UL 1370

STANDARD FOR SAFETY

Unvented Alcohol Fuel Burning Decorative Appliances

UL Standard for Safety for Unvented Alcohol Fuel Burning Decorative Appliances, UL 1370

First Edition, Dated July 18, 2011

Summary of Topics

These revisions to ANSI/UL 1370 are being issued to incorporate the following requirements:

Modifications to the scope

Fuel capacity and test room size

Editorial correction and addition

Test requirements for outdoor appliances

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated September 4, 2015 and January 22, 2016.

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UL 1370

Standard for Unvented Alcohol Fuel Burning Decorative Appliances

Prior to the first edition, the requirements for the products covered by this standard were included in the Outline of Investigation for Unvented Alcohol Fuel Burning Decorative Appliances, SU 1370.

First Edition

July 18, 2011

This ANSI/UL Standard for Safety consists of the First Edition including revisions through March 25, 2016.

The most recent designation of ANSI/UL 1370 as an American National Standard (ANSI) occurred on March 14, 2016. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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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INTRODUCTION

1 Scope

1.1 These requirements apply to factory built unvented liquid or gelled alcohol based, fuel burning decorative appliances intended to be fixed non-moveable appliances including only the following:

a) Floor mounted appliances; and

b) Wall-mounted appliances;

c) Fireplace grates installed in existing masonry fireplaces; and

d) Appliance combustion chambers installed into fabricated enclosures that comply with the requirements of this Standard, applicable local codes, and manufacturer installation and clearance requirements.

These appliances are intended to be decorative in nature and not intended to be utilized as a primary heat source. These appliances are limited to a maximum input rate of 0.25 gallons of fuel per hour (0.95 liters per hour). Fuel oils, kerosene, gasoline, and other non-alcohols are not covered by these requirements.

1.2 These products consist of an overall enclosure, burning chamber, and provision for refueling. They are not intended for use in spaces in which flammable vapors or gases may be present. They are not intended to be used as cooking appliances. And, these systems are not intended to be used in conjunction with blower assemblies.

Exception: Fireplace grates do not require an integral enclosure; they utilize the existing masonry fireplace as their enclosure, see 1.1(c).

1.3 The appliances as covered by these requirements are intended for installation in occupancies where use is permitted by local codes, such as NFPA 1, Uniform Fire Code and NFPA 101, Life Safety Code.

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

3.2 Unless indicated otherwise, all voltage and current values mentioned in this Standard are rms.

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 ALCOHOL – Any of a series of hydroxyl compounds having the general formula $C_nH_{2n+1}OH$, including ethanol. The fuel may be provided in liquid or gelled form.

5.2.1 CARTRIDGE OR CAN – A container that is used to enclose the fuel for shipment and transportation and in addition is used to hold the fuel while it is burning (ie. acts as the burner also).

5.3 COMBUSTIBLE MATERIAL – Material made of or surfaced with wood, compressed paper, plant fibers, plastics, or other material that can ignite and burn, whether flameproofed or not, or whether plastered or unplastered.

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5.4 COMBUSTION – The rapid oxidation of fuel accompanied by the production of heat, or heat and light. Complete combustion of a fuel is possible only in the presence of an adequate oxygen supply.

5.5 COMBUSTION (BURNING) CHAMBER – The area within the appliance where the fuel is intended to be combusted.

5.6 ENCLOSURE – The construction that surrounds and contains all parts of the appliance, including the combustion chamber and fuel reservoir.

5.6.1 FIREPLACE GRATE – A structure containing a fuel reservoir, which is intended to be secured within an existing masonry fireplace.

5.6.2 FUEL CONFINING PART – A fuel confining part is a part of the factory built appliance that is in direct physical contact with alcohol.

5.7 FUEL RESERVOIR – The basin where the fuel is loaded for the purposes of combustion.

5.8 NONCOMBUSTIBLE MATERIAL – A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat; materials that are reported as passing ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, shall be considered noncombustible materials.

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5.9 READILY ACCESSIBLE – Accessible without the need to open an access door or cover.

5.9.1 TEST STRUCTURE – the laboratory-built enclosure used to test decorative unvented alcohol gel fueled appliances for compliance with UL 1370.

5.10 UNVENTED DECORATIVE APPLIANCE, FLOOR – A stationary, self-contained, decorative appliance intended to be directly or indirectly secured to the floor and not for duct connection, which burns alcohol and is made in a manufacturing facility for subsequent delivery to the installation site.

5.11 UNVENTED DECORATIVE APPLIANCE, WALL – A stationary, self-contained, wall mounted appliance and not for duct connection, intended to be directly or indirectly secured to the wall, which burns alcohol and is made in a manufacturing facility for subsequent delivery to the installation site.

CONSTRUCTION

6 General

6.1 Assembly

6.1.1 Each unvented decorative appliance shall include all the essential components necessary for its intended function when installed as intended.

6.1.2 The various parts of an unvented decorative appliance shall be constructed and assembled in accordance with these requirements to provide the strength, rigidity, and durability required.

6.1.3 The various parts of an unvented decorative appliance shall be assembled or jointed as intended. Soft solder shall not be used on any fuel-handling parts if melting of the solder may allow leakage of fuel. Soft-soldered joints, where acceptable, shall be made mechanically secure before soldering.

6.1.4 The unvented decorative appliance shall be completely assembled by the manufacturer before shipment from the factory.

Exception No. 1: An unvented decorative appliance that incorporates decorative logs may be shipped with the logs uninstalled.

Exception No. 2: A combustion chamber fuel reservoir that complies with the requirements in 7.5.2 may be furnished without being assembled on the unvented decorative appliance.

Exception No. 3: An unvented decorative appliance that incorporates a guard or grille may be shipped with the guard or grille unassembled, provided the appliance is marked in accordance with 22.2.3(n).

6.2 Installation of appliance

6.2.1 The unvented decorative appliance shall be installed in a fixed secure position by screws, bolts, or the equivalent to wall studs or floor joists, or other construction elements capable of securing the item firmly, such as a concrete floor. For a fireplace grate, the unit shall be provided with means to secure it within an existing masonry fireplace.

Exception: Appliances with a minimum weight of 100 pounds (45.46 kg) and meet Section 16 and/or SA7 Stability tests are considered fixed and not required to be secured by screws, bolts, or the equivalent to wall studs or floor joists.

6.2.2 Installation instructions shall be provided with the unvented decorative appliance per Section 19, Marking.

7 Materials

7.1 General

7.1.1 An unvented decorative appliance shall be constructed of materials having the necessary strength and durability to provide intended service of the parts and the assembly. Parts shall not sag, distort, melt, oxidize, or show leakage of fuel during any of the tests specified herein.

7.2 Fuel confining parts

7.2.1 A fuel-confining part of an unvented decorative appliance or an operating part in contact with the fuel, if malfunction of the part would allow leakage of fuel, risk of fire, or prevent a safety device from functioning, shall have the necessary strength, durability, and resistance to fire to provide intended service of the parts and the assembly. Parts formed from drawn- or machined-brass rod or bar stock shall comply with the 10-Day Moist Ammonia Air Stress Cracking Test, Section 18.

7.2.2 To comply with the requirements in 7.2.1, a material having a melting point (solidus temperature) of not less than 950°F (510°C) and a tensile strength of not less than 10,000 psi (68.9 MPa) at 400°F (204.4°C) shall be used.

7.2.3 A material used for gaskets and seals to confine alcohol based fuels shall be compatible with the intended fuel as determined by tests in accordance with Gasket Test, Section 18.

7.3 Base

7.3.1 The base of an unvented decorative appliance shall be constructed of metal or fabricated of other noncombustible material in a manner that provides equivalent strength and durability.

7.3.2 All materials used in the base construction shall be provided with corrosion protection.

7.4 Enclosure

7.4.1 An enclosure shall be provided for the protection of the appliance combustion chamber and fuel reservoir.

Exception: Fireplace grates do not require an integral enclosure; they utilize the existing masonry fireplace as their enclosure, see 1.1(c).

7.4.2 An enclosure shall be made of steel or material of equivalent strength and durability so that it is not likely to be damaged by handling in shipment, installation, and use.

7.4.3 Sheet metal enclosures shall have a minimum thickness of 0.025 inches (0.635 mm).

7.4.4 Thermal insulation may be provided in the walls of the enclosure.

7.4.5 The construction of fabricated enclosures shall be in accordance with reasonable concepts of safety, substantiality and durability. Component parts shall be secured against distortion, warpage or other damage and constructed so as to maintain a fixed relationship between essential parts under normal and reasonable conditions of handling and usage. Fabricated enclosures shall comply with the requirements in this section.

