

Subject 300

November 2, 2018

SUMMARY OF TOPICS

The following standard is being proposed for ballot:

1. Proposed Fourth Edition of the Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, which includes first time SCC approval for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, ANSI/CAN/UL/ULC 300

2. Safety critical function protection requirements

STP BALLOTS AND ALL COMMENTS DUE: JANUARY 1, 2019

For your convenience in review, a copy with legislative markups have been provided as Supporting Documentation. It can be accessed in the Quick View area of the Work Area.

1. Proposed Fourth Edition of the Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, which includes first time SCC approval for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment, ANSI/CAN/UL/ULC 300

RATIONALE

Proposal submitted by: Blake Shugarman, UL LLC and Brian McBain, Underwriters Laboratories of Canada, Inc.

The proposal is to consider a joint Canada-United States National Standard for the testing covered herein. The proposals take into consideration current technology and standard operating procedures for the products covered herein. For Canadian evaluation, this standard is intended to replace ULC/ORD-C1254.6-1995, "Fire Testing of Restaurant Cooking Area Fire Extinguisher System Units."

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ANNEX A Normative References

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INTRODUCTION

1 Scope

1.1 These requirements cover the performance during fire tests of pre-engineered fire extinguishing system units intended for the protection of commercial cooking equipment for restaurants, cafeterias and other similar venues. For installation requirements, see the following documents: NFPA 17, Standard for Dry Chemical Extinguishing Systems; NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; NFPA 17A, Standard for Wet Chemical Extinguishing Systems; and the National Building Code of Canada. Note that local authorities having jurisdiction should be consulted prior to installation.

1.2 Pre-engineered fire extinguishing system units, agents, or both shall also comply with the requirements for construction and performance as applicable to specific types, designs, sizes, and arrangements. Such additional requirements include ANSI/CAN/UL/ULC 1254 and are not within the scope of these requirements for fire tests.

1.3 The term "product" as used in this standard refers to all fire extinguishing systems or any part thereof covered by the requirements unless specifically noted otherwise.

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 Measurements

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

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 these requirements, the following definitions apply.

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5.2 COOKING APPLIANCE – A cooking device that has or is capable of having a surface of liquid grease or one in which grease is involved, such as a deep fat fryer, griddle, range, chain broiler, electric char-broiler, charcoal broiler, mesquite broiler, gas-radiant char-broiler, wok, tilt skillets, and similar appliances. The protected area is limited to the cooking surfaces of the appliance only.

5.3 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 extinguishing agent storage container and cartridge mechanism. When actuated, the valve releases the agent into the distribution network of the extinguishing system.

5.4 DISCHARGE RATE – The ratio of the quantity of agent discharged from a nozzle to the discharge time measured within ± 1 second. When a minimum discharge rate is indicated, reference is made to the minimum quantity of agent discharged and the time measured within ± 1 second.

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

5.6 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.

5.7 DUCT (OR DUCT SYSTEM) – A continuous enclosed passageway for the transmission of air and cooking vapors.

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

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

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

5.11 GREASE – For test purposes, grease is new vegetable shortening incorporating an anti-foaming agent. For hood and duct and broiler testing only, grease shall be new or used vegetable shortening, or rendered animal fat.

5.12 GREASE FILTER – A component of a grease vapor removal system that deflects the air and vapors passing through it in such a manner as to result in the grease vapors to concentrate, condense, or both, for the purpose of grease collection.

5.13 HOOD – A device provided as part of an exhaust system to direct and capture grease vapors and exhaust gases from a cooking appliance.

5.14 LOW QUALITY FATTY BEEF STEAKS – Steaks that contain 20 – 30 percent fat or gristle, well marbled, and uniform in size. An example of a cut of meat which meets the requirement is "goose neck round," which is 70 – 80 percent lean.

5.15 MANUAL MEANS OF ACTUATION – A means of system actuation in which the system operator initiates system discharge.

5.16 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.

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

5.18 PLENUM – The volume of enclosed space between the grease filters and the portion of the hood above the grease filters in a hood and duct system.

5.19 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, types of fire risks and their maximum areas, volumes, or both areas and volumes of protection.

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

5.21 TILT SKILLETS/BRAISING PANS – Cooking devices which are intended to braise, simmer, saute, or fry foods.

PERFORMANCE

6 Cooking Appliance Extinguishment Tests

6.1 General

6.1.1 An extinguishing system unit is to be tested with each type of cooking appliance with which it is intended to be used. Specific cooking appliance test methods are contained in 6.2 – 6.18.

Exception: Protection for tilt skillets is to be based upon the coverage limitations provided for deep fat fryer protection.

