



ULC Standards
Normes ULC



JOINT CANADA-UNITED STATES
NATIONAL STANDARD

STANDARD FOR SAFETY

ANSI/CAN/UL/ULC 2127, Inert Gas Clean Agent Extinguishing System Units



ANSI/UL 2127-2018



Standards Council of Canada
Conseil canadien des normes

UL COPYRIGHTED MATERIAL –

NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

SCC FOREWORD

National Standard of Canada

A National Standard of Canada is a standard developed by an SCC-accredited Standards Development Organization (SDO), and approved by the Standards Council of Canada (SCC), in accordance with SCC's *Requirements and Guidance-Accreditation for Standards Development Organizations*, and *Requirements and Guidance-Approval of National Standards of Canada Designation*. More information on National Standard requirements can be found at www.scc.ca. An SCC-approved standard reflects the consensus of a number of experts whose collective interests provide, to the greatest practicable extent, a balance of representation of affected stakeholders. National Standards of Canada are intended to make a significant and timely contribution to the Canadian interest.

SCC is a Crown corporation within the portfolio of Industry Canada. With the goal of enhancing Canada's economic competitiveness and social well-being, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts. Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at www.scc.ca.

Users should always obtain the latest edition of a National Standard of Canada from the standards development organization responsible for its publication, as these documents are subject to periodic review.

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



Documents

Document Sharing Hub

UL Standard for Safety for Inert Gas Clean Agent Extinguishing System Units, ANSI/CAN/UL/ULC 2127
Third Edition, Dated May 9, 2017

Summary of Topics

The Third Edition of the Standard for Safety for Inert Gas Clean Agent Extinguishing System Units, ANSI/CAN/UL/ULC 2127, has been issued to reflect the latest ANSI and SCC approval dates, include Annex B, and to incorporate the proposals dated September 15, 2017 and March 2, 2018. These changes are reflected in 14.4 and Table 35.2:

Pressure gauge construction requirements

Update commercial grade heptane specifications

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated September 15, 2017 and March 2, 2018.

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.

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.

No Text on This Page

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



Documents

Document Sharing Hub



ANSI/UL 2127-2018



MAY 9, 2017

(Title Page Reprinted: October 17, 2018)

1

ANSI/CAN/UL/ULC 2127

Standard for Inert Gas Clean Agent Extinguishing System Units

First Edition – March, 1999

Second Edition – July, 2012

Third Edition

May 9, 2017

This ANSI/CAN/UL/ULC Safety Standard consists of the Third Edition including revisions through October 17, 2018.

The most recent designation of ANSI/UL 2127 as an American National Standard (ANSI) occurred on October 17, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

This standard has been designated as a National Standard of Canada (NSC) on October 17, 2018.

COPYRIGHT © 2018 UNDERWRITERS LABORATORIES INC.

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



Documents

Document Sharing Hub

No Text on This Page

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



Documents

Document Sharing Hub

CONTENTS

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

INTRODUCTION

1 Scope	9
2 General	9
3 Glossary	9
4 Components	11
5 Design Manual	11
6 Owner's Manual	12

CONSTRUCTION

7 General	13
8 Electrically Operated Alarms	14
9 Controls and Indicators	14
10 Pressure Vessels	15
11 Pressure Relief Devices	15
12 Gaskets and "O" Rings	15
13 Pressurization Level and Filling Volume	15
14 Pressure Gauges– Extinguishing System Units	15
15 Pressure Gauges – Pneumatic Control Assemblies	17
16 Puncturing Mechanisms	18
17 Electrically Operated Valves and Pressure Switches	18A
18 Clean Agents	18A
19 Pressure Reducing Devices	18A
20 Polymeric Materials and Nonmetallic Parts	18A
21 Anti-Recoil Devices	18B
22 Pressure Switches	18B

PERFORMANCE

23 General	18B
24 Discharge Test	18B
25 Valve Leakage Test	19
26 Hydrostatic Pressure Test	21
27 30-Day Elevated Temperature Test	22
28 Temperature Cycling Test	22
29 Salt Spray Corrosion Test	22
30 500 Cycle Operation Test	23
31 Time Delay Verification Test	24
32 Pressure-Operated Alarm Test	24
33 One-Year Time Leakage Test	25
34 Mounting Device Test	25
35 Class A and B Fire Clean Agent Extinguishment Tests	25
35.1 General test parameters	25
35.2 Class A fire extinguishment tests	26
35.3 Class B fire extinguishment tests	32
36 Nozzle Distribution Verification Tests	33
36.1 General	33

