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ANSI/CAN/UL/ULC 2775:2019

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NATIONAL STANDARD

Standard for Fixed Condensed Aerosol Extinguishing System Units



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Standard for Fixed Condensed Aerosol Extinguishing System Units ANSI/CAN/UL/ULC 2775:2019

Second Edition, Dated July 31, 2019

Summary of Topics

This Second Edition of ANSI/CAN/UL/ULC 2775:2019, has been issued to reflect the latest ANSI and SCC approval dates, and to incorporate the proposal dated November 16, 2018.

The new requirements are substantially in accordance with Proposal on this subject dated November 16, 2018.

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ANSI/UL 2775-2019

JULY 31, 2019



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ANSI/CAN/UL/ULC 2775:2019

Standard for Fixed Condensed Aerosol Extinguishing System Units

First Edition – April, 2014

Second Edition

July 31, 2019

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

The most recent designation of ANSI/UL 2775 as an American National Standard (ANSI) occurred on July 31, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This standard has been designated as a National Standard of Canada (NSC).

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Preface

This is the Second Edition of the ANSI/CAN/UL/ULC 2775, Standard for Safety for Fixed Condensed Aerosol 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).

Annexes [A](#) and [B](#), identified as normative, form a mandatory part of this Standard.

This ANSI/CAN/UL/ULC 2775 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.

This Second Edition Joint American National Standard and National Standard of Canada is based on, and now supersedes, the First Edition of UL 2775 and the First Edition of ULC/ORD-C2775-12.

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>.

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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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Mitcheal Brown	Rotarex	Producer	USA
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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 fixed condensed aerosol extinguishing system units inclusive of aerosol generating extinguishing system units and aerosol generating automatic extinguisher units intended for total flooding applications when installed, inspected, tested, and maintained in accordance with the Standard for Fixed Aerosol Fire Extinguishing Systems, NFPA 2010 and the National Fire Code of Canada.

1.2 Aerosol generating automatic extinguisher units do not have a manual means of operation, and are not intended:

- a) For use as a general substitute for aerosol generating extinguishing system units; or
- b) For protection of fire risks larger than those specified in the installation 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.

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 **ACTUATING MECHANISM** – A device whose automatic or manual operation results in the physical discharge of extinguishing agent.

5.3 AEROSOL EXTINGUISHING AGENT – A fire-extinguishing medium consisting of gaseous matter and finely divided solid particles generally having approximate diameters in the order of microns that is produced by a combustion process of an aerosol-forming compound.

5.4 AEROSOL EXTINGUISHING AGENT QUANTITY – For fire tests, the required mass of solid aerosol-forming compound to achieve the extinguishing application density (for extinguishing system units) or design application density (for automatic extinguisher units) within the protected volume and within the specified discharge time.

5.5 AEROSOL-FORMING COMPOUND – A solid mixture of oxidant(s) and combustible component(s) included within a condensed aerosol generator that produces an aerosol extinguishing agent during combustion.

5.6 AUTOMATIC EXTINGUISHER UNIT – A condensed aerosol generator with mounting bracket that:

- a) Has no manual method of actuation;
- b) Has an automatic thermal method of actuation;
- c) Is intended for use in normally unoccupied spaces; and
- d) Is limited to a single protected area as specified in [1.2](#).

5.7 CASING – The external surface (s) of a condensed aerosol generator, excluding the surface (s) containing the discharge port(s).

5.8 CONDENSED AEROSOL GENERATOR (AEROSOL GENERATOR) – A normally non-pressurized device incorporating an aerosol-forming compound that, when pyrotechnically actuated, produces an aerosol extinguishing agent that flows through a cooling mechanism within the device prior to exiting through the discharge port(s).

5.9 COOLANT – A heat-absorbing process or medium included within a condensed aerosol generator that effectively reduces the temperature of an aerosol extinguishing agent prior to exiting through the discharge port(s).

5.10 DESIGN APPLICATION DENSITY – The minimum mass of a specific aerosol-forming compound per cubic meter of enclosure volume, including a safety factor, required for total flooding system design purposes.

5.11 DISCHARGE PORT – The opening (s) on a condensed aerosol generator from which aerosol extinguishing agent exits providing uniform distribution:

- a) Over a specific area;
- b) Within a specific volume; or
- c) Both.

5.12 DISCHARGE TIME – The time interval between condensed aerosol generator activation and the end of aerosol extinguishing agent exiting from the discharge ports.

5.13 EXTINGUISHING APPLICATION DENSITY – The minimum mass of a specific aerosol-forming compound per cubic meter of enclosure volume, excluding a safety factor, required to extinguish fire in total flooding applications involving a particular fuel under defined experimental conditions.

5.14 **EXTINGUISHING SYSTEM UNIT** – One or more condensed aerosol generators with mounting brackets, actuation mechanisms, and other accessory equipment (as applicable) designed for automatic and manual actuation.

