



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

UL Standard for Safety  
for  
Halogenated Agent Extinguishing System Units, UL 1058

Third Edition, Dated August 31, 1995

Revisions: This Standard contains revisions through and including August 22, 1996.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The new requirements are substantially in accordance with UL's Bulletin on this subject dated December 8, 1995. The bulletin is now obsolete and may be discarded.

The revisions dated August 22, 1996 include a reprinted title page (page 1) for this Standard.

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

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

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

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

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

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

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

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

Standards-on-Diskette purchasers agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgement (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing a Standard-on-Diskette on the purchaser's computer system.

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

If a multiple-user version Standards-on-Diskette was purchased, one copy of the Standard may be stored on a single LAN file-server, or on the permanent storage device of a multiple-user computer. The number of concurrent users shall not exceed the number of users authorized for the Standards-on-Diskette version. The original distribution diskette should be stored in a safe place.

Standards-on-Diskette are intended for on-line use, such as for viewing the requirements of a Standard, conducting a word search, and the like. Only one copy of the Standard may be printed from each single-user version of a Standards-on-Diskette. Only one copy of the Standard may be printed for each authorized user of a multiple-user version of a Standards-on-Diskette. An employee of an organization purchasing a Standard-on-Diskette can make a copy of the page or pages being viewed for their own fair and/or practical internal use. Because of differences in the computer/software/printer setup used by UL and those of Standards-on-Diskette purchasers, the printed copy obtained by a purchaser may not look exactly like the on-line screen view or the printed Standard.

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

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

Copyright 1996 Underwriters Laboratories Inc.

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

| Page               | Date                                        |
|--------------------|---------------------------------------------|
| tr1, tr2           | August 22, 1996                             |
| 1                  | August 31, 1995 (Reprinted August 22, 1996) |
| 2                  | August 31, 1995                             |
| 3                  | August 22, 1996                             |
| 4 – 28             | August 31, 1995                             |
| 29, 30, 30A, 30B   | August 22, 1996                             |
| 31 – 38, sa1 – sa4 | August 31, 1995                             |

**AUGUST 31, 1995**

(Title Page Reprinted: August 22, 1996)

**1**

**UL 1058**

**Standard for**

**Halogenated Agent Extinguishing System Units**

First Edition – December, 1984

Second Edition – October, 1989

**Third Edition**

**August 31, 1995**

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

**ISBN 1-55989-820-8**

**COPYRIGHT © 1984, 1996 UNDERWRITERS LABORATORIES INC.**

**CONTENTS****FOREWORD****INTRODUCTION**

|                        |   |
|------------------------|---|
| 1 Scope .....          | 5 |
| 2 General .....        | 5 |
| 3 Glossary .....       | 5 |
| 4 Components .....     | 7 |
| 5 Design Manual .....  | 7 |
| 6 Owner's Manual ..... | 8 |

**CONSTRUCTION**

|                                                             |    |
|-------------------------------------------------------------|----|
| 7 General .....                                             | 9  |
| 8 Electrically Operated Alarms .....                        | 10 |
| 9 Controls and Indicators .....                             | 10 |
| 10 Pressure Vessels .....                                   | 10 |
| 11 Gaskets and "O" Rings .....                              | 13 |
| 12 Filling Densities .....                                  | 13 |
| 13 Pressure Gauges and Indicators .....                     | 14 |
| 14 Puncturing Mechanisms .....                              | 15 |
| 15 Electrically Operated Valves and Pressure Switches ..... | 15 |
| 16 Siphon Tubes .....                                       | 15 |
| 17 Halon Agents .....                                       | 15 |
| 18 Expellant Gases .....                                    | 16 |
| 19 Polymeric Materials and Nonmetallic Parts .....          | 16 |

