, Foam, AFFF, FFFP, and Water Based Agents.

12.7 The pressure gauge shall be marked according to the following, as applicable, using a line extending as wide as, and of the same stroke thickness as, the manufacturer's identifying mark:

a) To indicate galvanic compatibility with aluminum valve bodies – a horizontal line above the manufacturer's identifying mark.

b) To indicate galvanic compatibility with brass valve bodies – a horizontal line below the manufacturer's identifying mark.

c) To indicate galvanic compatibility with aluminum and brass valve bodies – a line above and a line below the manufacturer's identifying mark, or the manufacturer's identifying mark by itself without additional lines.

12.8 A cartridge-operated wheeled extinguisher provided with an expellant gas cylinder shall be provided with a gauge capable of indicating cylinder pressure whether the valve is open or closed. The gauge shall comply with the Standard for Gauges, Indicating Pressure for Compressed Gas Service, UL 404.

ULNORM.COM : Click to view the full PDF of UL 8 2020

13 Puncturing Mechanisms

13.1 The parts of a puncturing mechanism, with the exception of unexposed springs and pins, shall be made of nonferrous metal or corrosion-resistant stainless steel.

14 Tamper Indicators and Locking Devices

14.1 The operating mechanism(s) of an extinguisher shall be provided with a locking pin or other device to reduce the risk of unintentional discharge. A locking device shall be made of corrosion-resistant material. See Salt Spray Corrosion Test, Clause 46.

14.2 The locking pin or other device shall be visible from the front of the extinguisher when the extinguisher is mounted on a wall in its bracket or on its mounting hook. However, the locking pin is able to be on the back side when pictographic operating instructions on the front illustrate the intended means of operation.

14.3 When the locking device is attached to the valve with a chain or similar device, the chain shall be attached so that it does not interfere with the discharge stream.

14.4 A tamper indicator such as a seal or the equivalent shall be made of a corrosion resistant material and shall be provided to retain the locking device and to indicate tampering with or use of the extinguisher. See 28.1.

14.5 The tamper indicator shall be constructed so that it must be broken to operate the extinguisher.

15 Hose

15.1 A hose to direct the discharge shall be provided on an extinguisher having:

a) A gross weight of more than 5.4 kg (12 lb); or

b) A rating of 2-A or higher, 20-B or higher, or both.

The length of the hose shall be such that the agent solution discharge is not restricted by kinking of the hose or by other means when the extinguisher is operated in any position in which it is capable of being held in service.

15.2 An extinguisher having a gross weight of 5.4 kg (12 lb) or less is not prohibited from being provided with a hose.

15.3 A hose shall have a nominal internal diameter of not less than 9.5 mm (3/8 in) and shall comply with the Standard for Fire Extinguisher and Booster Hose, UL 92 and the Standard for Fire Extinguisher and Booster Hose, CAN/ULC-S522.

15.4 A hose shall be attached so that it is removable and replaceable as intended.

15.5 For a hand-portable extinguisher, a holding device shall maintain a hose in a position within 25 mm (1 in) of the cylinder when the hose is not in use, or the hose shall be preformed and have rigidity to provide an equivalent function. The distance is to be measured from the cylinder to the nearest edge of the hose.

15.6 Extended wand type discharge hose assemblies shall not be used on Class K extinguishers.

ULNORM.COM : Click to view the full PDF of UL 8 2020

16 Couplings

16.1 A hose coupling shall be made of corrosion-resistant material. See salt spray Corrosion Test, Clause 46. The coupling shall be threaded or provided with equivalent means for its attachment to the outlet of the discharge valve. When the hose coupling incorporates a nozzle orifice, the threads or attachment means shall prevent the outlet end of the hose from being connected to the outlet of the discharge valve.

16.2 Continued use of the hose shall not cause loosening or detachment of the coupling, and there shall be no projections to catch on objects or otherwise interfere with pulling of the hose.

17 Nozzles and Discharge Valves

17.1 A hand-portable extinguisher shall have a self-closing valve for intermittent discharge and a nozzle to direct the discharge.

17.2 A wheeled extinguisher shall have a shutoff valve and nozzle at the end of the hose for intermittent discharge.

17.3 A discharge valve, spring, pin and nozzle shall be made of a corrosion resistant material and have no blow holes, cracks, or other imperfections. See Salt Spray Corrosion Test, Clause 46.

18 Siphon Tubes

18.1 A siphon tube shall be constructed of a material that is resistant to the corrosive effects of the extinguishing agent with which it is to be used.

18.2 Press-fit-type joints between the siphon tube, valve, and other mating parts of the discharge system shall not completely disengage during use. The siphon tube shall be notched, scarfed, or otherwise prevented from restricting discharge in an unintended manner when the tip of the siphon tube is resting on the bottom of the cylinder. See Servicing Tests, Clause 49.

19 Strainers

19.1 A strainer which prevents blockage of the nozzle shall be securely attached along the discharge path.

Exception: A rechargeable extinguisher having a capacity of 18.9 L (5 gal) or more or a disposable non-rechargeable fire extinguisher is not required to be provided with a strainer.

19.2 The strainer shall be made of nonferrous metal or austenitic stainless steel not less than 0.64 mm (0.025 in) thick [not less than 0.56 mm (0.022 in) thick after forming], or of polymeric material complying with these requirements. See Aging Tests – Polymeric Materials, Clause 44. The total area of the strainer openings shall be not less than 20 times the free area of the nozzle orifice. The largest dimension of any opening shall be smaller than the nozzle orifice diameter by 0.39 mm (1/64 in) or more.

20 Handles and Mounting Devices

20.1 A hand-portable extinguisher having a gross weight of 1.4 kg (3 lb) or more and having a cylinder diameter of 75 mm (3 in) or more, shall have a carrying handle and a means for mounting on a wall. A handle shall be made of nonferrous metal, austenitic stainless steel, carbon steel protected against corrosion, or a polymeric material complying with the Aging Tests – Polymeric Materials, Clause 44. The mounting means shall hold the extinguisher firmly in place.

ULNORM.COM : Click to view the full PDF of UL 8 2020

20.2 A side handle or hanger loop shall be located so that the operating instructions face outward when the extinguisher is supported by the mounting means.

20.3 A handle shall be not less than 90 mm (3-1/2 in) long for an extinguisher of 6.8 kg (15 lb) or more gross weight and not less than 75 mm (3 in) long for an extinguisher of less than 6.8 kg (15 lb) gross weight.

20.4 There shall be not less than 25 mm (1 in) clearance between the dome and the carrying handle when the handle is in the carrying position.

20.5 A mounting bracket shall prevent the extinguisher from dropping to the floor when the strap is opened. The clamp releasing device shall be of a color contrasting with that of the immediate background and shall be visible, and the method of release shall be obvious when viewing the front of the extinguisher.

20.6 A wall mounting hook shall require both a horizontal and a minimum 6 mm (1/4 in) vertical motion to remove the extinguisher from the wall.

Exception: A minimum vertical motion of 3 mm (1/8 in) is able to be used for an extinguisher having a gross weight of 5.4 kg (12 lb) or less.

20.7 When a bracket requires force to open, the force shall not exceed 65 N (15 lb-f) for finger actuated assemblies, and 130 N (30 lb-f) for hand actuated assemblies. See 29.3 and 29.4.

21 Hose Retainers – Wheeled Extinguishers

21.1 A hose retainer shall retain the hose and nozzle on the extinguisher so that neither the hose nor the nozzle strikes or rubs the wheels or the ground. The retainer shall provide for the hose to be installed and withdrawn as intended when the extinguisher is placed in operation.

22 Running Gear – Wheeled Extinguishers

22.1 The cylinder shall be secured to the running gear, consisting of the wheels, axle, cylinder bands, and the handle for hauling and manipulating the extinguisher.

23 Expellant Gases

23.1 The expellant gas used in a stored-pressure extinguisher or in the cartridge or cylinder of an extinguisher so provided shall be compressed air or nitrogen, carbon dioxide, or other inert gas.

23.2 The quantity of the gas charge in a gas cartridge shall not exceed the filling density requirements of DOT or TDGR. Leakage by weighing shall be detectable on a scale graduated in 0.0025 kg (1/8 oz) increments, unless other means are provided for detecting leakage.

24 Antioverfill tubes

24.1 An antioverfill tube shall have a minimum inside diameter of 19 mm (3/4 in) and be fabricated of a corrosion-resistant material such as austenitic stainless steel or polymeric material.