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



Documents

Document Sharing Hub

36.2 Test enclosure	34
36.3 System arrangement	34
36.4 Minimum room height/nozzle area coverage test arrangement	35
36.5 Maximum room height test arrangement	35
37 Verification of Flow Calculation Method Test	35
38 Equivalent Length Determination	37
39 High Pressure Discharge Test	37
40 Flexible Hose Low Temperature Test	38
41 Operation Test of Manual Actuators and Manual Pull Stations	38
42 Pneumatic Operation Test	38
43 Pressure Relief Tests	39
44 Calibration Test – Gauges	39
45 Burst Strength Test – Gauges	40
46 Overpressure Test – Gauges	40
47 Impulse Test– Gauges	40
48 Pressure Gauge Relief Test	41
49 Water Resistance Test – Gauges	41
50 Elastomeric Parts Test	41
51 10-Day Moist Ammonia Air Stress Cracking Test	42
52 Aging Tests– Plastic Materials	43
52.1 Air-oven aging test	43
52.2 Light and water test	44
53 Nameplate Exposure Tests	44
54 Nameplate Adhesion Test	45
55 Nameplate Abrasion Test	45

MANUFACTURING AND PRODUCTION TESTS

56 General	46
56.1 General	46
56.2 Hydrostatic pressure test – shells	46
56.3 Gauge calibration test	46
56.4 Leakage test	46
56.5 Clean agent	47

MARKING

57 General	47
58 Manuals	49
59 Placards	49

INSTALLATION INSTRUCTIONS

60 Installation, Operation, and Maintenance Instruction Manual	49
--	----

SUPPLEMENT SA - MARINE-TYPE INERT GAS CLEAN AGENT EXTINGUISHING SYSTEM UNITS

SA1 Scope	SA1
SA2 Installation, Operation, and Maintenance Instruction Manual	SA1
SA3 Wiring	SA1
SA4 Controls and Indicators	SA1

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  **Documents**
Document Sharing Hub

SA5 Pressure Vessels	SA2
SA6 Salt Spray Corrosion Test	SA2
SA7 Vibration and Shock Resistance Test	SA2
SA7.1 General	SA2
SA7.2 Vibration test	SA3
SA7.3 Shock resistance test	SA3
SA8 Area Coverage Test	SA4
SA9 Aging Tests— Polymeric Materials	SA4
SA10 Marking	SA4

ANNEX A (CAN) (normative) Markings – French Translation

ANNEX B NORMATIVE REFERENCES

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



Documents

Document Sharing Hub

Preface

This is the Third Edition of the ANSI/CAN/UL/ULC 2127, Standard for Safety for Inert Gas Clean Agent Extinguishing System Units.

UL is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

This ANSI/CAN/UL/ULC-2127 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

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.

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

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.

To purchase UL Standards, visit Comm 2000 at http://www.comm-2000.com/help/how_to_order.aspx or call tollfree 1-888-853-3503.

This Edition of the Standard has been formally approved by the UL Standards Technical Panel (STP) on Extinguishing Systems, STP 300.

This list represents the STP 300 membership when the final text in this standard was balloted. Since that time, changes in the membership may have occurred.

STP 300 Membership

Name	Representing	Interest Category	Region
Art Black	Carmel Fire Protection Associates	AHJ	USA
Richard Bolyard	NC Department of Insurance – Office of State Fire Marshal	AHJ	USA
Lawrence Carmen	Victaulic	Producer	USA
Doug Claywell	Henny Penny Corp.	Commercial/Industrial User	USA
Tony Crimi	A.C. Consulting Solutions Inc.	General	Ontario, Canada
Bradford Cronin	Newport Fire Department	AHJ	USA
James Engman	Ansul Incorporated	Producer	USA
Robbin Foxcroft	Fire Safety Services (Calgary) Ltd.	Supply Chain	Alberta, Canada
Diane Haithcock	Underwriters Laboratories Inc.	STP Chair - Non-voting	USA
Tom Harding	Classic Fire Protection Inc.	Supply Chain	Ontario, Canada
Frederick Jeffers	Nova Scotia Office of the Fire Marshal	AHJ	Nova Scotia, Canada
Guy Jones	Amerex Corporation	Producer	USA