**PERFORMANCE**

|                                                                      |    |
|----------------------------------------------------------------------|----|
| 20 General .....                                                     | 17 |
| 21 Discharge Test .....                                              | 17 |
| 22 Valve Leakage Test .....                                          | 17 |
| 23 Hydrostatic Pressure Test .....                                   | 17 |
| 24 30-Day Elevated Temperature Test .....                            | 19 |
| 25 Temperature Cycling Test .....                                    | 19 |
| 26 Salt Spray Corrosion Test .....                                   | 19 |
| 27 500 Cycle Operation Test .....                                    | 20 |
| 28 Time Delay Verification Test .....                                | 21 |
| 29 Pressure-Operated Alarm Test .....                                | 21 |
| 30 One-Year Time Leakage Test .....                                  | 22 |
| 31 Mounting Device Test .....                                        | 22 |
| 32 Area Coverage Test .....                                          | 22 |
| 33 Verification of Flow Calculation Method Test .....                | 24 |
| 34 Equivalent Length Determination .....                             | 25 |
| 35 High Pressure Discharge Test .....                                | 26 |
| 36 Flexible Hose Low Temperature Test .....                          | 26 |
| 37 Operation Test of Manual Actuators and Manual Pull Stations ..... | 26 |

|     |                                               |    |
|-----|-----------------------------------------------|----|
| 38  | Pneumatic Operation Test                      | 26 |
| 39  | Pressure Relief Tests                         | 27 |
| 40  | Calibration Test – Gauges and Indicators      | 27 |
| 41  | Burst Strength Test – Gauges and Indicators   | 27 |
| 42  | Overpressure Test – Gauges                    | 28 |
| 43  | Impulse Test – Gauges                         | 28 |
| 44  | Pressure Gauge Relief Test                    | 28 |
| 45  | Water Resistance Test – Gauges and Indicators | 28 |
| 46  | Liquid Level Indicators                       | 28 |
| 47  | Elastomeric Parts Test                        | 29 |
| 47A | 10-Day Moist Ammonia Air Stress Cracking Test | 29 |
| 48  | Aging Tests – Plastic Materials               | 30 |
| 49  | Nameplate Exposure Tests                      | 31 |
| 50  | Nameplate Adhesion Test                       | 31 |
| 51  | Nameplate Abrasion Test                       | 32 |
| 52  | Nameplate Removal Test                        | 32 |

## MANUFACTURING AND PRODUCTION TESTS

|    |         |    |
|----|---------|----|
| 53 | General | 32 |
|----|---------|----|

## MARKING

|    |          |    |
|----|----------|----|
| 54 | General  | 33 |
| 55 | Manuals  | 35 |
| 56 | Placards | 35 |

## INSTALLATION INSTRUCTION

|    |                                                             |    |
|----|-------------------------------------------------------------|----|
| 57 | Installation, Operation, and Maintenance Instruction Manual | 35 |
|----|-------------------------------------------------------------|----|

## SUPPLEMENT SA – MARINE-TYPE HALOGENATED AGENT EXTINGUISHING SYSTEM UNITS

|      |                                                             |     |
|------|-------------------------------------------------------------|-----|
| SA1  | Scope                                                       | sa1 |
| SA2  | Installation, Operation, and Maintenance Instruction Manual | sa1 |
| SA3  | Wiring                                                      | sa1 |
| SA4  | Controls and Indicators                                     | sa1 |
| SA5  | Pressure Vessels                                            | sa1 |
| SA6  | Salt Spray Corrosion Test                                   | sa2 |
| SA7  | Vibration and Shock Resistance Test                         | sa2 |
| SA8  | Area Coverage Test                                          | sa3 |
| SA9  | Aging Tests – Polymeric Materials                           | sa3 |
| SA10 | Marking                                                     | sa3 |

## FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

46.2 Sample extinguishing system units, utilizing pressure vessels of each diameter and of the longest length, are to be filled with the minimum and maximum fill density. The extinguishing system units are to be conditioned at the minimum rated storage temperature, at  $70 \pm 10^\circ\text{F}$  ( $21.1 \pm 5.5^\circ\text{C}$ ), and at the maximum rated storage temperature for 24 hours. Following each conditioning, the liquid level is to be measured and the weight in the container calculated based on the charts provided by the manufacturer. The weight calculated is then to be compared to the actual weight stored in the container, to verify that it is within  $\pm 2.5$  percent of the actual weight.

#### 47 Elastomeric Parts Test

47.1 An elastomeric part used to provide a seal 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 500 psi (3.4 MPa) and a minimum ultimate elongation of 100 percent.
- b) For fluoroelastomers, a minimum tensile strength of 1000 psi (6.9 MPa) 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 1200 psi (8.3 MPa) 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, all as specified in UL 157. The maximum service temperature used to determine the oven time and temperature for oven aging is considered to be  $60^\circ\text{C}$ .
- e) After exposure to the extinguishing agent as specified in UL 157, a minimum tensile strength and minimum ultimate elongation of 60 percent of the original.