24.2 An antioverfill tube shall be constructed so that it forms an airtight joint between the collar and the tube when installed.

24.3 An antioverfill tube shall be removable unless some means other than the fill opening provides access for cleaning out the cylinder.

ULNORM.COM : Click to view the full PDF of UL 8 2020

25 Extinguishing Agent

25.1 To qualify for a Class C rating, water or water based extinguishing agents shall have a maximum conductivity of 1.00 microsiemen/cm in accordance with the Standard Test Method for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample, ASTM 5391 and the extinguisher discharge shall meet the requirements of the Standard for Rating and Fire Testing of Fire Extinguishers, ANSI/UL 711/CAN/ULC-S508.

PERFORMANCE

26 General

26.1 For cartridge-operated extinguishers, unless otherwise specified, an interval of 5 seconds is able to elapse after the cartridge is punctured in order that pressure builds up before discharge of the agent is initiated.

27 Fire Tests

27.1 An extinguisher shall comply with the Binational Standard for Rating and Fire Testing of Fire Extinguishers, ANSI/UL 711/CAN/ULC-S508.

27.2 An extinguisher, charged with its rated capacity and conditioned at the minimum storage and use temperature for 16 hours, shall extinguish a Class B test fire having an area numerically equal to 40 percent of the area of the pan used in the rating of the fire extinguisher.

28 Tamper Indicator and Locking Device Test

28.1 Tamper Indicator

28.1.1 The tamper indicator shall break when subjected to a force of 65 N (15 lb-f) or less. (See 28.1.3)

28.1.2 When the tamper indicator is broken by the action required to start discharge of the extinguisher, or when an internal load is continuously applied to the release mechanism, the force, applied as intended and required to break the tamper indicator and accomplish discharge shall not exceed 130 N (30 lb-f). See 28.2.3.

28.1.3 The tamper indicator in 28.1.1, shall be installed in the intended installation position and pulled in a manner to determine the break strength of the indicator, with a constantly increasing force not exceeding 130 N (30 lb-f) per minute until the indicator breaks. The maximum breaking load shall be noted.

28.2 Locking Device and Tamper Indicator

28.2.1 The force required to extract or dislodge a locking device with the tamper indicator installed as intended along its axis shall not exceed 130 N (30 lb-f) after the locking device is subjected to the tests specified in 28.2.2 and 28.2.3.

28.2.2 A locking device shall not shear when a force of 220 N (50 lb-f) is exerted upon the operating mechanism for 30 seconds, and the extinguisher then shall be capable of being operated in its intended manner. An extinguisher, with its locking device and tamper indicator attached as intended, is to be secured on the floor in a vertical position and the 220 N (50 lb-f) exerted 13 mm (1/2 in) from the end of the operating lever or lever-operated cartridge-puncturing mechanism, or at the center of a non-lever type cartridge-puncturing mechanism.

ULNORM.COM : Click to view the full PDF of UL 8 2020

28.2.3 The extinguisher then is to be secured in a test fixture in a vertical position. The locking device is to be pulled with a 130 N (30 lb-f) for 30 seconds at an angle of 45 degrees in an upward direction from the horizontal, and then pulled for 30 seconds at a horizontally rotational angle of 45 degrees. The device shall break the tamper seal and either:

a) Be capable of extraction at the 45 degree angle; or

b) Not be damaged or the mechanism jammed to the extent that prevents intended extraction of the locking device directly outward along its axis, when a 130 N (30 lb-f) is applied for 30 seconds.

The 130 N (30 lb-f) force exerted on the locking device both at the 45 degree angle and along the axis of the device is to be achieved by increasing the force from zero to 130 N (30 lb-f) at a rate of 260 N (60 lb-f) per minute.

29 Handle and Mounting Device Test

29.1 The method of attachment of the handle and hanger loop of a hand-portable extinguisher weighing 1.4 kg (3 lb) or more, and having a cylinder diameter greater than 75 mm (3 in), shall support a static load of five times the fully charged weight of the extinguisher, or 45 kg (100 lb), whichever is greater applied downward through the vertical axis of the extinguisher for 5 minutes.

29.2 A hand-portable extinguisher charged with its rated capacity is to be placed in the bracket or mounting hook provided with the extinguisher after the bracket or mounting hook has been secured to a wood board. The board is to be secured in a vertical position, and the static load then is to be applied to the top of the extinguisher.

29.3 For a bracket mounting device, the force required to open the bracket shall not exceed 65 N (15 lb-f) for finger actuated assemblies and 130 N (30 lb-f) for hand actuated assemblies measured at the end of the bracket opening device.

29.4 A hand-portable extinguisher, charged with its rated capacity, is to be placed in the bracket provided with the extinguisher after the bracket is secured in the vertical position to a wood board. Using a spring scale, or a similar device, a gradually increasing force is to be applied to the tip of the clasp or lever of the bracket strap or band, at a 90 degree angle to the extinguisher, at a rate of 0.45 kg/s (1 lb/s) and until the band releases the bracket. For hand actuated assemblies, when there is an indent or gripping location, the force is to be applied to the center of that actuating area.

30 Operation Test

30.1 An extinguisher shall discharge a minimum 85 percent (by mass) of its rated capacity of agent solution when operated at an angle of 45 degrees in any direction from the intended operating position.

Exception: Wheeled extinguishers need not comply with this requirement.

30.2 An extinguisher charged with its rated capacity shall be discharged with the extinguisher positioned at an angle 45 degrees from the vertical in the forward, back, and side to side orientations.

31 Discharge Duration Test

31.1 An extinguisher shall have a duration of discharge at 21 ±3° C (70 ±5° F) not less than either 8 seconds, or the minimum duration specified in the Standard for Rating and Fire Testing of Fire Extinguishers, ANSI/UL 711/CAN/ULC-S508, for the appropriate Class A or Class B rating, whichever is longer.

ULNORM.COM : Click to view the full PDF of UL 8 2020

31.2 An extinguisher charged to its rated capacity at 21 ±3°C (70 ±5°F) is to be held in a vertical position, with the discharge nozzle in the horizontal position approximately 0.9 m (3 ft) from the floor or the ground. The extinguisher then is to be discharged, and the duration to gas point and amount of agent solution discharged recorded.

31.3 When the gas point is not readily determined in the test specified in 31.2, an extinguisher charged with its rated capacity of agent solution and expellant gas is to be discharged into a container for the minimum required effective duration specified in the Standard for Rating and Fire Testing of Fire Extinguishers, ANSI/UL 711/CAN/ULC-S508, for the appropriate Class A or Class B rating, and then discharged elsewhere for the remainder of the discharge. The weight of agent solution discharged into the container shall be not greater than 95 percent of the total amount discharged.

32 Rate of Flow Test

32.1 An extinguisher shall be discharged to determine the rate of flow at 21 ±3°C (70 ±5°F) and shall be consistent, as evidenced by the results of three consecutive tests not varying more than 10 percent from their mean value.

32.2 An extinguisher charged with its rated capacity is to be discharged for a period of two-thirds of its average duration at 21 ±3°C (70 ±5°F), rounded to the nearest second, with the nozzle held in a horizontal position. The rate of flow is to be calculated from the loss in weight during discharge. This test is to be used for identification and countercheck purposes with the rate of flow established as ±10 percent of the mean of the three tests conducted.

33 Discharge Range Test

33.1 The initial discharge of agent solution from an extinguisher conditioned at 21° ±3°C (70° ±5°F) shall be such that the initial discharge of agent solution shall fall at a distance of not less than 3.0 m (10 ft) from the nozzle, and a minimum of 50 percent of agent solution shall fall a distance of not less than 1.5 m (5 ft) from the nozzle.

Exception: An extinguisher having a capacity under 2.3 kg (5 lb) of agent solution shall discharge initially to a distance of not less than 1.5 m (5 ft) from the nozzle and a minimum of 90 percent of the discharged agent solution shall be effectively discharged beyond a point 0.9 m (3 ft) from the nozzle.

33.2 These characteristics are to be based on the operation of an extinguisher charged with its rated capacity with the discharge nozzle held in a horizontal position at a height of 0.9 m (3 ft) from the floor or ground.

