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# STANDARD FOR SAFETY

## ANSI/CAN/UL/ULC 1384:2017, Water-Based Automatic Extinguisher Units



ANSI/UL 1384–2017



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UL Standard for Safety for Water-Based Automatic Extinguisher Units, ANSI/CAN/UL/ULC 1384

First Edition, Dated May 9, 2017

### **Summary of Topics**

***The First Edition of the Standard for Safety for Water-Based Automatic Extinguisher Units, ANSI/CAN/UL/ULC 1384, has been issued to reflect the latest ANSI and SCC approval dates, and to incorporate the proposal dated September 9, 2016.***

The revised requirements are substantially in accordance with Proposal(s) on this subject dated September 9, 2016.

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MAY 9, 2017

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ANSI/CAN/UL/ULC 1384

Standard for Water-Based Automatic Extinguisher Units

First Edition

May 9, 2017

This ANSI/CAN/UL/ULC Safety Standard consists of the First Edition.

The most recent designation of ANSI/UL 1384 as an American National Standard (ANSI) occurred on May 8, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This standard has been approved as a National Standard of Canada (NSC) by the Standards Council of Canada (SCC).

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## Preface

This is the First Edition of the ANSI/CAN/UL/ULC 1384, Standard for Safety for Water-Based Automatic Extinguisher 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 1384 Standard for Safety is under continuous maintenance, whereby each revision is ANSI/CAN approved upon publication. If no revisions occur, the initiation of the review of this Standard will commence within 5 years of the date of publication.

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.

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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.

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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.

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## INTRODUCTION

### 1 Scope

1.1 These requirements cover the construction and operation of water-based automatic extinguisher units intended for total flooding applications when installed, inspected, tested, and maintained in accordance with the manufacturer's instructions.

1.2 Automatic extinguisher units do not have a manual means of operation, and are not intended for protection of fire risks larger than those specified in the manufacturer's instructions for a single unit by using multiple units.

### 2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 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.

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

2.4 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.

### 3 Units of Measurement

3.1 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.

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## 4 Undated References

4.1 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.

## 5 Glossary

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

5.2 **ACTUATOR ASSEMBLY** – A pressure vessel pressurized with an inert gas or a liquid and inert gas that includes a valve; or a gas cartridge pressurized with an inert gas that includes a puncture disc, which upon automatic means of actuation, releases pressure resulting in the discharge process.

5.3 **AUTOMATIC EXTINGUISHER UNIT** – A unit that has no manual means of actuation and discharges extinguishing agent upon thermal actuation, and is intended for use in a normally unoccupied space and is limited to a single protected area.

5.4 **CYLINDER/VALVE ASSEMBLY** – A container that incorporates a valve and that provides storage of the extinguishing agent and expellant gas until the valve is actuated. For cartridge operated units, this assembly includes the dry chemical storage container and cartridge mechanism. When actuated, the valve releases the agent into the distribution network of the extinguisher unit.

5.5 **DISCHARGE NOZZLE** – A device that is used to uniformly distribute the extinguishing agent over or into a specific area, or within a specific volume, or both.

5.6 **DISCHARGE RATE** – The ratio of the quantity of agent discharged from a nozzle to the discharge time measured within  $\pm 1$  s. When a minimum discharge rate is indicated, reference is made to the minimum quantity of agent discharged and the time measured within  $\pm 1$  s.

5.7 **DISCHARGE TIME** – The time interval between the first appearance of extinguishing agent at the nozzle and the time at which the discharge becomes predominantly gaseous.

5.8 **EXPELLANT GAS** – Dry nitrogen, dry air, or other gas used to facilitate the discharge of the extinguishing agent.

5.9 **GAS CARTRIDGE** – A container that provides storage for an expellant gas.

5.10 **HEPTANE** – A commercial grade hydrocarbon used as a test fuel with the following characteristics:

Minimum Initial boiling point 88°C (190°F)

Maximum Dry point 100°C (212°F)

Specific gravity (15.6°C/15.6°C)(60°F/60°F) 0.69 - 0.73

5.11 **METHOD OF ACTUATION, AUTOMATIC** – A means of actuation that results in extinguishing agent discharge without the necessity of human intervention, such as a thermal actuating mechanism.