7.5 Combustion chamber and fuel reservoir

7.5.1 The combustion chamber and fuel reservoir shall comply with this section and 7.2.2.

7.5.2 A combustion chamber and/or fuel reservoir, if furnished as a separate assembly, shall be arranged for attachment to the unvented decorative appliance in the intended position only and in a manner that will establish and maintain the intended position of the combustion chamber fuel reservoir with respect to the appliance.

7.5.3 The combustion chamber and fuel reservoir shall be designed to limit the amount of fuel loaded into the combustion chamber and have provisions to prevent spillage of fuel onto combustible surfaces. The maximum total fuel volume of all fuel reservoirs and the combustion chamber shall be 2.6 gallons (10 Liters).

7.5.4 The thickness of uncoated sheet steel used in the combustion chamber and fuel reservoir construction shall not be less than 0.042 inch (1.07 mm). A preservative shall be applied to uncoated surfaces to prevent rusting prior to use.

7.5.5 The wall thickness of aluminum-coated steel, galvanized steel, terne sheet, and corrosion-resistant sheet metal shall be not less than 0.016 inch (0.41 mm) uncoated. Coated sheet shall be of prime finish, that is, free from blisters, flux, and uncoated spots visible to the unaided eye.

7.5.6 Zinc coating on sheet steel shall not be less than Grade G90. Galvanized steel conforming to The Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653, certified as such by the steel mill, as evidenced by a marking on each bundle or roll, ordinarily conforms to the above.

7.5.7 The coating of aluminum-coated steel sheet shall not be less than T1 40, (120 g/m^2) of sheet conforming to The Standard Specification for Steel sheet, Aluminum Coated, by the Hot Dip Process, ASTM A463.

7.5.8 A joint of a combustion chamber and/or fuel reservoir shall be locked-seamed, brazed, welded, or otherwise made mechanically secure. A joint not continuously brazed or welded shall be thoroughly sweated with solder or the equivalent, see 6.1.3. Brazing or welding of coated sheets less than 0.042 inch (1.07 mm) thick shall not damage the coating of surfaces in contact with the fuel when the combustion chamber fuel reservoir is full. All connections shall be made through solid threaded bosses or fittings mechanically secured to the combustion chamber and/or fuel reservoir.

7.6 Piping, tubing and fittings

7.6.1 Pipe and fittings shall be standard full-weight wrought iron or steel, or iron-pipe size brass or copper pipe. Unions, if used, shall be the ground-joint type or the equivalent.

7.6.2 Steel tubing of the seamless, brazed, or welded type shall be not less than 0.236 in. (6.00 mm) outside diameter and shall have a wall thickness not less than that shown in Table 7.1.

Table 7.1
Wall thickness – steel tubing

Outside diameter, in. (mm)	Wall thickness, in. (mm)
0.236 (6.00)	0.029 (0.71)
5/16 (7.94)	0.028 (0.71)
3/8 (9.53)	0.028 (0.71)
1/2 (12.7)	0.028 (0.71)
5/8 (15.88)	0.035 (0.89)
3/4 (19.05)	0.035 (0.89)

7.6.3 Steel tubing used for confinement of liquid fuel or refilling the appliance shall be constructed of corrosion resistant material such as stainless steel or shall be plated, dipped, coated, or otherwise treated to resist external corrosion.

7.6.4 Seamless drawn aluminum or copper tubing employed in the fabrication of factory assembled equipment shall be not less than 1/4 in. (6.35 mm) outside diameter and shall have a wall thickness not less than that shown in Table 7.2

Table 7.2
Wall thickness – aluminum and copper tubing

Outside diameter, in. (mm)	Wall thickness, in. (mm)
1/4 (6.35)	0.029 (0.74)
5/16 (7.94)	0.029 (0.74)
3/8 (9.53)	0.032 (0.81)
7/16 (11.11)	0.032 (0.81)
1/2 (12.70)	0.035 (0.89)
9/16 (14.29)	0.038 (0.96)
5/8 (15.88)	0.038 (0.96)
3/4 (19.05)	0.045 (1.14)

7.6.5 Tubing connections shall be made by means of compression or flare type fittings with steel or brass nuts.

7.6.6 Flexible metal hose, if used, shall be of a type acceptable for the purpose and be used in a manner that it is not likely to be damaged.

8 Controls

8.1 Oxygen depletion safety shutoff systems

8.1.1 Each unvented decorative appliance shall be equipped with an oxygen depletion sensitive (ODS) safety shutoff system.

Exception: If the unvented decorative appliance successfully passes the Combustion Tests by the maximum fuel capacity condition instead of the oxygen depletion level of 15.1 percent, as outlined in Combustion Tests, Section 13, an oxygen depletion safety shutoff system is optional.

8.1.2 The ODS shall act to extinguish the combustion chamber flame when the oxygen in the surrounding atmosphere is depleted to the percent concentration specified by the manufacturer, but not lower than 18.0 percent.

8.1.3 The ODS shall not incorporate field adjustment means capable of changing the set point at which the system acts to shut off the combustion chamber flame.

8.2 External manual shutoff devices

8.2.1 An unvented decorative appliance shall be equipped with an external manual-shutoff device to extinguish the burner flame. The device shall be operable by a motion in one direction, such as pushing a button or pulling a lever.

8.2.2 The external manual shutoff device shall be visable and readily accessible while the appliance is in operation.

PERFORMANCE

9 General

9.1 An unvented decorative appliance shall comply with the applicable requirements when tested as described herein in an ambient of 75.0 ±9.0°F (23.9 ±5.0°C) or as noted in the individual test. An appliance of a type not described specifically herein shall be tested in accordance with the intent of these requirements.

9.2 The performance of an unvented decorative appliance shall be evaluated upon the basis of operation tests conducted on the appliance. Appliances of each size and type, or a sufficient number of sizes and types to be representative of the entire range of sizes and types involved, are to be subjected to all or part of the tests prescribed herein. If optional features affecting performance are furnished, an unvented decorative appliance shall be tested with each such optional equipment.

9.3 An unvented decorative appliance, when tested in accordance with these requirements, shall operate free from excessive carbonization or other phenomena that may increase the risk of fire or explosion. See 13.8.

9.4 If any indications are observed during the tests prescribed in this Standard, that an unvented decorative appliance will not continue to comply with the requirements in intended usage, supplementary tests shall be conducted, as deemed necessary by the certifying organization, to determine compliance.

9.5 Wherever use of cheesecloth is specified for use in a test (see Sections 14, Operation Tests and 15, Temperature Tests) bleached cheesecloth shall be used as specified in 9.6.

9.6 Bleached cheesecloth shall be 36 inches (910 mm) wide, running 14 –15 yards per pound (28 – 30 m/kg), and having what is known to the trade as a count of 32 x 28; that is, for any square inch, 32 threads in one direction and 28 threads in the other direction (for any square centimeter, 13 threads in one direction and 11 threads in the other direction).

10 Instrumentation

10.1 Temperature measurement

10.1.1 Temperatures of other than metal surfaces are to be measured using either Type K (chromel-alumel) or Type J (iron-constantan) thermocouples of wire not larger than 24 AWG (0.21 mm^2). |

10.1.2 Temperatures of metal surfaces other than handles and electrical components are to be measured using Type J (iron-constantan) or Type K (chromel-alumel) of 18 AWG (0.82 mm) to 24 AWG (0.21 mm^2). |

10.1.3 The thermocouple wire insulation shall have a temperature use rating higher than the temperatures to which it is subjected during these tests. |

10.1.4 The wiring methods for thermocouple circuitry, including junctions, terminals, switches, plugs, and jacks are to be designed and constructed to provide independent continuous routing of both thermocouple leads to the recording equipment. |

10.1.5 The ambient temperature of a zone shall be determined by a thermocouple located centrally within a vertically oriented 6 inch (152 mm) length of 2 inch steel pipe, aluminum painted, and open at both ends. |

10.1.6 Ambient temperatures are to be determined by shielded thermocouples located relative to parts of the unvented decorative appliance and test structure. |

10.1.7 The ambient temperature in Figure 10.2 shall be determined by use of a shielded thermocouple located 6 inches (152 mm) away from the side wall, 7 feet (2.1 m) from the back wall, and 4 feet (1.2 m) above the floor. |