34 Intermittent Discharge Test

34.1 An extinguisher shall discharge a minimum 85 percent (by mass) of its rated capacity of agent solution when conditioned at its minimum storage and use temperature, 21 ±3°C (70 ±5°F) and 49 ±3°C (120 ±5°F), and shall operate in such a manner that not more than 1 second elapses from the time the discharge valve is opened until the agent solution starts to discharge.

34.2 An extinguisher charged with its rated capacity and conditioned at each of the temperatures specified in 34.1 for a minimum of 16 hours is to be operated intermittently by opening and closing the discharge valve in cycles of 2 seconds "open" and 2 seconds "closed" until the end of discharge is reached. For a wheeled extinguisher, the cycles are to be 5 seconds "open" and 5 seconds "closed."

ULNORM.COM : Click to view the full PDF of UL 8 2020

35 Operating Temperature Limits Test

35.1 An extinguisher shall discharge a minimum 95 percent (by mass) of its rated capacity of agent solution when conditioned for at least 16 hours at the minimum storage and use temperature and 49 ±3°C (120 ±5°F).

35.2 An extinguisher charged with its rated capacity and conditioned at the temperatures specified in 35.1 for a minimum of 16 hours is to be discharged in its intended operating position. The extinguishers are to be operated with the nozzle held in a horizontal position at a height of 0.9 m (3 ft) from the floor or ground.

36 Temperature Cycling Test

36.1 An extinguisher shall discharge a minimum 90 percent (by mass) of its rated capacity of agent solution when alternately conditioned at the minimum storage and use temperature and at 49 ±3°C (120 ±5°F).

36.2 An extinguisher charged with its rated capacity is to be conditioned at the minimum storage and use temperature for 24 hours, then conditioned at 49 ±3° C (120 ±5° F) for 24 hours, and then again at the minimum storage and use temperature for 24 hours. The extinguisher is then to be conditioned at 21 ±3°C (70 ±5°F) for 24 hours, after which it is to be discharged and the amount of agent solution discharged is to be calculated.

37 30-Day Elevated Temperature Test

37.1 An extinguisher shall discharge a minimum 90 percent (by mass) of its rated capacity of the agent solution when conditioned at 49 ±3°C (120 ±5°F) for 30 days.

37.2 An extinguisher charged with its rated capacity and conditioned at the temperature specified in 37.1 for 30 days is to be discharged when removed from the conditioning temperature. It is to be removed from the oven and operated with as little delay as possible and not to exceed 1 minute. It then is to be reweighed and the amount of agent solution discharged is to be calculated.

38 High-Temperature Exposure Test

38.1 An extinguisher shall retain its parts, without rupture, during conditioning. The extinguisher is not required to operate.

38.2 An extinguisher charged with its rated capacity shall be conditioned for 7 days at 79 ±3° C (175 ±5°F).

39 Abnormal Operation Test

39.1 A cartridge operated extinguisher shall discharge not less than 75 percent of its rated capacity at 21 ±3°C (70 ±5°F) and operated without pressure build-up before discharge of the agent is initiated.

39.2 A cylinder operated wheeled unit, in addition to meeting the requirements in the Discharge Duration Test, Clause 31, shall discharge not less that 75 percent of its rated capacity at 21 ±3° C (70 ±5° F) and operated without a pressure build up and with the hose in the stored position.

ULNORM.COM : Click to view the full PDF of UL 8 2020

40 Hydrostatic Pressure Test

40.1 Cylinders

40.1.1 An extinguisher cylinder shall withstand for 1 minute, without rupture, a pressure of twice the proof test pressure as specified in 40.1.2 (a), (b), (c), (d), or (e).

40.1.2 The proof test pressure is to be determined as follows:

a) For a hand-portable extinguisher that uses a separate expellant gas cartridge, the proof test pressure shall be:

1) Three times the maximum pressure developed in the cylinder when operated under closed nozzle conditions after being charged with its rated capacity of agent solution and expellant gas and at 21°C (70°F), or

2) One and one-half times the maximum closed nozzle pressure developed when charged as above and at 49°C (120°F), whichever is greater.

b) For a hand-portable extinguisher that uses a single chamber for both the agent solution and expellant gas, the proof test pressure shall be three times the intended charging pressure at 21°C (70°F) except as provided in (c).

c) For cylinders that are tested and marked in accordance with the specifications for shipping containers of the DOT or TDGR, the proof test pressure shall be as specified in the applicable DOT or TDGR specification.

d) For extinguishers of the wheeled type, the proof test pressure shall be twice the intended charging pressure at 21°C (70°F), or twice the maximum pressure developed in the cylinder when operated under closed-nozzle conditions, for cartridge operated extinguishers. For this determination, the extinguisher is to be charged with its rated capacity of agent solution and expellant gas and at 21°C (70°F).

e) The minimum proof pressure shall be twice the charging pressure or 800 kPa (120 psig), whichever is greater.

40.1.3 A non-metallic cylinder for a wheeled extinguisher shall withstand for 1 minute, without rupture, a pressure of six times its intended charging pressure at 21°C (70°F) for stored-pressure extinguishers, or the maximum pressure developed in the cylinder when operated under closed-nozzle conditions, or whichever is greater.

40.1.4 There shall be no permanent volumetric expansion in excess of 10 percent of the total expansion of the cylinder of an extinguisher when the extinguisher is pressurized to the proof test pressure as specified in 40.1.2 (a), (b), (c), (d), or (e) for 30 seconds, after which the pressure then is to be released. For cylinders that have been proof pressure tested, the test pressure is to be increased by 10 percent.

40.1.5 When an extinguisher cylinder, tested to rupture (see 40.5.3), fractures along circumferential joints between the top or bottom dome and the side sheet, or at the collar or collar joint or at the point of attachment of elbows or discharge fittings, the rupture pressure shall be a minimum eight times the operating pressure at 21°C (70°F). Fractures passing through welds but parallel to the longitudinal axis of the cylinder are to be evaluated according to the requirements specified in 40.1.1. For the purposes of this requirement the heat affected zone is considered to be a part of the weld.

40.1.6 The flat dome or bottom of a cylinder shall withstand for 1 minute, without rupture, an internal pressure of eight times its intended charging pressure at 21° C (70° F). During this test, the cylinder

ULNORM.COM : Click to view the full PDF of UL 8 2020

sidewall shall be restrained with a close fitting steel sleeve or similar device to prevent rupture of the sidewall.

40.1.7 Extinguishers submitted for a marine type classification shall have a minimum burst pressure of five times the rated working pressure at 21°C (70°F).

40.2 Discharge valves, caps, and closures

40.2.1 A discharge valve assembly, cap, or closure shall withstand, without leakage, the hydrostatic test specified in 40.1.2 (hand portable extinguisher) or 40.1.3 (wheeled extinguisher), whichever is applicable. Caps and closures shall withstand, without rupture, the Hydrostatic Pressure Test in 40.1.1 or 40.1.3, whichever is applicable. In addition, no parts shall be thrown from the valve assembly at a pressure less than eight times the maximum operating pressure at 21°C (70°F).

40.3 Hose assemblies

40.3.1 A hose assembly provided with a shutoff nozzle shall withstand for 1 minute, without leakage, a hydrostatic pressure of:

a) Three times the pressure developed in the extinguisher when operated under closed-nozzle conditions after being charged with its rated capacity and at 21°C (70°F); or

b) 4100 kPa (600 psig), whichever is lower.

40.3.2 A hose assembly that is not provided with a shutoff nozzle shall withstand for 1 minute, without leakage, a hydrostatic pressure equal to two times the operating pressure of the extinguisher at 21° C (70°F).

40.4 Gas cartridges

40.4.1 A gas cartridge exempt from DOT or TDGR requirements because of size and capacity shall not leak when subjected for 30 seconds to the applicable hydrostatic test pressure specified in either (a)(1) or (b)(1). In addition, the gas cartridge shall not rupture at less than the applicable hydrostatic test pressure specified in (a)(2) or (b)(2).

a) For a cartridge having a pressure relief device intended to rupture at pressures from 18.3 to 20.7 MPa (2650 to 3000 psig):

1) 20.7 MPa (3000 psig) leakage test pressure.

2) 41.4 MPa (6000 psig) rupture test pressure.

b) For a cartridge having a pressure relief device intended to rupture at pressures from 27.9 to 31 MPa (4050 to 4500 psig):

1) 31 MPa (4500 psig) leakage test pressure.

2) 41.1 MPa (6000 psig) rupture test pressure.