6.1.2 Except as provided in 6.1.14, the appliances used in testing shall meet the minimum requirements as described in the applicable subsections of Section 6.

6.1.3 When tested with a cooking appliance, an extinguishing system unit shall:

- a) Result in the flame in the appliance to be completely extinguished upon complete discharge of the extinguishing agent;
- b) For deep fat fryers, woks, and ranges, not permit re-ignition of the grease for 20 minutes or until the temperature of the grease decreases at least 60°F (34°C) below its observed auto-ignition temperature, whichever is longer; and
- c) For all appliances other than deep fat fryers, woks- and ranges, not permit re-ignition of grease for 5 minutes.

6.1.4 Unless otherwise noted, each test is to be conducted using the minimum quantity of the extinguishing agent and the minimum discharge rate condition of the extinguishing system unit test nozzle or nozzles. To obtain the minimum discharge rate condition, an extinguishing system unit is to be assembled using its maximum piping limitations with respect to number of fittings and size and length of pipe.

6.1.5 The cylinder is to be filled to its rated capacity and the cylinder or gas cartridge pressurized with the expellant gas to the normal operating pressure at 70°F (21°C). The cylinder or gas cartridge used for these tests is to be conditioned, after charging, for at least 16 hours at the minimum storage temperature prior to the test. As an alternative to conditioning at the minimum storage temperature for 16 hours, extinguishing system units that utilize dry nitrogen or dry air as an expellant gas are to be tested by under pressurizing the cylinder or gas cartridge at ambient temperature to simulate the pressure at minimum operating temperature.

6.1.6 Each cooking appliance extinguishment test is to be conducted in an environment in which the ambient temperature is not less than 50°F (10°C).

6.1.7 Extinguishment tests are to be conducted at both the maximum and minimum nozzle heights, with the nozzle positioned in the most difficult locations and orientations allowed by the installation instructions with respect to complying with the fire extinguishment requirements. Splash tests are to be conducted at the minimum nozzle height, with the nozzle positioned in the most difficult locations and orientations allowed by the installation instructions with respect to complying with the splash requirements.

6.1.8 The length and width of the cooking area of the appliance being tested are to correspond to the maximum area coverage limitation specified in the installation instructions.

6.1.9 Multiple appliance protection for single discharge nozzle coverage is to be tested per the manufacturer's installation instructions.

6.1.10 Appliances shall be permitted to be protected with multiple nozzles based on the single nozzle appliance coverage specified and the area of coverage for each nozzle does not exceed its single appliance coverage.

6.1.11 Deep fat fryers, having a total cooking area greater than 6 square feet (0.55 m²), shall be permitted to be protected with multiple nozzles when:

- a) Compliance with the Cooking Appliance Extinguishment Tests using a specified cooking appliance and surface area; and
- b) The fryer model number is referenced in the manufacturer's installation instructions.

6.1.12 Tilt skillets/braising pans are required to comply with 6.1.10 and not 6.1.11.

6.1.13 A gas radiant char-broiler with integral solid fuel holder(s) intended for flavoring (for example, a solid fuel holder intended for flavoring with mesquite wood) shall simultaneously comply with the requirements of 6.5 and 6.9. The appliance model with the corresponding size shall be referenced in the manufacturer's installation instructions.

6.1.14 Appliances equipped with an attached moveable obstruction or fixed obstruction(s), such as a cover, shall be evaluated at worst case fixed obstruction locations in accordance with the applicable subsections of Section 6. The appliance model with an integral moveable obstruction or fixed obstruction(s) or the appliance model and the model of the device providing the obstruction with the corresponding appliance size shall be referenced in the manufacturer's installation instructions.

Exception: The appliance model is not required in the manufacturer's installation instructions when a range back shelf obstruction is evaluated.

6.2 Deep fat fryer

6.2.1 The deep fat fryer used for this test is to be a commercially available natural gas or propane fired deep fat fryer, at least 9 inches (229 mm) deep, and having a cooking surface area as specified in the manufacturer's installation instructions. For a deep fat fryer with an integral drip board, or similar item, the calculated cooking area, along with the drip area, is to be as indicated in the manufacturer's installation instructions.

6.2.2 All deep fat fryers tested in accordance with 6.2.1 and 6.2.3 – 6.2.8 shall demonstrate an average cooling rate of not more than 5°F (2.8°C) per minute. The liquid grease in an uncovered fryer is to be heated at the fryer's maximum energy input. When the temperature of the liquid grease reaches 600°F (316°C) the fryer's energy source is to be immediately shut off and the cooling rate of the liquid grease (°F per minute) is to be measured (when the temperature of the grease returns to 600°F (316°C)) between the temperatures of 600 and 500°F (316 and 260°C). The fryer is to be tested with an ambient temperature of 70 ±10°F (21 ±5°C) throughout the duration of the test. The thermocouple monitoring the liquid grease temperature is to be installed as indicated in 6.2.6.