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

STP 300 Membership Continued on Next Page



Documents

Document Sharing Hub

STP 300 Membership (Continued)

Name	Representing	Interest Category	Region
Timothy Kelley	Giles Enterprises Inc.	Producer	USA
Chuck Kimball	Brooks Equipment Company, Inc.	Producer	USA
Bruce Levitt	Levitt-Safety Ltd	Supply Chain	Ontario, Canada
Richard Lupien	Kidde-Fenwal Inc.	Producer	USA
Norbert Makowka	National Association of Fire Equipment Distributors	General	USA
Brian McBain	Underwriters Laboratories of Canada, Inc.	Non-voting	Ontario, Canada
Romil Patel	Siemens Industry	Producer	USA
Maurice Pilette	Mechanical Designs Ltd.	General	USA
Scott Pugsley	Seneca College	General	Ontario, Canada
Mark Ramlochan	Underwriters Laboratories of Canada, Inc.	Non-voting	Ontario, Canada
Paul Rivers	3M Electronics Materials Solutions	Supply Chain	USA
Mark Robin	DuPont Chemicals & Fluoroproducts	Supply Chain	USA
Rajesh Sabadra	K V Fire Chemicals (I) Pvt Ltd	Supply Chain	India
Kevin Scott	KH Scott & Associates	AHJ	USA
Blake Shugarman	UL LLC	Testing and Standards	USA
Raymond Stacy	FM Approvals	Testing and Standards	USA
Jim Tidwell	Fire Extinguishers Manufacturers Association/ Tidwell Consulting Corporation	General	USA
David Tiller	Office of the Fire Marshal & Emergency Management – Ontario Fire College	AHJ	Ontario, Canada
Andrew Von Holt	Canadian Association of Fire Chiefs – Brampton Fire and Emergency Services	AHJ	Ontario, Canada
Nicolette Weeks	Underwriters Laboratories Inc.	STP Project Manager - Non-voting	USA

International Classification for Standards (ICS): 13.220.20

For further information on UL standards, please contact:

Underwriters Laboratories Inc.
171 Nepean Street, Suite 400
Ottawa, Ontario K2P 0B4
Phone: 1-613.755.2729
E-mail: customerservice@ulc.ca
Web site: ul.com

This Standard is intended to be used for conformity assessment.

The intended primary application of this standard is stated in its scope. It is important to note that it remains the responsibility of the user of the standard to judge its suitability for this particular application.

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE

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



Documents

Document Sharing Hub

INTRODUCTION

1 Scope

1.1 These requirements cover the construction and operation of inert gas clean agent fire extinguishing system units intended to be installed, inspected, tested, and maintained in accordance with the Standard for Clean Agent Fire Extinguishing Systems, NFPA 2001 and with the National Fire Code of Canada.

2 General

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

2.2 Where these requirements reference "extinguishing system unit," the requirements also apply to automatic extinguisher units unless specifically noted otherwise.

3 Glossary

3.1 For the purpose of these requirements, the following definitions apply.

3.2 AGENT TIME IMBALANCE – A situation in which the start of agent discharge at a nozzle occurs after agent discharge has been completed at any other nozzle in the system.

3.3 CLEAN AGENT – Electrically nonconducting, volatile, or gaseous fire extinguishant that does not leave a residue upon evaporation. The word "agent" as used in this document shall mean "clean agent" unless otherwise indicated.

3.4 CYLINDER/VALVE ASSEMBLY – A container that incorporates a valve and which provides storage of the extinguishing agent and expellant (when applicable) until the valve is actuated. When actuated, the valve releases the agent into the distribution network of the extinguishing system.

3.5 DISCHARGE NOZZLE – A device that is used to uniformly distribute the extinguishing agent:

- a) Over a specific area; or
- b) Within a specific volume;

or both.

3.6 DISCHARGE TIME – The time required to discharge from the nozzle 95 percent of the agent mass at 21°C (70°F).

3.7 DISCHARGE TIME, MAXIMUM – The longest discharge time specified by the manufacturer; but, not greater than 120 seconds.

3.8 ENGINEERED SYSTEM – A system that requires individual calculation and design, in accordance with the extinguishing system unit manufacturer's instructions, to determine the flow rates, nozzle pressures, quantities of extinguishing agent, and number and types of nozzles for effective extinguishing agent distribution and fire coverage.

3.9 EXTINGUISHING SYSTEM UNIT – Identified components that are assembled into systems for the discharge of an extinguishing agent through fixed piping and nozzles for the purpose of extinguishing fires.