40.5 Test method

40.5.1 The extinguisher is to be completely filled with water and tested with its own discharge valve or adaptor threaded in place. All air is to be expelled from the test sample before the pressure is applied.

ULNORM.COM : Click to view the full PDF of UL 8 2020

40.5.2 The apparatus for these tests is to consist of a hand- or motor-operated hydraulic pump that produces the required test pressure, a test cage that contains the extinguisher and its parts in the event that parts are thrown off, required valves and fittings for attachment to the test sample, and the required valves and fittings for regulating and maintaining the specified test pressure.

40.5.3 The pressure is to be increased at a rate of approximately 2000 kPa (300 psig) per minute until the test pressure is obtained. This pressure then is to be held for the time specified. The pressure then is to be increased until the cylinder ruptures.

40.5.4 To determine compliance with the requirements specified in 40.1.4, the water jacket test apparatus is to be used. The test is to be conducted in accordance with Methods for Hydrostatic Testing of Compressed Gas Cylinders, CGA C-1.

41 Vibration Test

41.1 General

41.1.1 A hand-portable extinguisher with its rated capacity and mounted in its bracket or in a standard mounting fixture shall withstand the variable frequency and endurance tests specified in 41.1.3 – 41.5.1 without:

a) Becoming inoperable;

b) Causing a risk of injury to persons;

c) Dislodgment of the siphon tube; and

d) Incurring damage to the side handle, hanger loop, or means of attachment that impairs their intended use.

41.1.2 Physical deterioration of components that requires repair or replacement of the extinguisher, components, or bracket before they are able to be returned to service does not meet the intent of the requirement. For example, broken welds in the cylinder, malfunctions of operating parts, or abrading or scoring of the cylinder in excess of 10 percent of the minimum calculated wall thickness do not meet the intent of this requirement.

41.1.3 Following the vibration test, the extinguisher shall discharge a minimum of 95 percent of its rated capacity of agent solution at 21 ±3°C (70 ±5°F). When there are visible signs of damage or deterioration of the valve or cylinder, the extinguisher shall be subjected to and comply with the requirements of 40.1.1, 40.1.5 and 40.2.1.

41.1.4 For these tests, amplitude is defined as the maximum displacement of sinusoidal motion from position of rest or one-half of the total table displacement. Resonance is defined as the maximum magnification of the applied vibration.

41.2 Mounting of test sample

41.2.1 A representative sample extinguisher charged with its rated capacity is to be mounted in a standard mounting fixture that has been secured to the test fixture of the vibration test apparatus in a vertical position. When the extinguisher is for marine type use, the extinguisher is to be mounted using the bracket specified for use with the extinguisher.

ULNORM.COM : Click to view the full PDF of UL 8 2020

41.3 Test orientation

41.3.1 The extinguisher is to be subjected to variable frequency and endurance tests in each of the three rectilinear orientation axes, horizontal, lateral, and vertical. Both variable frequency and endurance tests are to be completed in one plane of vibration before the sample is tested in another plane.

41.4 Variable frequency test

41.4.1 The extinguisher is to be vibrated from 10 to 60 hertz in discrete frequency intervals of 2 hertz at the displacement indicated in Table 1. The vibration at each frequency is to be maintained for 5 minutes.

41.5 Endurance test

41.5.1 The extinguisher is to be vibrated for 2 hours at the frequency that produced maximum resonance as determined in the variable frequency test or, when no resonance is observed in the variable frequency test, at a frequency of 60 hertz. The table displacement is to be as specified in Table 1.

42 Roadability and Rough Usage Tests

42.1 Roadability

42.1.1 After being towed for 8 km (5 mi) at the rate of 8 to 13 km/h (5 to 7 mph) over concrete, macadam, or gravel roads or a combination thereof, a wheeled extinguisher shall comply with the following:

a) A minimum 90 percent (by mass) of the rated capacity of the extinguisher shall be able to be discharged as intended;

b) The wheels, axles, and carriage assembly shall not be damaged to the extent of impairing mobility by one person;

c) No weld shall be broken; and

d) The siphon tube shall not become dislodged.

42.1.2 After being dropped three times onto a concrete surface from a 305 mm (12 in) high platform so as to land on the wheels; pulled at 8 km/h (5 mph) during which one wheel strikes a vertical wall of concrete, steel, or brick; and pushed over so as to land on the bumper, a wheeled extinguisher shall comply with the following:

a) The extinguisher shall not be damaged;

b) No weld shall be broken;

c) The mobility of the extinguisher shall not be impaired; and

d) The siphon tube shall not become dislodged.

42.1.3 The nozzle of a wheeled extinguisher, as attached to the hose, shall function as intended after being dropped three times onto a concrete surface from a height of 0.9 m (3 ft). The assembly is to be dropped in a random manner so that no effort results in any part of the nozzle, such as the tip or handle, to initially strike the concrete surface.

ULNORM.COM : Click to view the full PDF of UL 8 2020

42.2 Rough usage

42.2.1 A hand-portable extinguisher charged with its rated capacity shall comply with the requirements specified in (a) and (b) below after being dropped three times onto a concrete surface as specified in 42.2.2:

a) The extinguisher shall not rupture.

b) The extinguisher shall comply with the requirements specified in 40.1.1, except that the test pressure is to be equal to the rated charging or maximum operating pressure.

42.2.2 Sample hand-portable extinguishers are to be charged with their rated capacity. A sample is to be tested with the locking device disengaged, and another sample is to be tested with the locking device engaged. When polymeric materials are to be tested, sample extinguishers are to be conditioned to the minimum use temperature and to 49°C (120°F) for 24 hours immediately prior to the test. The distance of the drop is to be measured from the concrete surface to the bottommost part of the extinguisher. For extinguishers having an overall height of 609 mm (2 ft) or less, the drop distance is to be 0.9 m (3 ft). For extinguishers having an overall height of more than 609 mm (2 ft), the drop distance is to be 609 mm (2 ft). For the first test, each extinguisher is to be held in the upright position and dropped. For the second test, each extinguisher is to be held in the horizontal position and dropped. The orientation of the extinguisher is dependent on the extinguisher design. Each extinguisher is to be positioned to impact on the weakest point. For the third test, each extinguisher is to be held upside down and dropped.

42.3 Rough usage – operation

42.3.1 A hand-portable extinguisher, charged as intended, shall comply with (a) – (d) below after being dropped once onto a concrete surface as specified in 42.3.2. After the drop test:

a) The indicated pressure loss shall not exceed 10 percent;

b) The locking device shall disengage when subjected to a force not exceeding 178 N (40 lb-f);

c) The extinguisher shall actuate as intended to accomplish discharge; and

d) Parts of the extinguisher shall not be damaged to the extent that impairs intended use.

42.3.2 Sample hand-portable extinguishers are to be charged with their rated capacity. The test procedure is to be similar to that described in 42.2.2, except that the inverted drop test is to be omitted and the locking device is to be engaged. When polymeric materials are to be tested, sample extinguishers including any polymeric parts are to be conditioned to the minimum storage and use temperature and to 49°C (120°F) for 24 hours immediately prior to the test. Conditioning is to be conducted after air oven aging and after light and water exposure. Each sample is to be subjected to only one drop, and a different sample is to be used for each test. After each drop, the locking device of the extinguisher is to be removed. Each extinguisher shall be subjected to and shall comply with the results obtained in the Discharge Duration Test, Clause 31, and Discharge Range Test, Clause 33.

43 Siphon Tube Attachment Test – Polymeric Materials

43.1 General

43.1.1 Following the exposure tests in 43.1.2, and the Vibration Test in Clause 41, sample extinguishers shall be capable of retaining the integrity of the siphon tube attachment to the valve assembly as indicated by discharge in the intended manner in accordance with 41.1.3.

ULNORM.COM : Click to view the full PDF of UL 8 2020

Exception: Extinguishers conditioned at the exposure at 60°C in accordance with 43.1.2, that did not retain operating pressure after the exposure, shall be permitted to be re-pressurized before and after the Vibration Test. If these extinguishers cannot be re-pressurized, they shall be examined in accordance with 43.3.3.

43.1.2 Twenty-four charged hand-portable extinguishers are to be divided into six groups. Three groups are to be conditioned in a vertical position at temperatures of 21, 49, and 60 ±3°C (70, 120, and 140 ±5°F), respectively, for 30 days. The remaining three groups are to be conditioned in a horizontal position at 21, 49, and 60 ±3°C (70, 120, and 140 ±5°F), respectively, for 90 days. After conditioning, all extinguishers are to be cooled.