10.1.8 The measurements of temperature rises on the fire chamber and on the enclosures and test structure are to be referenced to the recorded ambient temperature determined as indicated in 10.1.7. |

10.1.9 Thermocouples are to be attached to metal surfaces by screws, rivets, silver soldering, brazing, or welding of the tip to the metal surface. See Figure 10.1. |

Figure 10.1
Thermocouple installation methods

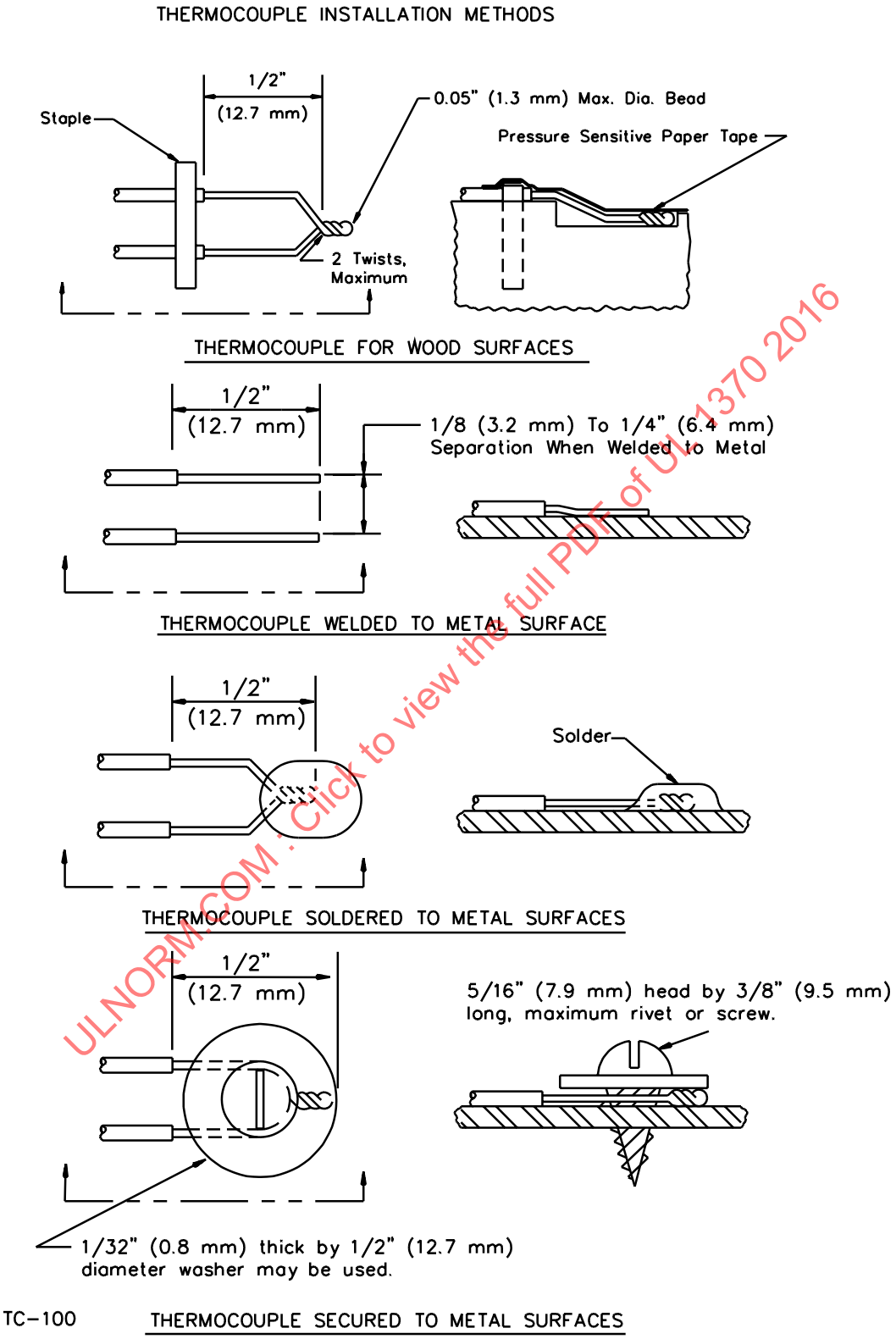
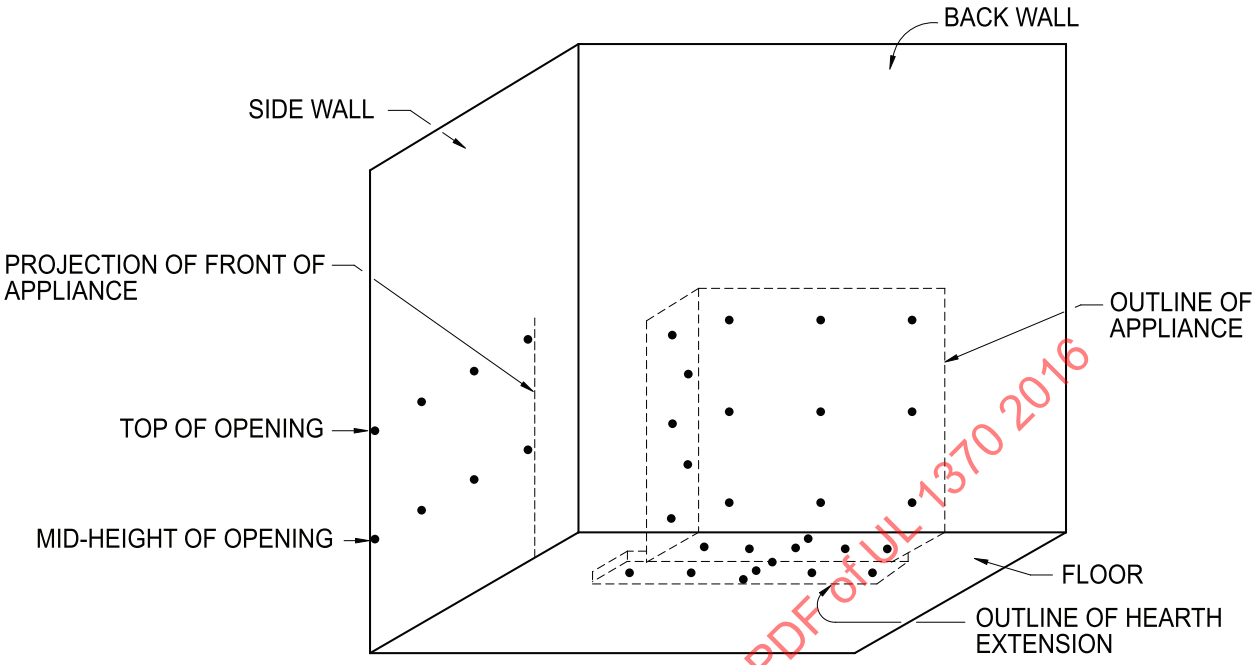


Figure 10.2
Typical thermocouple locations (•) back, side, and floor of test structure



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10.1.10 Thermocouples shall be secured to wood surfaces by the use of staples placed over the insulated portion of the wires. The thermocouple tip shall be depressed into the wood so as to be flush with the wood surface at the point of measurement and held in thermal contact with the surface at that point by the use of pressure-sensitive paper tape. See Figure 10.1.

10.1.11 Thermocouples shall be attached to nonmetallic or nonwood material surfaces by having the 1/2 inch (12.7 mm) tip and at least 1 inch (25.4 mm) of the lead wires embedded into the material so as to be flush with the surface of the material. Furnace cement shall be smoothed over such indentations to maintain thermal contact.

10.1.12 Thermocouples shall be attached to surfaces other than those described in 10.1.9 or 10.1.11 by being cemented or taped to the surface to maintain thermal contact with the surface. Materials or parts whose temperatures are to be measured are included in Table 15.1.

10.1.13 A minimum number of typical thermocouple locations to be attached to wood surfaces of the fire chamber enclosure is shown in Figure 10.2.

10.1.14 For test enclosure elements in contact with a fire chamber part, junctions of thermocouples are to be placed on the fire chamber part surface.

Exception No. 1: Where a point or line contact of a spacer to an enclosure is not greater than 1/8 inch (3.2 mm) diameter or width, thermocouples are to be placed on the test enclosure at points 1/2 inch (12.7 mm) from the center line of such point or line contact.

Exception No. 2: Thermocouples shall not be attached to a combustible floor unless the bottom of the fire chamber is in direct contact with the floor.