**5.12 OPERATING PRESSURE** – The pressure in a fully charged cylinder/valve assembly or actuation assembly at 21°C (70°F).

**5.13 OPERATING PRESSURE RANGE** – The pressure range corresponding to the pressures within the agent storage container at the specified minimum and maximum temperatures for which the automatic extinguisher unit is intended to be operated.

**5.14 OPERATING TEMPERATURE RANGE** – The temperature range inclusive of the minimum and maximum temperatures for which the automatic extinguisher unit is intended to be stored, used, and operated.

**5.15 PRESSURE VESSEL (CYLINDER)** – A container that provides storage for dry chemical extinguishing agent and expellant gas, or when used at a location remote to the extinguisher unit, provides storage for expellant gas.

**5.16 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 ASME Boiler and Pressure Vessel Code. For non-DOT cylinders, non-TDGR cylinders, and non-ASME cylinders, the factory test pressure is at least three times the cylinder operating pressure at 21°C (70°F).

**5.17 PROTECTED VOLUME** – For fire tests, the volume within the protected enclosure, minus the volume of any permanent impermeable building elements within the enclosure.

**5.18 TOTAL FLOODING** – Discharge an extinguishing agent into and throughout an enclosed space to achieve a uniform distribution of the extinguishing agent.

**5.19 WATER-BASED EXTINGUISHING AGENT** – A fire-extinguishing medium consisting of water and additives to enhance performance.

## CONSTRUCTION

### 6 General

**6.1** After discharge of the extinguishing agent is initiated, an automatic extinguisher unit shall maintain the maximum rate of application of extinguishing agent without requiring a manual action.

**6.2** All exposed parts of an automatic extinguisher unit and automatic extinguisher unit, including the finishes on coated or painted parts, nameplates as secured in place, attachments such as mounting brackets required for installation, assemblies of moving parts, or other similar parts, shall be resistant to commonly encountered atmospheric corrosive influences, and to galvanic corrosion, as determined by the Salt Spray Corrosion Test, Section 36.

**6.3** When the deterioration, breakage or other malfunction of a part for an automatic extinguisher unit presents a risk of the unit becoming inoperable, the part shall not be susceptible to stress cracking, as determined by the Stress Corrosion Cracking Test for Brass Parts of the Standard for Fixed Condensed Aerosol Extinguishing System Units, UL 2775.

6.4 As covered by these requirements, an automatic extinguisher unit consists of:

- a) Extinguishing agent storage container;
- b) Actuating assembly;
- c) Indicators that show the condition of the storage container and, when applicable, actuating assembly;
- d) Discharge nozzle or nozzles; and
- e) Mounting bracket(s).

6.5 An automatic extinguisher unit shall have a minimum operating temperature of no less than minus 54°C (minus 65°F) and a maximum operating temperature of no greater than 65°C (150°F).

6.6 The pressure vessels of storage containers shall comply with the appropriate requirements of the U.S. Department of Transportation (DOT), Transport Canada, Transportation of Dangerous Good Regulations (TDGR), or local transport equivalent.

## 7 Controls and Indicators

7.1 An automatic extinguisher unit shall be provided with the following controls and indicators:

- a) An automatic means of actuation only.
- b) A pressure gauge for each pressure vessel of storage containers, showing the pressure within the container.

7.2 The thermal actuating mechanism of an automatic extinguisher unit shall comply with the applicable requirements of the Standard for Heat Responsive Links for Fire Protection Service, UL 33; or Standard for Fusible Links for Fire Protection Services, ULC-S505, or the Standard for Heat Detectors for Fire Protective Signaling Systems, UL 521, or the Standard for Heat Actuated Fire Detectors for Fire Alarm Systems, CAN/ULC-S530.

7.3 An automatic extinguisher unit that requires setup of a device, such as the movement of a valve, to place the unit in the set condition shall be provided with a locking indicator on the device to maintain the unit in the set condition. A locking indicator shall be made of corrosion-resistant material and shall comply with the Salt Spray Corrosion Test, Section 36.

7.4 A locking indicator shall break when subjected to a force of 65 N (15 lb-f) or less when subjected to the Locking Indicator Test.