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



Documents

Document Sharing Hub

3.10 INERT GAS CLEAN AGENT – A clean agent that contains as primary components one or more of the gases helium, neon, argon, or nitrogen. Inert gases that are blends of gases may also contain carbon dioxide as a secondary component.

3.11 MANUAL MEANS OF ACTUATION – A means of system actuation in which the system operator initiates system discharge, either mechanically or electrically.

3.12 MASTER VALVE – A discharge valve that upon automatic or manual actuation operates other valves or devices in an extinguishing system.

3.13 MINIMUM DESIGN NOZZLE PRESSURE – Typically, the minimum average pressure for a nozzle present during system discharge.

3.14 OPERABLE PRESSURE RANGE – The pressure range corresponding to the pressures in the storage container at the specified minimum and maximum temperatures for which the extinguishing system unit is intended to be operable.

3.15 OPERATING PRESSURE – The pressure in a fully charged storage container at a manufacturer specified normal ambient temperature condition. Currently recognized normal ambient temperature conditions for extinguishing system units using SI (International System) units are 15°C and 20°C. Currently recognized normal ambient temperature condition for extinguishing system units using US customary units is 70°F (21°C).

3.16 OPERATING TEMPERATURE RANGE – The temperature range inclusive of the minimum and maximum temperatures for which the extinguishing system unit or pneumatic control assembly is intended to be stored, used, and operated.

3.17 PNEUMATIC CONTROL ASSEMBLY – A pressure vessel with a valve pressurized with an inert gas that upon automatic or manual means of actuation, releases pressure that controls or results in the discharge process.

3.18 PRE-ENGINEERED SYSTEM – A system that is tested in accordance with the limitations prescribed by the manufacturer for maximum and minimum pipe lengths, accessories, number of fittings, number and types of nozzles and nozzle placement, maximum areas, volumes, or both areas and volumes of protection.

3.19 PRESSURE REDUCING DEVICE – A device which limits pressure downstream from the manifold.

3.20 PROOF TEST PRESSURE – The factory test pressure of each cylinder used to evaluate cylinder leakage and construction integrity. For Department of Transportation (DOT) or Transport Canada, Transportation of Dangerous Goods Regulations (TDGR) approved cylinders, the factory test pressure is specified in the appropriate DOT or TDGR specification. For ASME vessels, the factory test pressure is specified in Section VIII, Pressure Vessels, of the ANSI/ASME Boiler and Pressure Vessel Code. For non-DOT cylinders, non-TDGR cylinders, and non-ASME cylinders, the factory test pressure is three times the cylinder operating pressure at 21°C (70°F).

3.21 SELECTOR (DIRECTIONAL) VALVE – A device that is installed in the piping of an extinguishing system and that directs the flow of extinguishing agent to the appropriate protected volume. This valve is used only when more than one volume is being protected by a single extinguishing system.

3.22 TOTAL FLOODING SYSTEM – A system consisting of a supply of inert gas clean agent, arranged to discharge the agent into the intended protected volume and to fill that volume to an effective agent concentration.

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.

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 Design Manual

5.1 An engineered clean agent extinguishing system unit shall be provided with a design manual that references the limitations determined by the calculation method and includes the following items:

- a) A description of the general principles utilized in the calculation method;
- b) Limitation on the cylinder volume to pipe volume ratio;
- c) Limitations on minimum and maximum pipeline flow rates;
- d) Limitations regarding the types of tee splits (for example, bullhead or side outlet) and attached fittings. In addition, the intended range of flow splits and information on the orientation, installation, and critical length for each type of split;
- e) Limitations on conditions that result in an agent time imbalance condition at each nozzle, for example, limits on the variance for agent arrival time and runout time between nozzles;
- f) Minimum design nozzle pressure;
- g) Method for determining nozzle orifice area and selection of nozzle, as well as nozzle flow information, limits for minimum and maximum orifice area in relation to the attached pipe area;
- h) Nozzle area coverage limitations and information on location of nozzle in the protected area;
- i) Filling weights or volumes for each size container;
- j) Minimum and maximum design discharge time;
- k) Operating temperature range limitations;

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



Documents

Document Sharing Hub

- l) Description of the system design procedure and a sample problem indicating all computer input required and computer output information calculated;
- m) Equivalent length values of all fittings and all system equipment through which the clean agent flows;
- n) Reference to installation, operation, and maintenance manual;
- o) The name of the manufacturer or private labeler or equivalent designation;
- p) Date and manual designation number on each page;
- q) When the calculation method has not been investigated at temperatures other than the normal ambient temperature, cautionary information stating that when the storage temperature varies by $\pm 5.5^{\circ}\text{C}$ (10°F) from the normal ambient temperature, there is the risk that the system will not supply the designed quantity of extinguishing agent;
- r) Cautionary information indicating that the calculation method has been investigated for specific types of fittings, types of pipe, and pipe inside diameter. Also information that when the specified limitations are not maintained there is the risk that the system will not supply the designed quantity of extinguishing agent.