43.2 Press-fit type siphon tube assemblies

43.2.1 For extinguishers having a press-fit type siphon tube assembly, two samples from each of the six groups then are to be inverted, depressurized, and cut open to allow removal of the siphon tube assemblies. Pull strength tests then are to be conducted on each siphon tube in accordance with the Standard Test Method for Tensile Properties of Plastics, ANSI/ASTM D638, with the test machine crosshead speed set at 0.021 mm/s (0.5 in/min).

43.2.2 The siphon tube strength data derived from the tests specified in 43.2.1 is to be used to determine the "most severe condition" combination of time and temperature, as evidenced by the lowest pull strength. Two extinguishers from those remaining that have not been cut open, and that have the most severe condition combination of time and temperature determined as specified in 43.1.2 or 43.2.1 then are to be subjected to the Vibration Test, Clause 41.

43.3 Threaded siphon tube assemblies

43.3.1 For extinguishers having threaded siphon tube assemblies, two samples from each of the six groups are to be inverted, depressurized, and disassembled and the siphon tube and adapter are to be visually examined for signs of cracking or other deterioration.

43.3.2 The siphon tube examination specified in 43.2.2 is to be used to determine the "most severe condition" combination of time and temperature, as evidenced by cracking or other deterioration. Two extinguishers from those remaining that have not been disassembled, and that have the most severe condition combination of time and temperature determined as specified in 43.1.2 are to be subjected to the Vibration Test, Clause 41.

43.3.3 Extinguishers that did not retain operating pressure after the exposure at 60°C in accordance with 43.1.2 and cannot be re-pressurized shall be permitted to be disassembled and visually examined to verify retention of the attachment of the siphon tube to valve assembly.

44 Aging Tests – Polymeric Materials

44.1 General

44.1.1 There shall be no cracking of a polymeric valve, valve part, gauge/indicator components, container, or bracket after air-oven aging for 180 days at 100 ±3°C (212 ±5°F). Aged samples of the valve, valve part, bracket, or container shall perform as intended, when tested in accordance with 42.3.1 and 40.2.1 (valves); Burst strength test – gauges and indicators, Clause 52 (gauge components intended to be pressurized); 41.1.1 and Clause 29 (brackets); or the Hydrostatic pressure test, Clause 40 (containers). See 44.1.4 – 44.2.2.

44.1.2 There shall be no cracking of a polymeric siphon tube after air-oven aging for 90 days at 100 ±3°C (212 ±5° F). Aged samples of the siphon tube shall perform as intended, when installed in test

ULNORM.COM : Click to view the full PDF of UL 8 2020

extinguishers and tested in accordance with 42.3.1. Ring samples cut from the aged tube shall not exhibit a degradation in excess of 40 percent of the original tensile or ring crushing strength values. See 44.1.4.

44.1.3 When polymeric parts are attached to other polymeric or nonpolymeric parts or assemblies, the securement of the parts shall remain as intended after air-oven aging.

44.1.4 To determine the degradation of a polymeric material used in a siphon tube, ring samples 13 mm (1/2 in) wide are to be cut from the tube and subjected to air-oven aging. See 44.1.5. The ring samples then are to be subjected to a crush test between parallel flat plates using a machine capable of applying a compression load at a uniform rate of 5 mm (0.2 in) per minute and recording the load applied as a function of the deflection. The test is also to be conducted on as-received parts of identical size for comparative purposes. When the nature of the material is such that meaningful test results are not obtained, other tests, such as tension tests of the rings are to be conducted.

44.1.5 The polymeric valve, valve parts including discharge hose assembly and nozzle, bracket, and siphon tube samples to be aged are to be supported in a full-draft, circulating-air oven that has been preheated at full draft to 100 ±1°C (212 ±2°F). Samples are not to touch one another or the sides of the oven. The samples of the polymeric valve, valve parts including discharge hose assembly and nozzle, and the bracket are to be aged for 180 days and the siphon tube is aged for 90 days at full draft and then allowed to cool in air at 21 ±2°C (70 ±4°F) for at least 24 hours before conducting any test or dimensional check. As used in this test, the term "full draft" refers to the oven being used with inlet and outlet vents open and the air vent damper control at a maximum setting so as to provide 250 to 350 air changes per hour.

44.1.6 As an alternate to the air-oven aging tests specified in 44.1.1 and 44.1.2, an air-oven aging test at a lower temperature for a longer period of time is able to be used. The equivalent time-temperature for 180 days at 100 ±3°C (212 ±5°F) is to be 430 days at 87 ±3°C (189 ±5°F). The equivalent time-temperature for 90 days at 100 ±3°C (212 ±5°F) is to be 210 days at 87 ±3°C (189 ±5°F).

44.2 Exposure to extinguishing agent test

44.2.1 Polymeric siphon tubes that have been partially immersed in the agent solution with which they are to be used for 210 days at 87 ±3° C (189 ±5° F) shall perform as intended, when installed in test extinguishers that are then subjected to the test described in 42.3.1. Ring samples cut from the tube, and completely immersed in the agent solution with which they are to be used for 210 days at 87 ±3°C (189 ±5° F), shall not exhibit degradation in excess of 40 percent of the original tensile or ring crushing strength values. See 44.2.2.

44.2.2 Complete siphon tubes are to be partially immersed in the agent solution with which they are to be used, and ring samples, 13 mm (1/2 in) wide, cut from as-received siphon tubes are to be totally immersed in the agent solution. The samples are not to touch each other or the container holding the agent solution and samples. The container of agent solution, with the samples in place, is to be loosely capped and placed in a preheated oven at 87 ±3°C (189 ±5°F) for 210 days. After the test exposure, the samples are to cool in air at 21 ±2°C (70 ±4°F) for at least 24 hours before any tests or dimensional measurements are conducted. The ring samples then are to be subjected to a crush test between two parallel flat plates using a testing machine capable of applying a compressive load at a uniform rate of 5 mm (0.2 in) per minute and recording the load versus the deflection. When the nature of the material is such that meaningful test results are not able to be obtained, other tests, such as tensile tests, are to be conducted.

44.3 Light and water test

44.3.1 There shall be no cracking of a polymeric valve, valve parts, gauge/ indicator components, cylinders, or bracket following exposure to ultraviolet light and water for 720 hours. Aged samples of the valve or valve part or bracket shall perform as intended when tested as specified in the Handle and

ULNORM.COM : Click to view the full PDF of UL 8 2020

Mounting Device Test, Clause 29; the Hydrostatic Pressure Test, Clause 40; the Vibration Test, Clause 41; the Roadability and Rough Usage Test, Clause 42; and the Burst Strength Test, Clause 52, as applicable.

44.3.2 The ultraviolet light is to be obtained from two stationary enclosed carbon-arc lamps. The arc of each lamp is to be formed between two vertical carbon electrodes, 12.7 mm (1/2 in) in diameter, located at the center of a revolvable vertical metal cylinder, 787 mm (31 in) in diameter and 450 mm (17-3/4 in) in height. Each arc is to be enclosed with a No. 9200-PX clear Pyrex glass globe. The samples are to be mounted vertically on the inside of the revolvable cylinder, facing the lamps, and the cylinder continuously revolved around the stationary lamps at one revolution per minute. A system of nozzles is to be provided so that each sample, in turn, is sprayed with water as the cylinder revolves. During each operating cycle (total of 20 minutes) each sample is to be exposed to the light and water spray for 3 minutes and to the light only for 17 minutes. The air temperature within the revolving cylinder of the apparatus during operation is to be 63 ±5°C (145 ±9°F).

44.3.3 An alternate ultraviolet light exposure is obtainable in accordance with ASTM D2565, Standard Practice for Operating Xenon Arc-Type (Water-Cooled) Light-Exposure Apparatus With and Without Water for Exposure of Plastics. The source of radiation is to be a 6500 Watt, water-cooled xenon-arc lamp with borosilicate inner and outer optical filters. The wattage to the lamp is automatically controlled to provide spectral irradiance of 0.35 W/m^2 at 340 nm. The samples are mounted vertically on the inside of a 965 mm (38 in) diameter cylinder, facing the arc, and the cylinder is rotated about the arc at one revolution per minute. During each operating cycle of 120 minutes, each sample is exposed to light for 102 minutes and to light and water spray for 18 minutes. The black-panel temperature during the dry portion of the light-on cycle is regulated to 63 ±5°C (145 ±9°F).