10.1.15 As applicable, thermocouples shall be attached to the plywood flooring under the unvented decorative appliance and, as applicable, placed between the hearth extension material and the plywood flooring. The two front center thermocouples under the hearth extension shown in Figure 10.2 are to be placed 1/2 inch (12.7 mm) and 1-1/2 inches (38.1 mm), respectively, from the front edge of the hearth extension. The front edge of the hearth extension is the exposed front away from the face of the unvented decorative appliance, and not the edge that abuts the front of the appliance surround.

Figure 10.3
Typical thermocouple locations (Fire chamber surfaces)

Figure 10.3 deleted January 8, 2014

10.1.16 Thermocouples shall be attached to the various surfaces of the fire chamber in at least the typical locations shown in Figure 10.3.

10.1.17 The surface temperature for the largest amount of material employed in a handle or knob used on an appliance shall not exceed the temperature specified in Table 15.1 during the Temperature Test.

Exception: The temperature limitation does not apply to knobs used for adjusting combustion air inlets.

10.2 Flue-gas analysis

10.2.1 The concentration of carbon monoxide in flue gases shall be measured by means of an infrared analyzer or other equivalent instruments.

10.2.2 The concentration of nitrogen dioxide in the combustion products shall be measured by means of a chemiluminescent type or equivalent instrument that has a rated accuracy of not more than plus or minus 2 percent and rated precision not more than plus or minus 1 percent. The sample shall not pass through a cold trap.

10.2.3 A hood with a mixing chamber, constructed as illustrated in Figures 10.4 and 10.5, employing a probe as illustrated in Figure 10.6, shall be used to collect combustion products for analysis in accordance with the test described in 13.10 of Section 13, Combustion Tests. The hood assembly shall be of the size to encompass the parameter of the appliance but not less than 24 inches (609.6 mm) by 30 inches (762 mm) in dimension. The longitudinal axis of the probe is to be parallel with the 24 inch (609.6 mm) dimension of the hood, and perpendicular to the 30 inch (762 mm) of the hood. The hood, the mixing chamber, the probe and the tubing and connectors between the probe and the nitrogen dioxide instrument shall be of materials such as aluminum, stainless steel and teflon that do not adsorb nitrogen dioxide.

Figure 10.4
Hood assembly

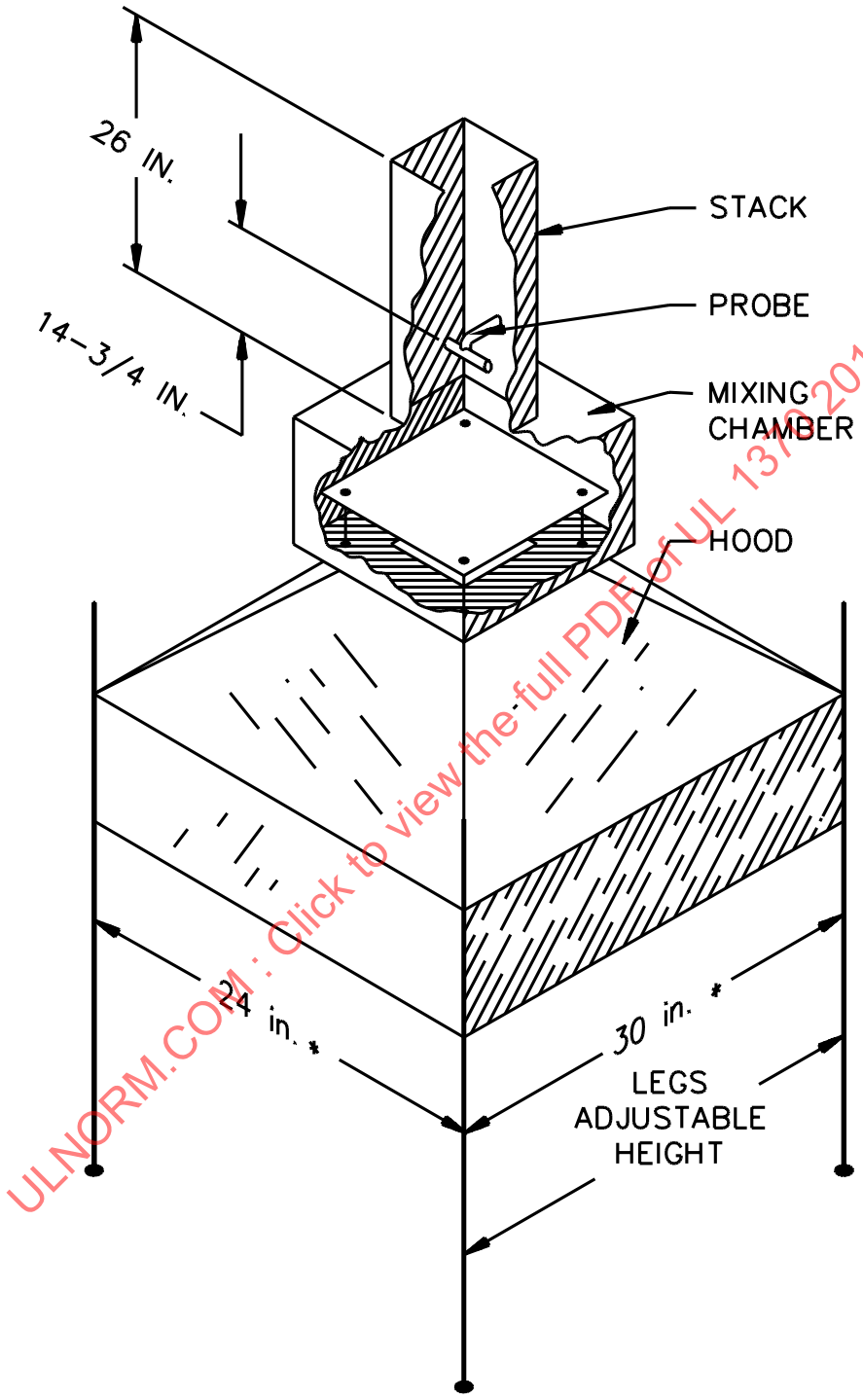
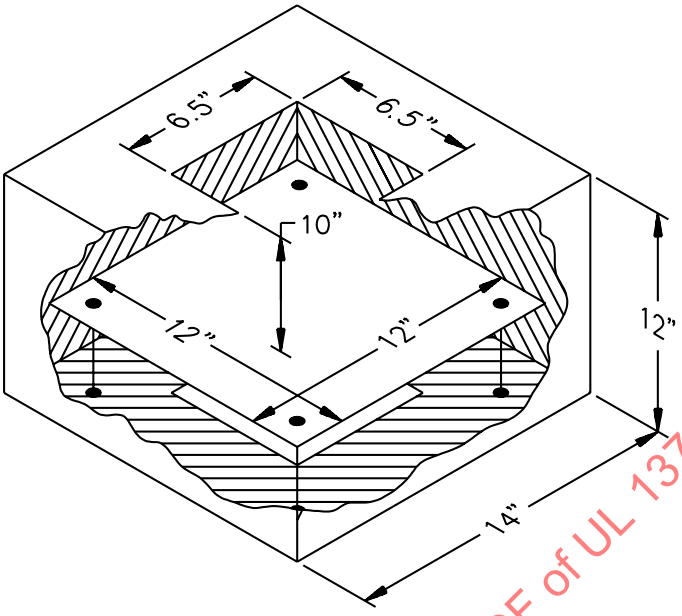


Figure 10.5
Mixing chamber



1 inch = 25.4 mm

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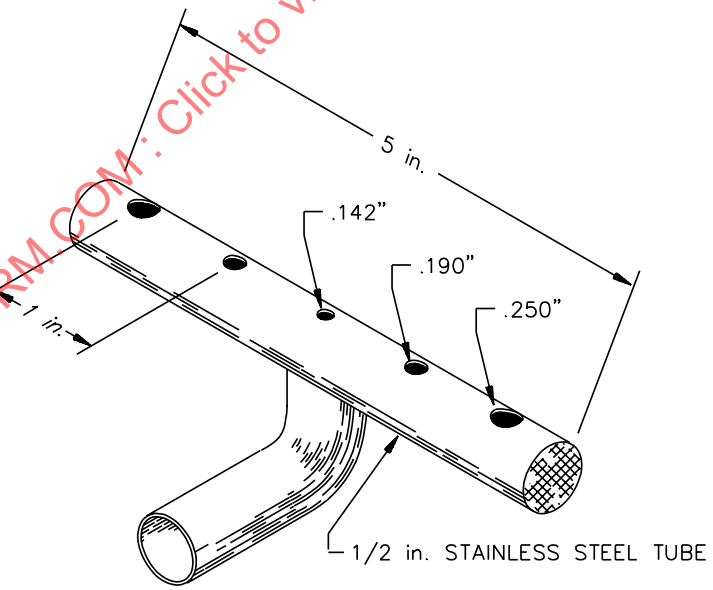
Figure 10.6
Multiport sample probe



1 inch = 25.4 mm

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11 Temperature Test Installation

11.1 Tests shall be conducted as described herein on each type of unvented decorative appliance. When an unvented decorative appliance is manufactured in more than one size, tests shall be conducted on as many representative sizes as required to determine compliance of all sizes with these requirements.