Exception: When compliance with the deep fat fryer requirements is demonstrated using a specified cooling rate greater than 5°F (2.8°C) per minute, the protection of a deep fat fryer with a cooling rate exceeding 5°F (2.8°C) per minute is permitted. Fryers with a cooling rate exceeding 5°F (2.8°C) per minute shall be specifically indicated by model number in the manufacturer's installation instructions.

6.2.3 Multiple vat and split vat deep fat fryers are to be separately tested with the discharge nozzle positioned in the most difficult location and orientation allowed by the manufacturer's installation manual.

6.2.4 Split vat fryers are to be tested wherein a vat(s) adjacent to the vat to be spontaneously ignited is filled with liquid grease and heated to 350 – 375°F (177 – 191°C). The grease level for the adjacent vat(s) is to be at the bottom of the drip board, and not greater than 3 inches (76.2 mm) below the top of the vat when the grease temperature is between 350 – 375°F (177 – 191°C). Energy shutoff for all vats is to occur when the extinguishing system is actuated.

Exception: When saponified foam from the adjacent vat(s) rolls over into the burning vat after system actuation, the grease temperature of the adjacent vat(s) is to be reduced to the point where foam rollover does not occur or a means is to be provided to prevent foam from rolling over into the burning vat.

6.2.5 A two minute free burn shall commence, with the energy source remaining on during the duration of the free burn, at auto-ignition or when the temperature reaches 685°F (363°C), whichever occurs last. When the test vat of the fryer includes an integral drip board, the vat is to be filled so that the grease level is at the top of the drip board when the grease temperature is between 550 – 600°F (288 – 316°C). In no case shall the grease level for any type of fryer be more than 3 inches (76.2 mm) below the top of the vat when the grease temperature is between 550 – 600°F (288 – 316°C).

6.2.6 The grease temperature during testing is to be measured with a thermocouple located 1 inch (25.4 mm) below the grease surface. The thermocouple is to be located not closer than 3 inches (76.2 mm) to the fryer's sidewall.

6.2.7 The liquid grease in the uncovered fryer is to be heated at the fryer's maximum energy input and at a rate not less than 12°F (7.2°C) temperature rise per minute as measured when the grease temperature is between 500 and 600°F (260 and 316°C). The grease is then continually heated using the same energy input until auto-ignition occurs. After auto-ignition of the liquid grease, the fire is to burn freely with the fryer's heating source remaining on for a period of not less than 2 minutes. After the free burn period of not less than two minutes, the heating source is to be shut off and the extinguishing system unit is to be discharged.

6.2.8 Upon complete discharge of the extinguishing agent, the deep fat fryer shall comply with the requirements in 6.1.2.

6.3 Griddle

6.3.1 Identical coverage and nozzle placement limitations for a griddle application are to be used based on a successful extinguishment test of a deep fat fryer. See 6.2.1 – 6.2.8.

6.3.2 The griddle used for this test is to be constructed of sheet metal at least 0.079 inch (2.01 mm) thick and is to be 1 inch (25.4 mm) deep.

6.3.3 The griddle is to be filled with liquid grease to a depth of 1/4 inch (6.4 mm).

6.3.4 The liquid grease in the griddle is to be heated by the griddle's heating source until spontaneous ignition occurs. After the cooking area is fully involved in flames, the fire is to burn for a minimum 1 minute freeburn, with the heating source remaining on, after which the heating source is to be shut off and the extinguishing system unit is to be discharged.

6.3.5 Upon complete discharge of the extinguishing agent, the griddle shall comply with the requirements in 6.1.2.

6.4 Range top

6.4.1 The range top used for the test is to be a commercially available electric, natural gas or propane fired range top or a commercial range top burner to simulate variable range top configurations. When a manufacturer references protection for a range top incorporating a back shelf, a back shelf of the maximum size and located at the minimum height as specified in the manufacturers installation instructions is to be used for test. The cooking surfaces of the range top are to be the maximum as specified for coverage in the manufacturer's installation, operation and maintenance instruction manual.

6.4.2 The following test vessels are to be used for this test:

- a) A cast iron skillet having a diameter of 13 to 14 inches (330 to 356 mm) at the top and having sides 1-1/3 – 2-3/8 inches (33.9 – 60.3 mm) high, measured from the inside of the skillet.
- b) A stainless steel pot having a diameter of 10 ±1/4 inches (254 ±6.4 mm) at the top and having sides 7 to 8 inches (178 to 203 mm) high.