47.2 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 diameters of less than 1 inch (25.4 mm). 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 tested.

#### 47A 10-Day Moist Ammonia Air Stress Cracking Test

47A.1 After being subjected to the conditions described in 47A.2 – 47A.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.*

\*Added 47A.1 effective February 23, 1998\*

47A.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 22A.1. Teflon tape or pipe compound are not to be used on the threads.

\*Added 47A.2 effective February 23, 1998\*

**Table 47A.1**  
**Torque requirements for threaded connections**

| Nominal thread size, inches | Torque pound-inches (N·m) |         |
|-----------------------------|---------------------------|---------|
| 1                           | 1200                      | (135.6) |
| 1-1/4                       | 1450                      | (163.8) |
| 1-1/2                       | 1550                      | (175.1) |
| 2                           | 1650                      | (186.4) |
| 2-1/2                       | 1750                      | (197.7) |
| 3                           | 1800                      | (203.4) |

\*Added Table 47A.1 effective February 23, 1998\*

47A.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 12 by 12 by 12 inches (305 by 305 by 305 mm) having a glass cover.

\*Added 47A.3 effective February 23, 1998\*

47A.4 Approximately 600 ml 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 1-1/2 in. (38.1 mm) 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 93°F (34°C).

\*Added 47A.4 effective February 23, 1998\*

## **48 Aging Tests – Plastic Materials**

### **48.1 Air-oven aging test**

48.1.1 There shall be no cracking of a plastic valve, valve part, part subjected to the flow of halon, or bracket, after air-oven aging for 180 days at 212°F (100°C). Aged samples of the valve, valve part, bracket, or container shall perform as intended when tested as specified in 23.6 (valves and parts); Hydrostatic Pressure Test, Section 23 (containers); 31.1 (brackets); or the Burst Strength – Gauges and Indicators, Section 41 (pressurized gauge components). See 48.1.4 – 48.3.1.

48.1.2 Following air-oven aging for 90 days at 212°F (100°C), there shall be no cracking of a plastic siphon tube, and aged samples of the siphon tube shall perform as intended. 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.

48.1.3 If a plastic material cannot withstand the temperature specified in 48.1.1 and 48.1.2 without excessive softening, distortion, or deterioration, an air-oven aging test at a lower temperature for a longer period of time may be used. The equivalent time and temperature for 180 days at 212°F (100°C) is to be 430 days at 188.6°F (87.0°C). The equivalent time and temperature for 90 days at 212°F is to be 210 days at 188.6°F.

48.1.4 If plastic parts are attached to other parts or assemblies, the securement of the parts shall not be impaired after air-oven aging.

48.1.5 To determine the degradation of a plastic material used in a siphon tube, ring samples 1/2 inch (12.7 mm) wide are to be cut from the tube and subjected to air-oven aging. See 48.1.6. The ring samples then are to be subjected to a crush test between parallel flat plates using a machine that applies a compression load at a uniform rate of 0.2 inch (5 mm) per minute and records the load applied as a function of the deflection. The test also is to be conducted on unaged parts of identical size for comparative purposes. If the nature of the material is such that meaningful test results cannot be obtained, other tests, such as a tension test, are to be conducted.

48.1.6 The plastic valve parts and plastic 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  $212 \pm 1.8^{\circ}\text{F}$  ( $100 \pm 1.0^{\circ}\text{C}$ ). Samples are not to touch one another or the sides of the oven. The samples of the plastic valve parts and siphon tube are to be aged for 180 and 90 days, respectively, at full draft and then allowed to cool in air at  $73.4 \pm 3.6^{\circ}\text{F}$  ( $23.0 \pm 2.0^{\circ}\text{C}$ ) for at least 24 hours before conducting any test or dimensional measurement. As used in this test, the term "full draft" refers to the oven used with inlet and outlet vents open and the air vent damper control at a setting that provides 250 to 350 air changes per hour.

## 48.2 Exposure to extinguishing agent test

48.2.1 Plastic siphon tubes that have been immersed for 90 days at  $120^{\circ}\text{F}$  ( $48.9^{\circ}\text{C}$ ) in the halon extinguishing agent in which they are to be used shall perform as intended when installed in test extinguishing system units. Ring samples cut from the tube and immersed for 90 days at  $120^{\circ}\text{F}$  in the halon extinguishing agent with which they are to be used shall not exhibit degradation in excess of 40 percent of the original tensile or ring crushing strength values.