11.2 Unvented decorative appliances having doors shall be tested with the doors fully open and fully closed.

11.3 Unvented decorative appliances shall be tested as described in Temperature Test.

11.4 The unvented decorative appliance shall be installed in a structure similar to that illustrated by Figure 10.2 and constructed to accommodate the appliance to be tested. Combustible enclosure materials and a mantel (when applicable) are to be placed in proximity to the unvented decorative appliance in accordance with the minimum distances specified in the installation instructions.

Exception: For the purposes of the temperature test, fireplace grates are not required to be installed in a structure similar to that illustrated by Figure 10.2 and described in 11.4 – 11.18. They are to be tested on a non-combustible floor with all sides exposed.

11.5 The test structure shall be free of extraneous drafts and the unvented decorative appliance is to exhaust into the same space, or into a space freely communicating with the space, from which the combustion air is taken. A typical room with a test structure is shown in Figure 10.2.

11.6 The temperature of the entire test structure shall be between 60 and 90°F (16 and 32°C) at the beginning of the Temperature Test.

11.7 The room in which the test structure is erected shall be such that during any one test the room temperature does not increase by more than 20°F (11°C) above the room temperature recorded at the beginning of the test.

11.8 Ventilating, combustion, or cooling-air openings into the unvented decorative appliance assembly are to be sealed unless the openings are more than 1-1/2 inches (38.1 mm) above the floor and are otherwise arranged so that unintentional closure does not occur.

11.9 That part of the test structure representing the living-space area in which the unvented decorative appliance shall be installed shall consist of a back wall, one side wall, a combustible floor, and a typical ceiling and floor construction. A typical test installation is shown in Figure 10.2.

11.10 The combustible floor below the unvented decorative appliance is to consist of two layers of 3/4-inch (19.1-mm) thick plywood over trade size 2- by 4-inch [nominal 1-1/2 by 3-1/2 inches (38.1 by 89 mm)] or trade size 2- by 6-inch [nominal 1-1/2 by 5-1/2 inches (38.1 by 140 mm)] floor supports placed on 16 inch (406 mm) centers.

11.11 The side wall and back wall shall consist of one thickness of 3/4 inch (19.1 mm) plywood.

11.12 The ceiling construction immediately above the unvented decorative appliance shall be constructed with one thickness of 3/4 inch (19.1 mm) plywood.

11.13 The floor under, and the ceiling above, the unvented decorative appliance shall be 8 feet (2.4 m) apart and shall extend at least 4 feet (1.2 m) in front of the unvented decorative appliance opening and at least 8 feet in front of the back wall. The side wall shall be perpendicular to the back wall and located at the minimum distance specified by the manufacturer and not more than 4 feet from the nearest side of the appliance opening. The floor, ceiling, and back wall are to join the side wall. The floor, ceiling, and back wall shall extend at least 4 feet beyond the side of the unvented decorative appliance opening which is opposite the side wall.

11.14 The unvented decorative appliance shall be located in relation to the back wall of the test structure in accordance with the minimum clearances specified by the installation instructions. Other areas of the unvented decorative appliance in contact with combustible construction, when the appliance is recessed or enclosed, such as the sides, bottom, and top, are to be enclosed with one layer of 3/4 inch (19.1 mm) plywood at the minimum clearances specified by the installation instructions.

11.15 When installation instructions specify areas not to be in contact with combustible material, those areas shall be fully exposed to the living space in which the unvented decorative appliance is located.

11.16 The face areas of an unvented decorative appliance that are intended to be covered with decorative materials, such as slate, tile, or marble are to be covered with such materials when provided with the unvented decorative appliance, otherwise, with noncombustible material having a 3/8 inch (9.5 mm) minimum thickness.

11.17 Unless the manufacturer's installation instructions specify that the unvented decorative appliance fire chamber within the living space in which the appliance is located shall be fully exposed, the fire chamber is to be enclosed with 3/4 inch (19.1 mm) thick plywood extending to the back of the test structure.

11.18 When an unvented decorative appliance is provided with air ducts, the appliance shall be tested with the ducts installed and with the specified air space provided above the fire chamber. This installation method, for example, ″chase installation,″ shall be illustrated in the installation instructions.

12 Combustion Chamber Fuel Reservoir Capacity

12.1 For all tests that specify a full fuel reservoir or chamber, the reservoir or chamber shall be filled in accordance with 12.2.

12.2 With respect to the requirement in 7.5.3, the capacity of an integral or removable fuel reservoir of the unvented decorative appliance shall be determined by:

a) Measuring the amount of fuel that can be poured into the reservoir through its fill opening before it overflows from the fill opening; or

b) Measuring the amount of gelled fuel containers that can be properly loaded into the chamber.

For this test the unvented decorative appliance shall be located on a level surface and the fuel shall be at a temperature of 65 ±10°F (18 ±6°C).

13 Combustion Tests

13.1 The unvented decorative appliance is to be observed for a stable burner flame. Samples of the combustion products are to be analyzed for maximum smoke density, carbon monoxide, carbon dioxide, nitrogen dioxide, and oxygen concentration in accordance with 13.2 – 13.9. See 10.2 for details on flue gas analysis. The hood as described in 10.2.3 is not required for the test described in 13.2 – 13.9 (sealed room), but shall be required for the test described in 13.10 (open room).

13.2 The unvented decorative appliance is to be arranged for operation in accordance with the instructions furnished with the unvented decorative appliance and in an area free of drafts. The surfaces of the unvented decorative appliance are to be clean and free of soot and dust at the beginning of the test.

13.3 The unvented decorative appliance is to be operated at the maximum permissible setting and/or fuel capacity for the purpose of this test. The flue gases is to be secured as indicated in 10.2.3. Room (ambient) temperature is to be recorded as indicated in 10.1.6.

13.4 When tested in accordance with 13.5 – 13.9, the carbon monoxide concentration of the combustion products is not to exceed 0.025 percent and the oxygen content of the room is not to be reduced to 15.1 percent by volume or less, corrected to 60°F (15.5°C) and 30.0 inches mercury (101.3 kPa) pressure, in a room with no air changes occurring during combustion of the maximum capacity of the fuel reservoir. The smoke density is not to exceed that indicated by a number 1 spot on the Shell-Bacharach scale with the Model RDC smokemeter or equivalent.

13.5 The unvented decorative appliance is to be installed in a room constructed so as to prevent infiltration of air. The volume of the room is as shown on Table 13.1. Air circulation within the room is to be provided so the atmosphere of the room is evenly mixed and does not interfere with the operation of the unvented decorative appliance.

Table 13.1
Test room volume

Fuel Capacity, L	Test Room Size	
	ft^3	m^3
2	1050	29.8
3	1575	44.6
4	2100	59.5
5	2625	74.4
6	3150	89.3
7	3675	104.1
8	4200	119.0
9	4725	133.9
10	5250	148.8

13.6 The unvented decorative appliance is to be operated for 15 minutes with the door of the room open and the room completely ventilated. A smoke density sample is to be taken at the completion of the 15 minute duration then, the room is to then be sealed and the ventilation shut off.

13.7 During the operation of the test, room temperature, oxygen, carbon monoxide, and carbon dioxide shall be monitored at minimum intervals of 5 minutes. A final sample of the products of combustion shall be analyzed at the completion of the test, when the oxygen content of the room reaches 15.1 percent or within 3 minutes of the fuel in the reservoir being completely combusted, whichever condition is reached first. The final sample shall be evaluated for carbon dioxide concentration and the increase in carbon monoxide production from the initial time of the room being sealed, per 13.6 and the smoke density of the products of combustion.

13.8 No excess carbon, soot, or tar is to be deposited on surfaces of the unvented decorative appliance. Any accumulation is to be deemed excessive if it:

a) Is likely to be deleterious to the performance of the unvented decorative appliance resulting in increased risk of explosion or run-away fire; or

b) Continually increases as the test progresses.