6 Owner's Manual

6.1 When an owner's manual is provided with an extinguishing system unit (see 58.1) it shall include at least the following:

- a) Clear indication that it is not a detailed installation, operation, and maintenance manual or design manual (when applicable);
- b) Clear reference to the availability of the installation, operation, and maintenance manual and design manual by contacting the manufacturer;
- c) A statement that the system periodically be inspected by qualified and trained personnel;
- d) Information regarding the essentials required to maintain the system in operation both before and after a fire;
- e) A statement that no modifications are to be made to the system without consulting a qualified system designer who is to refer to the detailed installation or maintenance manual. The statement shall include the following or equivalent wording: "This system is made up of units tested within limitations contained in the detailed installation manual. The system designer must be consulted whenever changes are planned for the system or area of protection. An authorized installer or system designer must be consulted after the system has discharged. "

CONSTRUCTION

7 General

7.1 After discharge of the extinguishing agent is initiated, an extinguishing system unit shall maintain the maximum rate of application of the extinguishing agent without requiring a manual action.

7.2 All exposed parts of an extinguishing system, including the finishes on coated or painted parts, the assemblies of moving parts, the nameplates as secured in place, the mounting bracket, or similar parts, shall be resistant to commonly encountered atmospheric corrosive influences and to galvanic corrosion, as determined by the Salt Spray Corrosion Test, Section 29.

7.3 When the deterioration, breakage or other malfunction of a material for an extinguishing system unit presents a risk of causing the extinguishing system to become inoperable, the material shall not be susceptible to stress cracking. See 10-Day Moist Ammonia Air Stress Cracking Test, Section 51.

7.4 As covered by these requirements, an extinguishing system unit consists of:

- a) Actuating assemblies;
- b) An extinguishing agent storage container and valve assembly;
- c) Discharge nozzle(s);
- d) Indicators that show the condition of the extinguishing system;
- e) A means for mounting the extinguishing system;
- f) Manifold check valves;
- g) Remote manual controls;
- h) Selector valves;
- i) Pressure reducing devices; and/or
- j) Other accessory equipment.

7.5 Where U.S. customary units are employed, the minimum storage temperature of an extinguishing system unit shall be 32°F (0°C), 0°F (minus 17.8°C), or lower in increments of 10°F (5.5°C); and a maximum storage temperature of either 100°F (37.8 °C), 120°F (48.9°C), 130°F (54.4°C), or higher in increments of 10°F (5.5°C), except that the 100°F (37.8°C) maximum storage temperature applies to an automatic extinguisher unit only.

7.6 Where SI (System International) units are employed, extinguishing system units shall have a minimum storage temperature of 0°C (32°F), -20°C (minus 4°F) or lower in increments of 5°C (9°F); and a maximum storage temperature of 37.8°C (100°F), 50°C (122°F), or higher in increments of 5°C (9°F), except that the 37.8°C (100°F) maximum storage temperature applies to an automatic extinguisher unit only.

7.7 When used as part of a multiple unit system, an extinguishing system unit shall be provided with a means for simultaneous operation of all system units.

7.8 The design concentrations for an extinguishing system unit shall be in accordance with Standard for Clean Agent Fire Extinguishing Systems, NFPA 2001. Also, compliance with the Class A and B Fire Extinguishment Tests described in Section 35 and Nozzle Distribution Verification Tests described in Section 36 shall be demonstrated.

8 Electrically Operated Alarms

8.1 When an electrically operated alarm is used, it shall comply with the Standard for Audible Signal Appliances, UL 464 or the Standard for Audible Signal Devices for Fire Alarm Systems, CAN/ULC-S525.

9 Controls and Indicators

9.1 An extinguishing system shall be provided with:

- a) An automatic and manual means of actuation; or
- b) A manual means of actuation only.