48.2.2 Complete siphon tubes and ring samples, 1/2 inch (12.7 mm) wide and cut from unaged siphon tubes, are to be placed in a container filled with the halon extinguishing agent. The container of halon, with the samples in place, is to be capped and placed in a preheated oven at  $120^{\circ}\text{F}$  ( $48.9^{\circ}\text{C}$ ) for 90 days. After the test exposure, the samples are to cool in air at  $73.4 \pm 3.6^{\circ}\text{F}$  ( $23.0 \pm 2.0^{\circ}\text{C}$ ) for at least 24 hours before conducting any tests or dimensional measurements. The ring samples then are to be subjected to a crush test between two parallel flat plates on a testing machine that applies a compressive load at the uniform rate of 0.2 inch (5 mm) per minute and records the load as a function of the deflection. If the nature of the material is such that meaningful test results cannot be obtained, other tests, such as tensile tests, may be conducted.

## 48.3 Light and water test

48.3.1 There shall be no cracking of materials used for a plastic valve, exposed valve part, or bracket after exposure to light and water for 720 hours. Samples of the valve or valve part or bracket so exposed shall perform as intended when tested as specified in Hydrostatic Pressure Test, Section 23 (containers); 23.6 (valves and parts); Mounting Device Test, Section 31 (brackets); or the Burst Strength Tests – Gauges and Indicators, Section 41 (gauges). See 48.1.4. If a gauge or indicator is involved in this test, it shall remain watertight throughout the test.

No Text on This Page

# UL 1058

ISBN 1-55989-820-8

# Halogenated Agent Extinguishing Systems Units





**Underwriters Laboratories Inc.®**

Northbrook, Illinois • (708) 272-8800  
 Melville, New York • (516) 271-6200  
 Santa Clara, California • (408) 985-2400  
 Research Triangle Park,  
 North Carolina • (919) 549-1400  
 Camas, Washington • (360) 817-5500

Underwriters Laboratories Inc., founded in 1894, is chartered as a not-for-profit organization without capital stock, under the laws of the State of Delaware, to establish, maintain, and operate laboratories for the examination and testing of devices, systems and materials to determine their relation to hazards to life and property, and to ascertain, define and publish standards, classifications and specifications for materials, devices, products, equipment, constructions, methods, and systems affecting such hazards.

UL Standards for Safety are developed under a procedure which provides for participation and comment from the affected public as well as industry. The procedure takes into consideration a survey of known existing standards and the needs and opinions of a wide variety of interests concerned with the subject matter of the standard. Thus manufacturers, consumers, individuals associated with consumer-oriented organizations, academicians, government officials, industrial and commercial users, inspection authorities, insurance interests and others provide input to UL in the formulating of UL Standards for Safety, to keep them consonant with social and technological advances.

A not-for-profit organization  
 dedicated to public safety and  
 committed to quality service



**Underwriters Laboratories Inc.®**

A not-for-profit organization dedicated to public safety  
and committed to quality service

**August 31, 1995**

**Standard for**

**Halogenated Agent Extinguishing System Units**

**UL 1058, Third Edition**

Accompanying this transmittal notice is a copy of the Third edition of UL 1058.

THIS EDITION OF THE STANDARD IS NOW IN EFFECT.

Revised and/or additional pages may be issued from time to time.

**AUGUST 31, 1995**

**1**

**UL 1058**

**Standard for**

**Halogenated Agent Extinguishing System Units**

First Edition – December, 1984  
Second Edition – October, 1989

**Third Edition**

**August 31, 1995**

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

**ISBN 1-55989-820-8**

**COPYRIGHT © 1984, 1995 UNDERWRITERS LABORATORIES INC.**

**CONTENTS****FOREWORD****INTRODUCTION**

|                        |   |
|------------------------|---|
| 1 Scope .....          | 5 |
| 2 General .....        | 5 |
| 3 Glossary .....       | 5 |
| 4 Components .....     | 7 |
| 5 Design Manual .....  | 7 |
| 6 Owner's Manual ..... | 8 |