Note: The observations of 13.8 are determined by the discretion of the testing agency performing the certification testing.

13.9 No flames are to extend beyond the unvented decorative appliance casing.

13.10 The appliance is to also be tested in the appropriate room size shown on Table 13.1 with normal oxygen supply (door of room open and ventilated). The appliance is to be operated until the fuel in the reservoir is completely combusted. An initial reading of carbon monoxide, carbon dioxide, and nitrogen dioxide is to be recorded 1 hour after the start of the test or when 50 percent of the fuel has been combusted, whichever is less, and monitored at equal intervals of 1 to 15 minutes thereafter, with a minimum of 10 readings recorded. All recordings are to be averaged to obtain a final representative reading. The carbon monoxide concentration of the combustion products is not to exceed 0.02 percent and the nitrogen dioxide concentration of the combustion products is not to exceed 0.002 percent in an air free sample. Observations of the appliance during this test are to be in accordance with 13.8 and 13.9.

14 Operation Tests

14.1 Test No. 1

14.1.1 An unvented decorative appliance, when lighted as described in 14.1.2 and 14.1.3, is to cause no flash or puff and all portions of the reservoir burner shall continuously burn.

14.1.2 The unvented decorative appliance is to be arranged for operation in accordance with the instructions furnished with the unvented decorative appliance and in an area free of drafts. The surfaces of the unvented decorative appliance are to be clean and free of soot and dust at the beginning of the test.

14.1.3 With the unvented decorative appliance at room temperature, the reservoir burner is to be lighted in accordance with the manufacturer's instructions. After ignition is obtained, the unvented decorative appliance is to be operated for 15 minutes. The reservoir burner is then to be shut off and, immediately following extinguishment of a burner flame, the burner is to be again lighted. The burner is to then be allowed to fire at high-fire input for at least 15 minutes. The unvented decorative appliance is then to be turned off. After the unvented decorative appliance has attained room temperature, the burner is to be again lighted in accordance with the instructions. The interval from the time the fuel is ignited until stable ignition can be obtained is to be not more than 5 minutes.

14.2 Test No. 2

14.2.1 Two layers of cheesecloth are to be placed on the floor beneath the unvented decorative appliance and be extended 12 inches (0.3 m) beyond in all directions. Two thickness of cheesecloth, stretched taut, are to be placed vertically in a plane parallel to and 12 inches from the appliance opening or boundary and other openings of the unvented decorative appliance.

14.2.2 The unvented decorative appliance is to be fired at high-fire input for not less than 30 minutes. The burner is then to be shut off. Immediately after the burner flame becomes extinguished, the doors or panels, if so equipped, are to remain in a closed position. If no autogenous ignition occurs in 15 seconds, the lighting door is to be opened and the burner ignited per the manufacturers instructions.

14.2.3 No ignition, burning, charring, etc. of the cheesecloth is to occur during the test.

14.3 Test No. 3

14.3.1 An unvented decorative appliance, when operated as described in 14.3.3 and 14.3.4, is to comply with the following:

a) The burner is to be capable of igniting without delay;

b) All portions of the reservoir burner opening are to continuously burn;

c) The wind is to cause no flash;

d) The burner is not to become permanently extinguished; and

e) Flames considered a risk of fire are not to extend beyond the appliance opening, see 14.3.2 (Not applicable to fireplace grates.).

14.3.2 If during the conduct of this test, any flames are observed extending outside of the appliance opening, the test specified in 14.3.5 is to be applied to determine compliance to 14.3.1(e).

Exception: This requirement does not apply to a fireplace grate (see 5.6.1).

14.3.3 A draft is to be directed to strike the unvented decorative appliance from the front by means of a blower, the output of which passes through a 12 inch (305 mm) length of 5 inch (127 mm) diameter sheet-metal pipe in the outlet end of which is fastened a sheet-metal orifice disc with a 3 inch (76.2 mm) diameter opening.

14.3.4 The point on the axis of the air stream 6 ft (1.83 m) from the orifice of the blower pipe shall coincide with the midpoint of the plane of the appliance opening. The unvented decorative appliance is to then be removed or blocked and the blower regulated to produce a wind velocity of 3 miles per hour (1.34 m/s) as measured by the average of the readings taken with an anemometer at the midpoint of four 6 in. (152 mm) squares forming a plane area 1 ft (305 mm) square at right angles to the axis of the air stream and 6 ft (1.83 m) from the orifice. The appliance is to then be replaced in the identical position it initially occupied and the reservoir burner is to be lighted in accordance with the manufacturer's instructions. The test is to be repeated at any critical angle of the wind to the appliance at the testing agency's discretion.

14.3.5 If, when the appliance is operated as described in 14.3.3 and 14.3.4, flames are observed to extend outside any appliance opening or boundary, the test is to be repeated with two thickness of cheesecloth stretched taut and placed vertically in a plane parallel to any appliance side opening and horizontally in a plane parallel to any appliance top or bottom opening of the unvented decorative appliance.

14.3.6 The cheesecloth is to be located at the lesser of the clearance to combustibles specified in the installation instructions or at 12 inches (305 mm) to the appliance opening or boundary. The test is to be conducted at any combination of wind angle and cheesecloth application at the testing agency's discretion. No ignition, burning, charring, etc. of the cheesecloth is to occur during this test.

14.4 Test No. 4 – Applied to liquid fuel unvented decorative appliances only

14.4.1 An unvented decorative appliance, when operated as described in 14.4.2 and 14.4.3, is to ignite without flashing, flame rollout, excessive smoke or ignition of the cheesecloth. And, within 5 minutes of ignition, all flames are to be contained within the reservoir burner of the unvented decorative appliance.

14.4.2 Two layers of cheesecloth are to be placed on the floor beneath the unvented decorative appliance and be extended 12 inches (0.3 m) beyond in all directions. Two thickness of cheesecloth, stretched taut, are to be placed vertically in a plane parallel to and 12 inches (0.3 m) from the appliance opening or boundary and other openings of the unvented decorative appliance.

14.4.3 The unvented decorative appliance reservoir burner is to be cleaned and empty prior to the test. The amount of fuel decanted into the reservoir burner shall be the maximum fuel capacity of the unit plus 10 percent. The unvented decorative appliance is to be lighted from a cold start at maximum fire input, per the manufacturers instructions, and operated for 1 hour or until the fuel is exhausted. The burner is then to be shut off. The burner is then to be immediately filled to maximum capacity plus 10 percent and lighted again at maximum fire input, per the manufactures instructions, and operated for a minimum of 30 minutes or until the fuel is exhausted. The time between burner shut down, refueling and relighting is not to exceed two minutes.

14.4.4 At the conclusion of the test in 14.4.3 and while the unvented decorative appliance is ignited, the lesser of 16 ounces, or the amount to fill to maximum capacity plus 10 percent of fuel is to be added to the reservoir burner and observations made for ignition of cheesecloth. No ignition of the cheesecloth is to occur.

14.5 Test No. 5

14.5.1 An unvented decorative appliance, when operated as described in 14.5.2 and 14.5.3 is not to ignite the open container of fuel or the fumes of that fuel in any way.

14.5.2 A container approximately 3 inches (7.6 cm) deep with a minimum open surface area of 28.26 in^2(182.32 cm^2) and a level overflow rim is to be filled to within 0.25 inches (6.4 mm) of the overflow rim with the intended fuel of the unvented decorative appliance and placed on the floor as close to the combustion chamber of the unvented decorative appliance as possible.

14.5.3 When the unvented decorative appliance opening is above the container, the height of the container is to be adjusted so the fuel surface in the container coincides [within 0.125 inches (3.2 mm)] with the bottom of the unvented decorative appliance opening.

14.5.4 The height adjustment in 14.5.3 may be accomplished by a level platform or stand with the container located at the horizontal distance from the unvented decorative appliance established in 14.5.2.

14.5.5 The unvented decorative appliance is to be fired at maximum-fire input for not less than 30 minutes.

14.5.6 Test No. 5 is to be repeated with a container located on each side of an unvented decorative appliance that is constructed with open access to the combustion chamber.

15 Temperature Tests

15.1 The unvented decorative appliance is to be installed in accordance with 10.1 and Section 11, Temperature Test Installation. The manufacturer's installation instructions are to be used as a guide.