9.2 A manual means of operation shall be provided with a tamper seal or other device to minimize the potential for accidental discharge.

9.3 An extinguishing system unit shall incorporate a means for determining the internal pressure within the container. See Pressure Gauges, Section 14.

9.4 When a manual means of actuation is provided (see 9.1) and it utilizes an electrical power source:

- a) That electrical power source shall be independent of the power source for the automatic means of actuation; or
- b) When the power source is for both manual and automatic actuation, it shall have an independent back-up source, such as a battery.

9.5 A control unit, such as a control panel, push-button station, or similar unit, used as part of an extinguishing system shall comply with the Standard for Control Units for Fire-Protective Signaling Systems, UL 864 or the Standard for Control Units for Fire Alarm Systems, CAN/ULC-S527.

9.6 Removal of an electric actuator from either the agent storage container discharge valve it controls or the selector valve it controls shall result in a visual and audible supervisory signal at the releasing control panel.

9.7 Duplicate terminals or leads, or an equivalent arrangement, shall be provided for circuits of products intended to be connected to initiating-device circuits of a releasing control unit; one for each incoming and one for each outgoing wire. It is not prohibited that a common terminal be used in lieu of duplicate terminals when it is intended to prevent the looping of an unbroken wire around or under a terminal screw in a manner that permits the looped wire to remain unbroken during installation, thereby precluding supervision in the event the wire becomes dislodged from under the terminal. A notched clamping plate under a single securing screw, where separate conductors are intended to be inserted in each notch, is an equivalent arrangement.

10 Pressure Vessels

10.1 An extinguishing system pressure vessel shall comply with the appropriate Department of Transportation (DOT) specifications for shipping containers and shall be fabricated of a material having rigidity, durability, and resistance to corrosion at least equivalent to a mild steel alloy, such as SAE 1010, having a minimum thickness of 0.71 mm (0.028 inch).

10.2 An extinguishing system pressure vessel that is not intended to be used in the United States or Canada is able to be tested in accordance with the National Standard which applies, and is not required to comply with the requirements in this section, Sections 26 and 56.2.

11 Pressure Relief Devices

11.1 Storage containers and applicable manifold and pilot relief devices shall be provided.

12 Gaskets and "O" Rings

12.1 A gasket of an elastomeric material shall be thick enough to provide a compression-type seal. A seal, gasket, or an "O" ring that is continuously exposed to the extinguishing agent under pressure during intended service shall be made of a material compatible with the extinguishing agent. See Elastomeric Parts Test, Section 50, and One-Year Time Leakage Test, Section 32.

13 Pressurization Level and Filling Volume

13.1 The pressurization level and filling volume shall be specified by the manufacturer.

14 Pressure Gauges— Extinguishing System Units

14.1 An extinguishing system unit shall be provided with a means to indicate the internal pressure of the storage container with a pressure gauge indicating the pressure in the chamber. The operating range of the gauge shall take into account the operating temperature-pressure relationship of the extinguishing system unit, except that the minimum operating pressure line is able to be higher than the pressure that corresponds to the minimum operating temperature.

14.2 In addition, the manufacturer shall reference in the Installation, Operation, and Maintenance Instruction Manual, the use of a test gauge at a frequency specified in NFPA 2001 to accurately measure the internal pressure of the storage container. The test gauge shall have an accuracy grade of 2A (0.5 percent of full scale) as specified in ANSI/ASME B40.1.

14.3 The pressure gauge face shall indicate the appropriate units for which the gauge is calibrated, such as psig, kPa, kg/cm², or any combination of pressure units.

14.4 The maximum indicated gauge pressure on the pressure gauge shall be not less than 5% higher than the pressure at 49°C (120°F), or not less than 5% higher than the pressure at the maximum operating temperature, whichever is greater. The zero, operating, and maximum indicated gauge pressures shall be shown in numerals and with marks. The minimum use temperature shall be marked on the left side of the operable pressure range, an operating temperature value shall be marked at indicated charging pressure and the maximum use temperature shall be marked on the right side of the operable pressure range. The portion of the arc between the minimum operating pressure marking and the maximum operating pressure marking shall be indicated in green except the lower portion of the arc is able to be higher than the minimum operating pressure, but no higher than 95 percent of the operating pressure and the upper portion of the arc is able to be lower than the maximum operating pressure, but no lower than 110 percent of the operating pressure. The background of the gauge face in the area