5.15 **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) 0.67 – 0.73

5.16 **HOLD TIME** – For fire tests, period of time during which an extinguishing agent is required to maintain an even distribution throughout the protected volume in an amount sufficient to prevent re-ignition.

5.17 **IGNITION DEVICE** – Device that initiates the pyrotechnic reaction of the solid aerosol-forming compound.

5.18 **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.

5.19 **METHOD OF ACTUATION, MANUAL** – A means of actuation that results in extinguishing agent discharge with the necessity of human intervention, either mechanically, pneumatically or electrically.

5.20 **MOUNTING BRACKET** – A device intended to attach a pneumatic control assembly or condensed aerosol generator of an extinguishing system unit or automatic extinguisher unit to the enclosure structure and maintains the intended discharge port orientation of condensed aerosol generators during discharge.

5.21 **OPERATING PRESSURE** – The pressure in a fully charged pneumatic control assembly at 21°C (70°F).

5.22 **OPERATING PRESSURE RANGE** – The pressure range corresponding to the pressures within the pneumatic control assembly at the specified minimum and maximum temperatures for which the extinguishing system unit is intended to be operated.

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

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

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

5.26 **RELEASE** – The physical discharge or emission of aerosol extinguishing agent as a consequence of the condensed aerosol generator's actuation.

5.27 **THERMAL CLEARANCE** – The minimum air distance between both the condensed aerosol generator casing and condensed aerosol generator discharge ports and either personnel, components, or structures sensitive to the temperature developed during and after discharge of the condensed aerosol generator.

5.28 TOTAL FLOODING – A system arranged to discharge an extinguishing agent into and throughout an enclosed space to achieve a uniform distribution of the extinguishing agent.

CONSTRUCTION

6 General

6.1 After discharge of the extinguishing agent is initiated, an extinguishing system unit and 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 extinguishing system unit and automatic extinguisher unit, shall be resistant to commonly encountered atmospheric corrosive influences as determined by the Moist Hydrogen Sulfide Air Mixture Corrosion Test, Section [29](#) and the Moist Carbon Dioxide-Sulfur Dioxide Air Mixture Corrosion Test, Section [30](#).

6.3 All exposed parts of an extinguishing system 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 [31](#).

6.4 When the deterioration, breakage or other malfunction of a part for an extinguishing system unit or 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, Section [54](#).

6.5 As covered by these requirements, an extinguishing system unit and an automatic extinguisher unit consists of:

- a) Actuating assembly;
- b) Condensed aerosol generator; and
- c) Mounting bracket.

An extinguishing system unit can also consist of remote manual controls and other accessory equipment.

6.6 An extinguishing system unit and an automatic extinguisher unit shall have a minimum operating temperature of either minus 54°C (minus 65°F), minus 40°C (minus 40°F), minus 29°C (minus 20°F), minus 17.8°C (0°F), or 0°C (32°F). An extinguishing system unit shall have a maximum operating temperature of either 49°C (120°F) or 54°C (130°F). An automatic extinguisher unit shall have a maximum operating temperature of either 38°C (100°F), 49°C (120°F), or 54°C (130°F).

6.7 When used as part of a multiple unit system, an extinguishing system unit shall be provided with a means for operation of all units within 1 s.

6.8 The design application density for an extinguishing system unit and an automatic extinguisher unit shall be in accordance with the Standard for Fixed Aerosol Fire Extinguishing Systems, NFPA 2010. An extinguishing system unit shall comply with the Class A and Class B Fire Extinguishment Tests described in Section [49](#), and Distribution Verification Tests with Extinguishing System Units described in Section [50](#). An automatic extinguisher unit shall comply with the Distribution Verification Tests with Automatic Extinguisher Units described in Section [51](#), and Automatic Extinguisher Unit Automatic Operation Extinguishment Tests described in Section [52](#). When automatic extinguisher units are intended for

protection against Class A fires as described in NFPA 2010, extinguishing system units of identical construction with exception only to the actuation method shall be considered representative of the same design and size of automatic extinguisher units provided the extinguishing system units comply with the Class A Fire Extinguishment Tests described in Section [49](#).

6.9 The aerosol generators and pyrotechnic aerosol compound shall comply with the requirements of the U.S. Department of Transportation (DOT), Transport Canada or local transport equivalent.

7 Electrically Operated Alarms

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

8 Controls and Indicators

8.1 An extinguishing system unit shall be provided with:

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

An automatic extinguisher unit shall incorporate an automatic means of actuation only. 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 the Standard for Fusible Links for Fire Protection Service, ULC-S505, as applicable.

8.2 A manual means of actuation shall be provided with a locking device to reduce the risk of unintentional discharge. A tamper indicator, such as a seal or the equivalent, that is breakable with 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 manual actuator. A tamper indicator shall be constructed so that it is required to be broken to operate the manual actuator.