7.5 Upon activation, an automatic extinguisher unit intended for Class C applications shall include auxiliary equipment to shut down all sources of fuel and electric power to all equipment within the protected volume.

## 8 Caps, Valves, and Closures

8.1 The fill opening of an automatic extinguisher unit shall have a minimum inside diameter of 6 mm (1/4 inch).

8.2 A collar with external threads shall be as high as required so the cap does not contact the dome or the bottom of the pressure vessel when the gasket is removed.

8.3 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.

8.4 A cap, valve, or closure shall withstand the hydrostatic pressure test as specified for the pressure vessel.

8.5 A cap, plug, cylinder valve or other component except a pressure gauge, shall be provided with a means of relieving pressure when it is removed while the storage container is still under pressure. The pressure shall be relieved with not less than two threads engaged.

## 9 Pressure Vessels and Cylinders

9.1 A pressure vessel shall be fabricated of a material having rigidity, durability, and resistance to corrosion at least equivalent to:

- a) A mild steel alloy, such as SAE 1010, having a minimum thickness of 0.71 mm (0.028 inch).
- b) An aluminum alloy, such as 6061-T6, as referenced in the Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, ASTM B209, having a minimum thickness of 0.71 mm (0.028 inch); or
- c) An aluminum alloy, such as 1100, 1170, and 3003, having a minimum thickness of 0.71 mm (0.028 inch).

9.2 The requirements in this section do not apply to a pressure vessel tested and marked as complying with DOT, Transport Canada, Transportation of Dangerous Good Regulations (TDGR) or other appropriate national specifications, unless otherwise specifically indicated.

9.3 A pressure vessel under the jurisdiction of the U.S. Department of Transportation shall comply with the appropriate DOT specifications for shipping containers. A pressure vessel under the jurisdiction of Transport Canada shall comply with the applicable Regulations and standards for pressure vessels.

9.4 A pressure vessel under the jurisdiction of a transport authority other than the U.S. Department of Transportation or Transport Canada, Transportation of Dangerous Good Regulations (TDGR) shall comply with the appropriate national specifications for shipping containers.

9.5 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.

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

9.7 Pressure vessels with an operating pressure of 1660 kPa (241 psi) or less at 21°C (70°F) and an internal volume not exceeding 18 L (1100 cubic inches) for a non-liquefied compressed gas, or 900 mL (55 cubic inches) for a liquefied compressed gas, shall be constructed so that the stress in any part of the pressure vessel does not exceed 80 percent of the yield strength of the material or 50 percent of the ultimate tensile strength of the material when subjected to the proof test pressure as described in the Hydrostatic Pressure Test. (Reference 9.8 – 9.17).

*Exception: Pressure vessels complying with 9.4 or 9.9 are not required to comply with this requirement.*

9.8 With reference to the requirements of 9.7, the maximum stress at proof pressure for commonly used materials and fabricating processes shall not exceed the values specified in Table 9.1.

**Table 9.1**  
**Maximum stress at proof pressure**

| Material                  | Maximum stress |          |
|---------------------------|----------------|----------|
|                           | kPa            | (psi)    |
| Copper brazed mild steel  | 172,370        | (25,000) |
| Welded mild steel         | 186,160        | (27,000) |
| Extruded 6061-T6 aluminum | 186,160        | (27,000) |
| Extruded 3003 aluminum    | 110,315        | (16,000) |
| Extruded 1100 aluminum    | 99,975         | (14,500) |
| Extruded 1170 aluminum    | 75,840         | (11,000) |

9.9 When the metal and the maximum stress value of the fabricating method used is other than that specified in Table 9.1 or when the mode of use or construction is such that the values specified are not appropriate, tensile tests are to be conducted to determine the yield and ultimate strength of the material. Test samples are to be taken either from stock material or from finished parts in accordance with Standard Test Methods and Definitions for Mechanical Testing of Steel Products, ASTM A370. When samples are taken from ruptured pressure vessels, the samples are to be taken in a direction perpendicular to the ruptured opening, as determined when taken to rupture in the Hydrostatic Pressure Test, Section 33. The maximum stress value is to be based upon the mean values resulting from the test series minus two unbiased standard deviations.

9.10 To determine the stress acting on the pressure vessel at the specified proof test pressure, the formulas specified in Figure 9.1 are to be used.