ULNORM.COM : Click to view the full PDF of UL 8 2020

45 Elastomeric Parts Test

45.1 An elastomeric part used to provide a seal for a rechargeable (refillable) fire extinguisher shall have the following properties when tested as specified in the Standard for Gaskets and Seals, UL 157:

a) For silicone rubber (having poly-organo-siloxane as its constituent characteristic), a minimum tensile strength of 3400 kPa (500 psi) and a minimum ultimate elongation of 100 percent.

b) For fluoroelastomers, a minimum tensile strength of 6900 kPa (1000 psi) and a minimum ultimate elongation of 150 percent.

c) For natural rubber and synthetic rubber other than silicone rubber or fluoroelastomers, a minimum tensile strength of 8300 kPa (1200 psi) and minimum ultimate elongation of 150 percent.

d) Those properties relating to maximum tensile set; minimum tensile strength and elongation after oven aging; and hardness after oven aging, as specified in UL 157. The maximum service temperature used to determine the oven time and temperature for oven aging is considered to be 60°C (140°F).

45.1.1 An elastomeric part used to provide a seal for a disposable (nonrechargeable) fire extinguisher shall have the following properties when tested as specified in the Standard for Gaskets and Seals, UL 157:

a) For silicone rubber (having poly-organo-siloxane as its constituent characteristic), a minimum tensile strength of 3400 kPa (500 psi) and a minimum ultimate elongation of 100 percent.

b) For fluoroelastomers, a minimum tensile strength of 6900 kPa (1000 psi) and a minimum ultimate elongation of 100 percent.

c) For natural rubber and synthetic rubber other than silicone rubber or fluoroelastomers, a minimum tensile strength of 8300 kPa (1200 psi) and minimum ultimate elongation of 100 percent.

d) Those properties relating to maximum tensile set; minimum tensile strength and elongation after oven aging; and hardness after oven aging, as specified in UL 157. The maximum service temperature used to determine the oven time and temperature for oven aging is considered to be 60°C (140°F).

45.2 The Standard for Gaskets and Seals, UL 157, provides for the testing of either finished elastomeric parts or sheet or slab material. Sheet or slab material is to be tested when the elastomeric parts are O-rings having diameter of less than 25.4 mm (1 in). The material tested is to be the same as that used in the product, regardless of whether finished elastomeric parts or sheet or slab material is used.

46 Salt Spray Corrosion Test

46.1 All parts of an extinguisher, including the finishes on coated or painted parts, the assemblies of moving parts, the nameplates as secured in place, and brackets or mounting hooks, when provided, shall be subjected to a 240 hour salt spray exposure as described in 46.3 and 46.4, and after exposure shall comply with the following:

a) The extinguisher shall operate and recharge as intended.

b) Any corrosion-resistant coating (such as paint) shall remain intact and shall adhere to the surface so as not to be removable (when such removal exposes a material subject to corrosion) by such action as washing or rubbing with a thumb or fingernail.

c) Dissimilar metals in contact or close proximity with one another shall be provided with a corrosion protection system, so that there is no evidence of galvanic corrosion.

d) The extinguisher and its bracket or mounting hook having no protective coating and paint, when provided, shall not show evidence of pitting, flaking, chipping, spalling, or similar destruction of metal surfaces.

e) The gauge or indicator on a stored-pressure extinguisher shall remain watertight throughout the test.

46.2 Extinguishers with stainless steel cylinders, intended for USCG approval, shall comply with the requirements in 46.1 and be subjected to a duration of 1,000 hour salt spray exposure.

46.3 The test samples are to be supported vertically and exposed to salt spray (fog) as specified by the Standard Practice for Operating Salt Spray (Fog) Testing Apparatus, ASTM B117. The apparatus used for salt spray exposure is to consist of a fog chamber of a size and shape that results in the atomization and quantity of collected solution within the limits of ASTM B117, having a salt solution reservoir, a supply of conditioned compressed air, a dispersing tower for producing a salt fog, specimen supports, provision for heating the chamber, and means of control. The dispersion tower is to be located in the center of the chamber and is to be supplied with salt solution and with warmed, humidified air at a pressure of 120 to 130 kPa (17 to 19 psi), to disperse the salt solution in the form of a fine mist or fog throughout the interior of the chamber. The temperature within the chamber is to be maintained between 33 and 36°C (92 and 97°F). Condensate accumulation on the cover of the chamber shall not drop on the test specimens, and drops of the solution that fall from the specimens are not to be recirculated and are to be removed through a drain located in the floor of the chamber.

46.4 The salt solution is to consist of 20 percent (by mass) of common salt (sodium chloride) and distilled water. The pH value of this solution as collected after spraying in the test apparatus is to be between 6.5 and 7.2, and the specific gravity between 1.126 and 1.157 at 35°C (95°F).

ULNORM.COM : Click to view the full PDF of UL 8 2020

47 10-Day Moist Ammonia Air Stress Cracking Test

47.1 After being subjected to the conditions described in 47.2 – 47.4, a brass part containing more than 15 percent zinc shall show no evidence of cracking when examined using 25X magnification.

Exception: Cracking is not prohibited when the cracking does not impact the ability of the product to comply with the requirements of this standard.

47.2 Each test sample is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Such stresses are to be applied to the sample prior to and maintained during the test. Samples with threads, intended to be used for installing the product in the field, are to have the threads engaged and tightened to the torque specified in Table 2. Teflon tape or pipe compound are not to be used on the threads.

47.3 Three samples are to be degreased and then continuously exposed in a set position for ten days to a moist ammonia-air mixture maintained in a glass chamber approximately 300 by 300 by 300 mm (12 by 12 by 12 in) having a glass cover.

47.4 Approximately 600 mL (0.15 gal) of aqueous ammonia having a specific gravity of 0.94 is to be maintained at the bottom of the glass chamber below the samples. The samples are to be positioned 38 mm (1-1/2 in) above the aqueous ammonia solution and supported by an inert tray. The moist ammonia-air mixture in the chamber is to be maintained at atmospheric pressure and at a temperature of 34 ±2°C (93 ±4°F).

48 Agent Exposure Test

48.1 Disposable (nonrechargeable) fire extinguishers

48.1.1 Three groups, each of eight fully charged and pressurized extinguishers, are to be conditioned at temperatures of 21 and 49 ±3°C (70 and 120 ±5°F) for 1 year, and 60 ±3°C (140 ±5°F) for 6 months, respectively. Half of the samples of each group are to be placed on their sides (horizontal).

48.1.2 After conditioning, the rupture pressures shall be not less than two times the proof test pressure when four extinguishers (two upright and two horizontally conditioned samples) from each group are subjected to the Hydrostatic Pressure Test, Clause 40.

48.1.3 There shall be no evidence of corrosion or pitting when the remaining extinguishers from each group are visually examined.

48.2 Rechargeable (refillable) fire extinguishers

48.2.1 Cylinder and/or metallic siphon tube specimens are to be exposed to the agent solution for 120 days at a temperature of 70 ±3°C (158 ±5°F). After the exposure specified in 48.2.2, the coated specimens are to be aged in an air oven at 100 ±3°C (212 ±5°F) for 180 days.

48.2.2 A total of 100 specimens, each 76 by 127 mm (3 by 5 in), are to be cut from extinguisher cylinders. If the extinguisher cylinders incorporate welds, 50 of the specimens are to include welds. When the extinguisher incorporates a metallic siphon tube, 50 specimens of the tube, each 152 mm (6 in) long, are to be cut. One-half the specimens are to be fully immersed and the other half partially immersed in the agent solution specified for the extinguisher. When a coating is used, all samples are to be coated with the nominal amount of coating and dried in accordance with the manufacturer's specifications. The coating is to be scored to the base metal over the full length of the specimen.

ULNORM.COM : Click to view the full PDF of UL 8 2020

48.2.3 Following the conditioning specified in 48.2.1 and 48.2.2:

a) There shall be no cracking, blistering, softening, or other signs of deterioration of the coated specimens, as evidenced by macroscopic and microscopic examination;

b) There shall be no more than a 10 percent loss of the minimum specified metallic wall thickness; and

c) There shall be no cracking, blistering, softening, or peeling of the coating.