8.3 A locking device and tamper indicator shall be made of corrosion-resistant material and shall comply with the Salt spray Corrosion Test, Section [31](#).

8.4 A tamper indicator shall break when subjected to a force of 65 N (15 lb-f) or less when subjected to the Locking Device and Tamper Indicator Test, Section [60](#).

Exception: The 65 N (15 lb-f) does not apply 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 accomplish discharge or release of the internal load. In this case, the force shall not exceed 133 N (30 lb-f). Reference [60.3](#).

8.5 When a manual means of actuation is provided and it uses a mechanical or pneumatic power source:

- a) The force to actuate shall not exceed 178 N (40 lb-f); and
- b) The movement to secure operation shall not exceed 356 mm (14 inches).

8.6 When a manual means of actuation is provided 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 used for both manual and automatic actuation, it shall have an independent back-up source, such as a battery.

8.7 An integral electrical fitting connection, such as a male cable fitting, female cable fitting, or similar, used as part of an extinguishing system unit shall comply with the Standard for Conduit, Tubing, and Cable Fittings, UL 514B (CSA-C22.2 No. 18.3).

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

8.9 A condensed aerosol generator with integral electrical initiator used as part of an extinguishing system shall comply with the applicable requirements for Enclosure and Wiring construction; and Jarring and Dielectric Voltage-Withstand Test performance as specified in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, or the Standard for Control Units for Fire Alarm Systems, CAN/ULC-S527.

8.10 An electrical initiator used as part of an extinguishing system shall comply with the applicable requirements for Variable Voltage Operation Test performance as specified in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 or the Standard for Control Units for Fire Alarm Systems, CAN/ULC-S527; except where 85 percent variable voltage conditions are specified, the product is to be subjected to 65 percent variable voltage conditions.

9 Pneumatic Control Assembly Pressure Vessels

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 or Transport Canada 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.

9.4 A pressure vessel under the jurisdiction of Transport Canada shall comply with the appropriate Transport Canada specifications for shipping containers.

9.5 A pressure vessel under the jurisdiction of a transport authority other than the U.S. Department of Transportation shall comply with the appropriate national specifications for shipping containers.

9.6 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.

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

9.8 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, Section [35](#). (Reference [9.9](#) – [9.18](#)).

Exception: Pressure vessels complying with [9.5](#) or [9.10](#) are not required to comply with this requirement.

9.9 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](#).

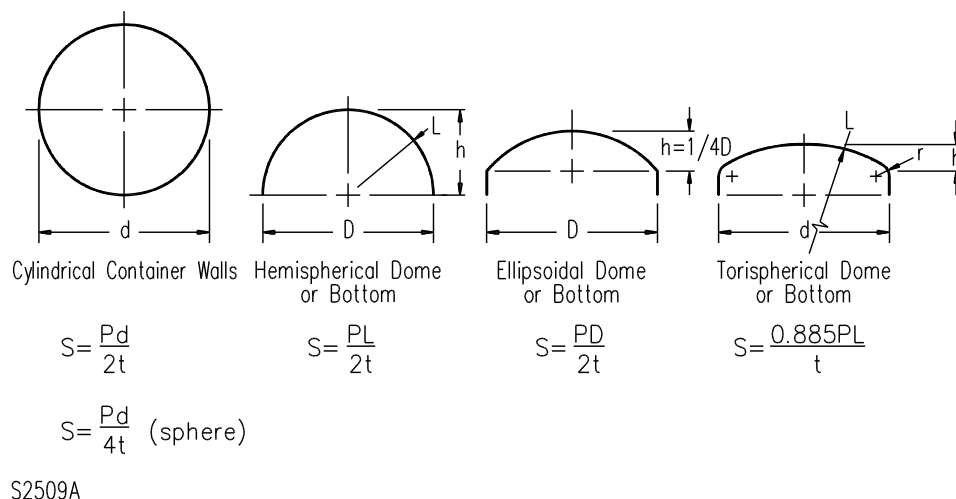
Table 9.1
Maximum stress at proof pressure

Material	Maximum stress	
	kPa	(psi)
Copper brazed mild steel	172,370	(25,000)
Welded mild steel	186,160	(27,000)
Extruded 6061T6 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)

9.10 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 [35](#). The maximum stress value is to be based upon the mean values resulting from the test series minus two unbiased standard deviations.

9.11 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.

Figure 9.1
Stress determination formulas



in which:

S is the stress at proof test pressure, kPa (psi)

P is the proof test pressure, kPa (psi)

d is the inside diameter (cylindrical portion of shell), mm (inches)

D is the inside diameter of dome or bottom, mm (inches)

L is the inside spherical radius or dish radius, mm (inches)

t is the material thickness, mm (inches)

r is the "Knuckle" radius, mm (inches)

h is the distance from outside crest of head to tangent point with sidewall, mm (inches)

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