15.2 After ignition of the fuel in the unvented decorative appliance, temperatures at all points of measurement are to be recorded at intervals not exceeding 30 minutes until it is apparent the maximum temperatures have been attained. Maximum temperatures are identified to have been attained when three successive readings taken at 30-minute intervals show no change or show a decrease.

15.3 When the unvented decorative appliance is fired the maximum temperature rise above ambient temperature is not to exceed:

a) 117°F (65°C) on exposed surfaces of the test enclosure; and

b) 90°F (50°C) on concealed surfaces of the test enclosure, such as beneath the hearth (fire chamber), beneath the hearth extension, behind the wall-mounted shields, and surrounding the unvented decorative appliance fire chamber.

15.4 The temperature rise of any part of the unvented decorative appliance assembly is not to exceed the maximum values specified in Table 15.1 for the material employed.

Table 15.1
Maximum temperature rises

Device or material			Degrees	
			C	F
A.	Metals[a]			
	1.	Aluminum alloys –		
		a. 1100 (2S)	183	330
		b. 3003 (3S)	239	430
		c. 2014, 2017, 2024, 5052[b]	294	530
	2.	Aluminum-coated steel, heat-resistant type[c]	572	1030
	3.	Carbon steel – Coated with Type A19 ceramic	572	1030
	4.	Galvanized steel[d]	267	480
	5.	Low-carbon steel, cast iron[e,c]	461	830
	6.	Stainless steel –		
		a. Type 302, 303, 304, 321, 347	686	1235
		b. Type 316	667	1200
		c. Type 309S	867	1560
		d. Types 310, 310B	894	1610
		e. Type 430	728	1310
		f. Type 446	961	1730
B.	Handles[g]			
	1.	Metallic	50	90
	2.	Glass	78	140
	3.	Plastic[f]	85	153
	4.	Wood	150	270

[a] The specified maximum temperature rises apply to parts whose malfunction shall result in the product to not be capable of use.

[b] These and other alloys containing more than 1 percent magnesium shall not be used when the reflectivity of the material is employed to reduce the risk of fire.

[c] When the reflectivity of aluminum coated steel is employed to reduce the risk of fire, the maximum temperature rise is 830°F (461°C).

[d] The specified maximum temperature rises shall apply when the galvanizing is required as a protective coating or the reflectivity of the surface is employed to reduce the risk of fire.

[e] The specified maximum temperature rises shall not apply to parts of 0.152 inch (3.86 mm) thick or heavier steel and 3/16 inch (4.8 mm) thick or heavier cast iron employed for the hearth and to other parts of 0.093 inch (2.36 mm) thick or heavier steel, and 1/8 inch (3.2 mm) thick or heavier cast iron when:

1. The part is not the only enclosure, and
2. Malfunction of the part shall not expose adjacent combustible construction to the fire in the fire chamber.

[f] Includes plastic with a metal plating not more than 0.005 inch (0.13 mm) thick; and metal with a plastic or vinyl covering not less than 0.005 inch (0.13 mm) thick.

[g] Handle temperatures are maximum temperatures, based on an ambient temperature of 70°F or 21°C.

16 Stability Test

16.1 When a minimum force of 150 pounds is applied to the appliance in any direction, the appliance is not to tip over or become disengaged from its mounting means, per 6.2.1.

16.2 For a floor mounted unit, the unvented decorative appliance is to be placed on a level floor or platform and installed as specified by the manufacturer, per 6.2.1. When leveling means are provided, the unvented decorative appliance is to be raised to the highest position allowed by the leveling means.

16.3 For a wall mounted unit, the unvented decorative appliances is to be mounted in a level position on a wall and installed as specified by the manufacturer per 6.2.1. When leveling means are provided, the unvented decorative appliance is to be raised to the highest position allowed by the leveling means.

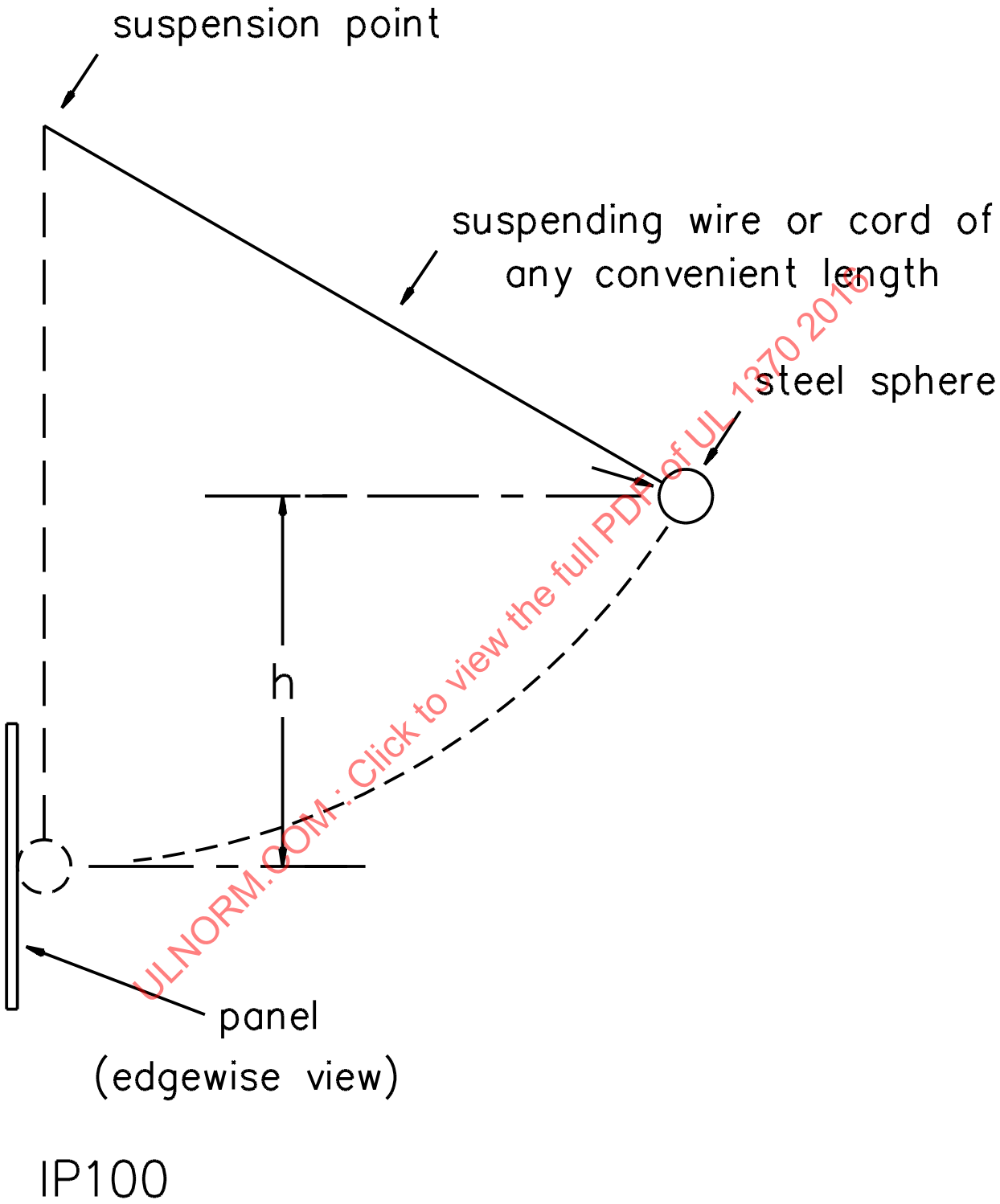
16.4 The tipping force is to be a horizontal force exerted in any direction at the topmost point of any part of the unvented decorative appliance. In addition for a wall mounted unit, this test shall be repeated in any direction at the lowest point of any part of the appliance.

17 Glass Panel Test

17.1 Glass panels and/or doors shall not crack, break, become dislodged, or sustain a loss of strength when subjected to the impact test as described in 17.2 –17.3.

17.2 An impact shall be applied to the center of the glass by means of a 1.18 lb (0.54 kg), 2 in (50.8 mm) diameter steel sphere swung through a pendulum arc from a height of 13.2 in (300 mm). The suspension point of the steel sphere shall be 39.6 in (1000 mm) above the center of the glass and the at-rest position of the steel sphere shall be 1 in (25 mm) in front of the point of impact. (See Figure 17.1, Glass Impact Test.)

Figure 17.1
Glass Impact Test



17.3 The test shall be conducted during the Temperature Test while at maximum temperatures developed during that test and following the Temperature Test with the appliance cooled to room temperature. When glass components are mounted in doors hinged such that they may close or open by gravity, they shall resist without breakage the effects of full, unrestrained opening or closure from the doors extreme closed or open positions.