49 Servicing Tests

49.1 After 30 recharging cycles as described in 49.2, a rechargeable extinguisher charged with its rated capacity shall retain its charge during a 24-hour conditioning cycle at minimum storage and use temperature and then shall comply with the requirements of the Discharge Duration Test, Clause 31, and the Hydrostatic Pressure Test, Clause 40. See 31.1 and 40.2.1.

49.2 During each cycle, the extinguisher is to be cleaned, filled with agent, pressurized or fitted with an expellant gas cartridge, and discharged according to the manufacturer's written instructions. The complete valve assembly, including discharge nozzle, stem, pressure gauge, and siphon tube assembly is to be disassembled during the first, tenth, twentieth, and thirtieth cycles, according to the manufacturer's written instructions. After the tenth cycle, an extinguisher having polymeric parts is to be subjected to the Aging Tests – Polymeric Materials, Clause 44, except that the test duration is to be reduced to 90 days at 100°C (212°F) for a valve and valve part, and 45 days at 100°C (212°F) for a siphon tube assembly.

50 One-Year Time Leakage Test

50.1 A stored-pressure type extinguisher shall retain its expellant-gas charge for 1 year at a temperature of 21 ±4°C (70 ±7°F).

50.2 Twelve sample extinguishers charged with their rated capacity are to be tested with six samples in a vertical position and six samples in a horizontal position and their pressure checked after 1, 3, 6, and 12 months. Any loss in pressure is an indication of leakage. When indicated, the leakage shall not exceed the rate when the pressure drops to the lower limit of the operable pressure range in 2 years. At least half of the samples are to be discharged and recharged at the 3 month and 6 month points during the 1-year test period.

50.3 A cartridge for an expellant-gas type extinguisher shall retain its charge, without leakage, for 1 year at a temperature of 21 ±4°C (70 ±7°F) and at a temperature of 49 ±2°C (120 ±3°F).

50.4 Twelve samples of the gas cartridge are to be weighed and stored at a temperature of 21 ±4°C (70 ±7°F) and six samples are to be weighed and stored at a temperature of 49 ±2°C (120 ±3°F). They are to be reweighed after 1, 3, 6, and 12 months.

51 Calibration Test – Gauges and Indicators

51.1 An indicator shall be accurate to within 4 percent of the charging pressure at the lower limit of the operable range.

51.2 The error of a pressure gauge at the indicated charging pressure and at the upper and lower limits of the operable range shall not exceed ±4 percent of the charging pressure. At the zero pressure mark the error shall not exceed plus 12, minus 0 percent of the charging pressure. At the maximum indicated pressure, the error shall not exceed ±15 percent of the charging pressure.

ULNORM.COM : Click to view the full PDF of UL 8 2020

51.3 The pressure gauge or indicator is to be installed on a deadweight gauge tester or on a piping apparatus with a master gauge that is accurate to within 1/4 of 1 percent. The pressurizing medium may be oil, water, nitrogen, or air, but all tests on a given type of gauge are to be conducted using the same medium. The pressure is to be applied to the gauge under test in uniform increments until the upper limit of the gauge is reached. The pressure then is to be reduced in the same increments until the zero point is reached. The pressure applied, the gauge or indicator reading, and net error are to be recorded for each increment in both the increasing and decreasing pressure conditions.

52 Burst Strength Test – Gauges and Indicators

52.1 A pressure gauge or indicator shall withstand, for 1 minute, without rupture, a pressure of six times the indicated charging pressure. In addition, if the bourdon tube or pressure-retaining assembly bursts at a pressure less than eight times the indicated charging pressure, no parts of the device shall be thrown.

52.2 The sample gauge or indicator is to be attached to a hydraulic pressure pump after all air has been excluded from the test system. The sample is to be placed in a test cage and the pressure applied at a rate of approximately 2000 kPa/min (300 psig/min) until the required test pressure is reached. The pressure is to be held for 1 minute, then increased until rupture occurs or eight times the indicated charging pressure is reached, whichever occurs first.

53 Water Resistance Test – Gauges and Indicators

53.1 A gauge or indicator for use on an extinguisher shall remain watertight:

a) After being immersed in 0.30 m (1 ft) of water for 2 hours

b) After being subjected to the Salt Spray Corrosion Test, Clause 46; and

c) When polymeric parts are used, after exposure to the Aging Tests – Polymeric Materials, Clause 44.

54 Leakage Test – Gauges and Indicators

54.1 A pressure gauge or indicator shall not leak at a rate in excess of 1 X 10^{-6} cc/s (6.1 X 10^{-8} in^3/s) when the gauge or indicator (including a press-to-test type indicator) is exposed to a pressure equivalent to the intended working pressure of the extinguisher at 21°C (70°F).

54.2 A leak detection apparatus and leak standard are to be used to verify compliance with the requirements specified in 54.1. The leak detection apparatus is to be capable of signaling, and the leak standard capable of generating, a leakage rate of 1 X 10^{-6} cc/s (6.1 X 10^{-8} in^3/s).

54.3 Twelve sample gauges or indicators, as applicable and without pressure relief devices for the type using such devices, are to be individually pressurized to a pressure equivalent to the intended working pressure of the extinguisher at 21°C (70°F). Each sample gauge or indicator, other than a press-to-test type indicator, is then to be subjected to a leak test by checking all pressurized components for leakage in order to verify compliance with the requirements in 54.1. Each press-to-test type indicator is to be tested for leakage by checking the opening sealed by the indicator for leakage. None of the samples shall exhibit leakage at a rate in excess of 1 X 10^{-6} cc/s (6.1 X 10^{-8} in^3/s).

55 Cycling Test – Pressure Indicators

55.1 An extinguisher with a press-to-test type pressure indicator shall not have a loss of pressure, as evidenced by a reduction of indicator pin length, after 300 cycles of pressure indicator operation.

ULNORM.COM : Click to view the full PDF of UL 8 2020

55.2 An extinguisher with a press-to-test type pressure indicator is to be charged with its rated capacity with nitrogen and extinguishing agent. The press-to-test indicator pin length is to be measured from the valve assembly to the top of the pin. The indicator is then to be pressed and released 75 times each week for four weeks, for a total of 300 cycles. Measurements of the indicator pin length are to be taken after each 75 cycles, to determine compliance with 55.1.

56 Vibration Test – Pressure Gauges and Indicators

56.1 A pressure gauge and indicator shall be capable of withstanding the Vibration Test, Clause 41, and shall comply with the Calibration Test – Gauges and Indicators, Clause 51, following the Vibration Test.

57 Overpressure Test – Gauges

57.1 The difference in readings of indicated charging pressure before and after a pressure gauge is subjected for 3 hours to a pressure of 110 percent of the indicated gauge capacity shall not exceed 4 percent of the indicated charging pressure.

57.2 Sample pressure gauges are to be subjected to the required test pressure for 3 hours. The pressure then is to be released and the gauges are to stand at zero pressure for 1 hour. The gauges then are to be subjected to the Calibration Test – Gauges and Indicators, Clause 51.

58 Impulse Test – Gauges

58.1 The difference in readings of indicated charging pressure before and after a pressure gauge used on a rechargeable extinguisher is subjected to 1000 cycles of pressure impulse shall not exceed 4 percent of the indicated charging pressure.

58.2 Sample pressure gauges are to be attached to a regulated source of pressure, either air, nitrogen, or water. The pressure then is to be varied from 0 to 125 percent of the indicated charging pressure, or from 0 to 60 percent of the gauge capacity, whichever is higher, and then back to 0 at a rate of six complete cycles each minute. The samples then are to be subjected to the Calibration Test – Gauges and Indicators, Clause 51.

59 Pressure Gauge Relief Test

59.1 The pressure relief of a bourdon tube type pressure gauge shall function at a pressure of 350 kPa (50 psig) or less within 24 hours. The minimum flow capacity of the pressure relief at 350 kPa (50 psig) shall be 1 liter per hour measured at 0 kPa (0 psig) and 25 ±4°C (77 ±7°F).

59.2 This test is to be conducted on pressure gauges with the bourdon tube cut completely through. The gauge is to be immersed under water with the gauge inlet connected to a regulated source of air or nitrogen. The supply pressure is to be maintained at 350 kPa (50 psig) until the pressure relief functions, or for 24 hours, whichever is shorter. The flow rate is to be measured with an inverted water column or other equivalent means.

60 Nameplate Exposure Tests

60.1 After being subjected to the exposures specified in 60.2 (b) – (f), when compared to the conditioned sample in 60.2(a), a nameplate shall remain intact, readable, and legible, and shall not exhibit cracking or curling at the edges.