**CONSTRUCTION**

|                                                             |    |
|-------------------------------------------------------------|----|
| 7 General .....                                             | 9  |
| 8 Electrically Operated Alarms .....                        | 10 |
| 9 Controls and Indicators .....                             | 10 |
| 10 Pressure Vessels .....                                   | 10 |
| 11 Gaskets and "O" Rings .....                              | 13 |
| 12 Filling Densities .....                                  | 13 |
| 13 Pressure Gauges and Indicators .....                     | 14 |
| 14 Puncturing Mechanisms .....                              | 15 |
| 15 Electrically Operated Valves and Pressure Switches ..... | 15 |
| 16 Siphon Tubes .....                                       | 15 |
| 17 Halon Agents .....                                       | 15 |
| 18 Expellant Gases .....                                    | 16 |
| 19 Polymeric Materials and Nonmetallic Parts .....          | 16 |

**PERFORMANCE**

|                                                                      |    |
|----------------------------------------------------------------------|----|
| 20 General .....                                                     | 17 |
| 21 Discharge Test .....                                              | 17 |
| 22 Valve Leakage Test .....                                          | 17 |
| 23 Hydrostatic Pressure Test .....                                   | 17 |
| 24 30-Day Elevated Temperature Test .....                            | 19 |
| 25 Temperature Cycling Test .....                                    | 19 |
| 26 Salt Spray Corrosion Test .....                                   | 19 |
| 27 500 Cycle Operation Test .....                                    | 20 |
| 28 Time Delay Verification Test .....                                | 21 |
| 29 Pressure-Operated Alarm Test .....                                | 21 |
| 30 One-Year Time Leakage Test .....                                  | 22 |
| 31 Mounting Device Test .....                                        | 22 |
| 32 Area Coverage Test .....                                          | 22 |
| 33 Verification of Flow Calculation Method Test .....                | 24 |
| 34 Equivalent Length Determination .....                             | 25 |
| 35 High Pressure Discharge Test .....                                | 26 |
| 36 Flexible Hose Low Temperature Test .....                          | 26 |
| 37 Operation Test of Manual Actuators and Manual Pull Stations ..... | 26 |

|                                                        |    |
|--------------------------------------------------------|----|
| 38 Pneumatic Operation Test .....                      | 26 |
| 39 Pressure Relief Tests .....                         | 27 |
| 40 Calibration Test – Gauges and Indicators .....      | 27 |
| 41 Burst Strength Test – Gauges and Indicators .....   | 27 |
| 42 Overpressure Test – Gauges .....                    | 28 |
| 43 Impulse Test – Gauges .....                         | 28 |
| 44 Pressure Gauge Relief Test .....                    | 28 |
| 45 Water Resistance Test – Gauges and Indicators ..... | 28 |
| 46 Liquid Level Indicators .....                       | 28 |
| 47 Elastomeric Parts Test .....                        | 29 |
| 48 Aging Tests – Plastic Materials .....               | 29 |
| 49 Nameplate Exposure Tests .....                      | 31 |
| 50 Nameplate Adhesion Test .....                       | 31 |
| 51 Nameplate Abrasion Test .....                       | 32 |
| 52 Nameplate Removal Test .....                        | 32 |

## MANUFACTURING AND PRODUCTION TESTS

|                  |    |
|------------------|----|
| 53 General ..... | 32 |
|------------------|----|

## MARKING

|                   |    |
|-------------------|----|
| 54 General .....  | 33 |
| 55 Manuals .....  | 35 |
| 56 Placards ..... | 35 |

## INSTALLATION INSTRUCTION

|                                                                      |    |
|----------------------------------------------------------------------|----|
| 57 Installation, Operation, and Maintenance Instruction Manual ..... | 35 |
|----------------------------------------------------------------------|----|

## SUPPLEMENT SA – MARINE-TYPE HALOGENATED AGENT EXTINGUISHING SYSTEM UNITS

|                                                                       |     |
|-----------------------------------------------------------------------|-----|
| SA1 Scope .....                                                       | SA1 |
| SA2 Installation, Operation, and Maintenance Instruction Manual ..... | SA1 |
| SA3 Wiring .....                                                      | SA1 |
| SA4 Controls and Indicators .....                                     | SA1 |
| SA5 Pressure Vessels .....                                            | SA1 |
| SA6 Salt Spray Corrosion Test .....                                   | SA2 |
| SA7 Vibration and Shock Resistance Test .....                         | SA2 |
| SA8 Area Coverage Test .....                                          | SA3 |
| SA9 Aging Tests – Polymeric Materials .....                           | SA3 |
| SA10 Marking .....                                                    | SA3 |