

UL 2127

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Inert Gas Clean Agent Extinguishing System Units

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UL Standard for Safety for Inert Gas Clean Agent Extinguishing System Units, UL 2127

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June 30, 2001	Entire Standard

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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 and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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Standard for Inert Gas Clean Agent Extinguishing System Units

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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.

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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 which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this Standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, 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.

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.

Effective date for 1.1 changed from March 31, 2001 to June 30, 2001

1.2 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

Effective date for 1.2 changed from March 31, 2001 to June 30, 2001

2 General

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

Effective date for 2.1 changed from March 31, 2001 to June 30, 2001

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

Effective date for 2.2 changed from March 31, 2001 to June 30, 2001

3 Glossary

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

Effective date for 3.1 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 3.2 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 3.3 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 3.4 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 3.5 changed from March 31, 2001 to June 30, 2001

3.6 DISCHARGE TIME – The time required to discharge from the nozzle 95 percent of the agent mass at 70°F(21°C) necessary to achieve the minimum design concentration for flame extinguishment.

Effective date for 3.6 changed from March 31, 2001 to June 30, 2001

3.7 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.

Effective date for 3.7 changed from March 31, 2001 to June 30, 2001

3.8 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.

Effective date for 3.8 changed from March 31, 2001 to June 30, 2001

3.9 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.

Effective date for 3.9 changed from March 31, 2001 to June 30, 2001

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

Effective date for 3.10 changed from March 31, 2001 to June 30, 2001

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

Effective date for 3.11 changed from March 31, 2001 to June 30, 2001

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

Effective date for 3.12 changed from March 31, 2001 to June 30, 2001

3.13 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.

Effective date for 3.13 changed from March 31, 2001 to June 30, 2001

3.14 OPERATING PRESSURE – The pressure in a fully charged storage container at 70°F (21°C).

Effective date for 3.14 changed from March 31, 2001 to June 30, 2001

3.15 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.

Effective date for 3.15 changed from March 31, 2001 to June 30, 2001

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

Effective date for 3.16 changed from March 31, 2001 to June 30, 2001

3.17 PROOF TEST PRESSURE – The factory test pressure of each cylinder used to evaluate cylinder leakage and construction integrity. For Department of Transportation (DOT) approved cylinders, the factory test pressure is specified in the appropriate DOT specification.

Effective date for 3.17 changed from March 31, 2001 to June 30, 2001

3.18 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.

Effective date for 3.18 changed from March 31, 2001 to June 30, 2001

3.19 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.

Effective date for 3.19 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 4.1 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 4.2 changed from March 31, 2001 to June 30, 2001

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

Effective date for 4.3 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 4.4 changed from March 31, 2001 to June 30, 2001

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;
- 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 70°F (21°C), cautionary information stating that when the storage temperature varies by $\pm 10^\circ\text{F}$ (5.5°C) 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.

Effective date for 5.1 changed from March 31, 2001 to June 30, 2001

6 Owner's Manual

6.1 When an owner's manual is provided with an extinguishing system unit (see 57.1) 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."

Effective date for 6.1 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 7.1 changed from March 31, 2001 to June 30, 2001

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 28.

Effective date for 7.2 changed from March 31, 2001 to June 30, 2001

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 50.

Effective date for 7.3 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 7.4 changed from March 31, 2001 to June 30, 2001

7.5 An extinguishing system unit shall have a minimum storage temperature of either minus 65°F (minus 53.9°C), minus 40°F (minus 40°C), minus 20°F (minus 28.9°C), 0°F (minus 17.8°C), or 32°F (0°C); and a maximum storage temperature of either 120°F (48.9°C), 130°F (54.4°C), 150°F (65.6°C), or higher.

Effective date for 7.5 changed from March 31, 2001 to June 30, 2001

7.6 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.

Effective date for 7.6 changed from March 31, 2001 to June 30, 2001

7.7 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 34 and Nozzle Distribution Verification Tests described in Section 35 shall be demonstrated.

Effective date for 7.7 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 8.1 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 9.1 changed from March 31, 2001 to June 30, 2001

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

Effective date for 9.2 changed from March 31, 2001 to June 30, 2001

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

Effective date for 9.3 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 9.4 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 9.5 changed from March 31, 2001 to June 30, 2001

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 0.028 inch (0.71 mm).

Effective date for 10.1 changed from March 31, 2001 to June 30, 2001

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 25 and 55.2.

Effective date for 10.2 changed from March 31, 2001 to June 30, 2001

11 Pressure Relief Devices

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

Effective date for 11.1 changed from March 31, 2001 to June 30, 2001

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 49, and One-Year Time Leakage Test, Section 32.

Effective date for 12.1 changed from March 31, 2001 to June 30, 2001

13 Pressurization Level and Filling Volume

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

Effective date for 13.1 changed from March 31, 2001 to June 30, 2001

14 Pressure Gauges

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.

Effective date for 14.1 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 14.2 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 14.3 changed from March 31, 2001 to June 30, 2001

14.4 The maximum indicated gauge pressure on the pressure gauge shall be not less than 120 percent of the pressure at 120°F (49°C). 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, a 70°F (21°C) 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 95 and 110 percent of the charging pressure at 70°F (21°C) shall be indicated in green. 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 read "Recharge." The arc of the dial from the maximum use temperature to the maximum indicated pressure shall read "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 0.010 inch (0.25 mm). The minimum length of the pointer from center point of the dial to the tip shall be 0.375 inch (9.53 mm). The minimum length of the arc from the zero pressure to the indicated charging pressure shall be 1 inch (25.4 mm) measured from the center line of the zero pressure mark to the center line of the indicated charging pressure mark.

Effective date for 14.4 changed from March 31, 2001 to June 30, 2001

14.5 The mark used to indicate the operating pressure at 70°F (21°C) shall be not less than 0.025 inch (0.64 mm) nor more than 0.040 inch (1.02 mm) wide.

Effective date for 14.5 changed from March 31, 2001 to June 30, 2001

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

Effective date for 14.6 changed from March 31, 2001 to June 30, 2001

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.

Effective date for 14.7 changed from March 31, 2001 to June 30, 2001

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

Effective date for 14.8 changed from March 31, 2001 to June 30, 2001