60.2 Prior to the exposures specified in (a) – (f), sample pressure-sensitive type nameplates are to be applied to test surfaces representative of the surface employed in the intended application. Curvature of

ULNORM.COM : Click to view the full PDF of UL 8 2020

this surface is to have the minimum radius anticipated in application. Each of the exposures specified in (b) – (f) is to be preceded by that specified in (a).

a) 72 hours at 23 ±2°C (73 ±4°F) and 50 ±5 percent relative humidity.

b) 24 hours at minus 54 ±2°C (minus 65 ±4°F) or minus 40 ±2°C (minus 40 ±4°F), depending on intended use.

c) 6 weeks at 60 ±2°C (140 ±4°F) and 97 ±3 percent relative humidity.

d) 90 days air-oven aging (mechanical convection) at 87 ±1°C (189 ±2°F).

e) 720 hours in ultraviolet light and water. See 44.3.1.

f) 48 hours immersion in distilled water 23 ±2°C (73 ±4°F).

61 Nameplate Adhesion Test

61.1 A pressure-sensitive nameplate containing the model number and extinguisher classification shall have an average adhesion after a 72-hour exposure to air at 23 ±2°C (73 ±4°F) and 50 ±5 percent relative humidity of a minimum 0.18 N/mm (1 lb-f/in) of nameplate width. Following the exposures specified in 60.2 (c) – (f), the average adhesion shall be a minimum 0.09 N/mm (1/2 lb-f/in) of nameplate width. The nameplate shall not be removable intact, showing signs of tearing, deformation or destruction of printed information when removal is attempted by hand following exposure specified in 60.2(a).

61.2 Sample nameplates are to be affixed to test surfaces representative of the surface employed in the intended application. The surface is to have a curvature with the minimum radius anticipated in application. The samples then are to be subjected to each of the exposures specified in 60.2 (a) – (e). After the exposure, the samples are to be conditioned for not less than 24 hours at 23 ±2°C (73 ±4°F) and 50 ±5 percent relative humidity and the nameplate is to be pulled from the surface at an angle of 90 degrees to the surface and at a constant speed of 50 mm/min (2 in/min) by means of an Instron testing machine. The force to remove the nameplate is to be recorded. The results obtained from a minimum three samples subjected to each exposure are to be averaged.

62 Nameplate Abrasion Test

62.1 After being subjected to the exposure specified in 60.2 (a), a nameplate shall remain intact, readable, and legible after being subjected to 500 strokes of emery cloth and to 500 strokes of a cloth covered with household detergents or cleansers.

Exception: Overlaminated or subsurface printed nameplates are not required to be subjected to the 500 strokes of a cloth covered with household detergents or cleansers requirement.

62.2 The apparatus for this test is to consist of common household detergents and cleaners and medium emery cloth (number 2 grit or 100 mesh).

62.3 The extinguisher is to be laid on its side and a strip of medium emery cloth, 25 mm (1 in) wide and long enough to cover half of the circumference of the extinguisher plus 150 mm (6 in), is to be draped over the nameplate. Weights of 0.45 kg (1 lb) each are to be attached vertically to the ends of the emery cloth. The weights are to be alternately unbalanced by quickly lifting one, then the other. The tests using detergent and cleanser, with a cloth, are to be conducted similarly but with the following exceptions. The weights, 0.45 kg (1 lb) each, are to be attached to a belt, 50 mm (2 in) wide, and the belt is to be placed over a cloth folded to form a pad, 50 mm (2 in) wide by 200 mm (8 in) long. The pad is to be wetted, squeezed by one hand to a damp condition, the powdered cleanser is to be applied liberally, and any excess powder shaken off. The powdering procedure is to be repeated for each series of 25 strokes for the duration of the test.

ULNORM.COM : Click to view the full PDF of UL 8 2020

63 Antioverfill Tube Test

63.1 When the extinguisher cylinder with the antioverfill tube in place is filled to overflow, there shall be no drop of the water column in the antioverfill tube for 5 minutes.

PACKAGING

***Advisory Note**: In Canada, there are two official languages, English and French. The Annex B lists acceptable French translations of the markings specified in this standard. All markings required by this standard may have to be in other languages to conform with the language requirements where the product is to be used.*

64 General

64.1 Each hand-portable extinguisher shall be packaged. An extinguisher equipped with a flexible hose is able to be packaged with the hose and nozzle assembly detached from the extinguisher, and the hose and nozzle assembly shall be included in the same package with the extinguisher.

64.2 A bracket or mounting hook shall be packaged with each extinguisher.

Exception: An extinguisher weighing less than 1.4 kg (3 lb) and having a cylinder diameter of 76.2 mm (3 in) or less is not required to be supplied with either a mounting hook or bracket.

64.3 The package of an extinguisher with a USCG marine type classification shall state:

a) That the marine approval is valid only when the extinguisher is equipped with an approved marine type bracket; and

b) Whether or not the marine type bracket is included.

64.4 A wheeled extinguisher with a separate expellant gas cylinder is able to be shipped empty. The expellant gas cylinder shall be mounted in place. The agent solution charge and hose are able to be packaged separately.

64.5 An extinguisher that is packaged uncharged shall have a caution tag attached reading as follows:

"CAUTION: THIS EXTINGUISHER IS NOT CHARGED. Follow Instructions On the Nameplate For Charging."

This caution tag shall not be used as a record tag.

ULNORM.COM : Click to view the full PDF of UL 8 2020

MANUFACTURING AND PRODUCTION TESTS

65 General

65.1 The manufacturer shall provide the necessary production control, inspection, and tests. The program shall include at least the tests specified in 66.1.1 – 67.2.

65.2 Pressure gauges used are to be calibrated at least once each month.

66 Hydrostatic Pressure Test

66.1 Cylinders

66.1.1 The cylinder of each extinguisher shall withstand for 30 seconds, without leakage, the proof pressure as specified in 40.1.2 (a), (b), (c), (d), or (e) as applicable.

66.2 Non-DOT or Non-TDGR gas cartridges

66.2.1 The body of each gas cartridge exempt from the DOT or TDGR requirements shall not leak when subjected for 30 seconds to the applicable hydrostatic test pressure specified either in (a) or (b).

a) For a cartridge having a pressure relief device intended to rupture at pressures from 18.3 to 20.7 MPa (2650 to 3000 psig) – 20.7 MPa (3000 psig).

b) For a cartridge having a pressure relief device intended to rupture at pressures from 27.9 to 31 MPa (4050 and 4500 psig) – 31 MPa (4500 psig).

66.2.2 Two cartridges out of each lot of 500 shall be hydrostatically tested to rupture. The rupture pressure shall be a minimum 41 MPa (6000 psi) gauge.

66.2.3 The apparatus for these pressure tests is to consist of a hand- or motor-operated pump capable of producing the required test pressure, fittings for attachment to the test sample, a pressure gauge graduated in increments of at least 138 kPa (20 psig), and the valves, fittings, and similar devices, for regulating and maintaining the specified pressure.

66.3 Hoses and couplings

66.3.1 There shall be no leakage or permanent movement of a coupling when a hose that is to be used with a shutoff valve at the outlet end of the hose is subjected, with couplings attached, to a test pressure for 1 minute. The test pressure is to be 25 percent greater than the pressure developed in the extinguisher when it is operated under the closed-valve conditions after being charged with its rated capacity of agent solution and expellant gas and conditioned at 21°C (70°F).

66.3.2 There shall be no leakage or permanent movement of a coupling when the hose assembly for a stored pressure extinguisher is subjected for 1 minute to a pressure 25 percent greater than the operating pressure at 21°C (70°F).

67 Two-Year Leakage Test

67.1 Each complete stored-pressure type extinguisher, and cartridges for cartridge-operated types, is to be tested by the manufacturer and shall be free from leakage such that the rate of leakage maintains the pressure within the operable range for at least 2 years.

67.2 The test method employed to determine the rate of leakage is to be one that uses sensitive weighing techniques, water immersion, or other equally sensitive methods employing special leak detectors.

MARKING

***Advisory Note**: In Canada, there are two official languages, English and French. The Annex B lists acceptable French translations of the markings specified in this standard. All markings required by this standard may have to be in other languages to conform with the language requirements where the product is to be used.*

ULNORM.COM : Click to view the full PDF of UL 8 2020