defined as being that above radial lines connecting each of the maximum and minimum markings to the center of the gauge shall be red. The arc of the dial from the zero pressure point to the minimum use temperature marking shall have a red or white background and shall be marked "Recharge." The arc of the dial from the maximum use temperature to the maximum indicated pressure shall have a red or white background and shall be marked "Overcharged." All numerals, letters, and characters shall be black and the remaining background of the gauge 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 inch). The minimum length of the pointer from center point of the dial to the tip shall be 9.53 mm (0.375 inch). The minimum length of the arc from the zero pressure to the operating pressure shall be 25.4 mm (1 inch) measured from the center line of the zero pressure mark to the center line of the operating pressure mark.

14.5 The mark used to indicate the operating pressure shall be not less than 0.64 mm (0.025 inch) nor more than 1.02 mm (0.040 inch) wide.

14.6 The pressure gauge face shall be marked to indicate: "Use with _____ Only." The blank is to contain the appropriate clean agent reference.

14.7 The pressure gauge shall be marked with the gauge manufacturer's identifying mark. The pressure gauge shall also 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; and
- c) To indicate galvanic compatibility with aluminum and brass valve bodies – a line above and a line below the manufacturer's identifying mark, or only the manufacturer's identifying mark without any additional line.

14.8 A pressure gauge shall have a pressure relief that provides for venting in the event of a Bourdon Tube leak.

15 Pressure Gauges – Pneumatic Control Assemblies

15.1 A pneumatic control assembly shall be equipped with a pressure gauge indicating the pressure in the pressure vessel or gas cartridge. The operating range of the gauge shall take into account the operating temperature-pressure relationship of the compressed gas, except that the minimum operating pressure identification mark is able to be higher than the pressure that corresponds to the minimum operating temperature.

Exception: A pressure gauge is not required for a pneumatic control assembly that is filled with carbon dioxide or a cartridge filled with high pressure inert gas that is intended to be weighed to verify the quantity.

15.2 The pressure gauge face shall indicate the appropriate units for which the gauge is calibrated, such as kPa, kg/cm², psig or any combination of pressure units.

15.3 The gauge dial face shall comply with the requirements in 15.4 – 15.9.

15.4 The maximum indicated pressure shall be between 150 and 250 percent of the indicated operating pressure, and not less than 120 percent of the pressure at the maximum operating temperature. The zero pressure, operating pressure, and maximum indicated pressure shall be shown with identification marks and in numerals. The minimum use temperature shall be marked on the left side of the operating pressure range; the operating temperature shall be marked at the operating pressure; and the maximum operating temperature shall be marked on the right side of the operating pressure range.

15.5 For gauges with at least 110 degrees of arc between the minimum and maximum operating temperature, at least five intermediate pressure identification marks shall be shown on each side of the operating pressure and at least one intermediate identification mark on each side of the operating pressure shall also be shown in numerals. For gauges with less than 110 degrees of arc between the minimum and maximum operating temperature, at least two pressure intermediate identification marks shall be shown on each side of the operating pressure and at least one intermediate identification mark on each side of the operating pressure shall also be shown in numerals.

15.6 The portion of the arc between the minimum operating pressure marking and the maximum operating pressure marking shall be green except the lower portion of the arc is able to be higher than the minimum operating pressure, but no higher than 95 percent of the operating pressure and the upper portion of the arc is able to be lower than the maximum operating pressure, but no lower than 110 of the operating pressure. The background of the gauge face in the area defined as being that above radial lines connecting each the maximum and minimum identification marks to the green arc of the gauge shall be red. The arc of the dial from the zero pressure point to the minimum operating temperature identification mark shall have a red or white background and shall be marked "Recharge." The arc of the dial from the maximum operating temperature to the maximum indicated pressure shall have a red or white background and shall be marked "Overcharged." All numerals, letters, and characters shall be black and the remaining background of the gauge shall be white. Pointers shall be yellow, and the tip of the pointer shall end in the arc of the pressure identification marks, and shall have a maximum tip radius of 0.25 mm (0.010 inch). The minimum length of the pointer from center point of the dial to the tip shall be 9.53 mm (0.375 inch). The minimum length of the arc from the zero pressure to the operating pressure shall be 25.4 mm (1 inch) from the center line of the zero pressure identification mark to the center line of the operating pressure mark when measured at the maximum radius of the gauge face.

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



Documents

Document Sharing Hub