MATERIAL PERFORMANCE

18 10-Day Moist Ammonia Air Stress Cracking Test

18.1 After being subjected to conditions in 18.2 – 18.4, a brass part containing more than 15 percent zinc is to show no evidence of cracking when examined using 25x magnification.

18.2 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 be effective 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 18.1. Teflon tape or pipe compound are not to be used on the threads.

Table 18.1
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)

18.3 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.

18.4 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 inches (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).

19 Gasket Test

19.1 Neoprene or rubber compounds, except foamed materials, used for gaskets to seal the unvented decorative appliance fuel tanks, are to have physical properties as specified in Table 19.1 before and after accelerated aging under the conditions specified in Table 19.2.

Table 19.1
Gasket physical properties

	Neoprene or rubber compound		Thermoplastic materials	
	Before test	After test	Before test	After test
Elongation – Minimum increase in distance between 1-inch (25.4-mm) gage marks at break.	Not specified	50 percent of original	Not specified	50 percent of original
Tensile Strength – Minimum force at breaking point.	850 psi (5.86 MPa)	50 percent of original	1200 psi (8.27 MPa)	50 percent of original

Table 19.2
Accelerated-aging conditions

Measured temperature rise		Material	Test program
°C	°F		
35	63	Rubber or neoprene	Air oven aging for 70 hours at 100°C (212°F)
35	63	Thermoplastic	168 hours in an air-circulating oven at 87.0 ±1.0°C (189.0 ±1.8°F)
50	90	Rubber or neoprene	Air oven aging for 168 hours at 100°C (212°F)
50	90	Thermoplastic	240 hours in an air-circulating oven at 100.0 ±1.0°C (212.0 ±1.8°F)
55	99	Rubber, neoprene or thermoplastic	168 hours in an air-circulating oven at 113.0 ±1.0°C (235.4 ±1.8°F)
65	117	Rubber or neoprene	168 hours in an air-circulating oven at 121.0 ±1.0°C (249.8 ±1.8°F)
65	117	Thermoplastic	168 hours at 121.0 ±1.0°C (249.8 ±1.8°F) or 1440 hours at 97.0 ±1.0°C (206.0 ±1.8°F) in an air-circulating oven
80	144	Rubber, neoprene or thermoplastic	168 hours in an air-circulating oven at 136.0 ±1.0°C (276.8 ±1.8°F)

19.2 Foamed neoprene or rubber compounds forming gaskets to seal an unvented decorative appliance fuel tank are to be subjected to accelerated aging under the conditions specified in Table 19.2. The compounds are not to harden or otherwise deteriorate to a degree that will impair their sealing properties.

19.3 Thermoplastic materials forming gaskets to seal unvented decorative appliance fuel tanks are to be subjected to accelerated aging under the conditions specified in Table 19.2. Thermoplastic material is not to deform or melt, or otherwise deteriorate to a degree that will impair its sealing properties. Solid polyvinyl-chloride gasket material shall have physical properties as specified in Table 19.1 before and after the accelerated aging.

19.4 Gaskets of materials other than those mentioned in 19.1 – 19.3 are to be nonabsorptive and shall provide equivalent resistance to aging and temperatures.

19.5 The temperatures specified in Table 19.2 correspond to the maximum temperature rise measured on the gasket during the Temperature Test, Section 15.

19.6 Gasket materials are to be alcohol resistant as determined in accordance with 19.7 and by a visual examination after immersion.

19.7 When immersed in the intended alcohol based fuel at room temperature for 70 hours, samples of gasket materials are not to shrink or swell in excess of 50 percent of original. Visual examination of the immersed sample is to indicate no sign of deterioration, such as cracking, melting, warping, discoloration, or damage.

MARKINGS

20 Marking

20.1 General

20.1.1 Markings on a fire chamber shall be permanent and, unless otherwise required to be placed at a specific location, shall be grouped together and located where they are visible and legible after the appliance is installed.

Exception: Locations within a compartment used to operate an appliance and provided with doors or panels intended to be opened or removed without requiring the use of a tool are determined visible.

20.1.2 All markings are required to be permanent. They shall be molded; die-stamped; paint-stenciled, stamped, or etched in metal that is permanently secured; or indelibly stamped on a pressure-sensitive label. Usage, handling, and storage of the product are to be evaluated in determining the permanence of the marking. See Marking Permanency Test, Section 21.

20.1.3 Each fire chamber shall be marked with the following:

a) The manufacturer's or private labeler's name or identifying symbol.

b) A distinctive type or model designation.

c) Date of manufacture (at least by quarter and year) which is in an established or otherwise traceable code.

20.1.4 A combustion chamber shall be marked: ″See (manufacturer's or private labeler's name) installation and operating instructions for this model.″

20.1.5 A combustion chamber shall also be marked at the back and sides in minimum 1/2 inch (12.7 mm) high red letters on a contrasting background with the word ″WARNING ″ and the following or equivalent statements: ″ These markings shall appear at each location on the fire chamber where clearance is required:

a) ″Risk of fire. A minimum of __a__ air space clearance to insulation and building materials must be maintained″.

b) ″Minimum Room size: ___b___ ft^3(___c___ m^3)″.

c) ″For installation and use only in a manufacturer approved enclosure″.

Exception No. 1: A combustion chamber intended for installation directly upon and adjacent to combustible building construction is not required to be marked with the warning marking regarding clearances.

Exception No. 2: A fireplace grate is not required to be marked with the warning marking regarding clearances.

[a] Manufacturer's specified minimum clearance

[b, c] Manufacturer's specified minimum clearance

20.1.6 An appliance not tested with glass doors shall be marked with the statement ″WARNING ″ and the following or equivalent statement: ″This appliance has not been tested for use with glass doors. To reduce the risk of fire or injury, do not install glass doors.″

20.1.7 An appliance having provision for doors shall be marked specifying proper operation with respect to the door positions.

20.1.8 An appliance shall be marked with the following or equivalent statement: ″Use __a__ fuel only.″

[a] Specific liquid or gelled alcohol based fuel utilitized during the testing of the appliance.

20.1.9 An appliance shall be marked with the following or equivalent statement: ″Do not use an appliance insert or other products not specified for use with this product.″

20.1.10 An appliance that has not been tested for use with an Unvented Gas Log Set shall be marked with the word, ″WARNING″, and the following or equivalent statement: ″THIS APPLIANCE HAS NOT BEEN TESTED WITH AN UNVENTED GAS LOG SET. TO REDUCE RISK OF FIRE OR INJURY, DO NOT INSTALL AN UNVENTED GAS LOG SET INTO APPLIANCE.″

20.1.11 For a fireplace grate, "THIS APPLIANCE IS INTENDED TO BE INSTALLED IN A FIXED SECURED POSITION IN AN EXISTING MASONRY FIREPLACE, SEE INSTALLATION INSTRUCTIONS".

20.2 Cautionary markings

20.2.1 An unvented decorative appliance shall be provided with two marking labels or a combined label that includes the wording and requirements as specified in 20.2.2 and 20.2.3. A combined label shall be affixed to the unvented decorative appliance at a location where it is visible when the ignition and burner adjustment controls of the unvented decorative appliance are manipulated. The size of the letters in the label shall be as specified in 20.2.4.

20.2.2 A label in the format specified in Tables 20.1 and 20.1A, including the applicable information verbatim, shall be affixed to an unvented decorative appliance at the location where it is visible at the time the ignition and adjustment of the unvented decorative appliance are manipulated. The top section of the label that includes the word WARNING shall be highlighted in orange color and it shall include an exclamation mark as depicted.

Exception: The specified WARNING label is not required to be highlighted in orange color if the label is etched into the appliance and meets all other criteria specified in 20.2.2 and 20.2.4.

20.2.3 A label in the format specified in Table 20.2, including all information verbatim and in the order depicted, shall be affixed to the front of the unvented decorative appliance or together with the label required in 20.2.2. The top section of the label that includes the word CAUTION shall be highlighted in yellow color and it shall include an exclamation mark as depicted.

Exception: The specified CAUTION label is not required to be highlighted in yellow color if the label is etched into the appliance and meets all other criteria specified in 20.2.3 and 20.2.4.

20.2.4 With reference to the requirements in 20.2.1 – 20.2.3, all letters in the words ″CAUTION″ or ″WARNING″ shall be capitalized and at least 1/4 inch (6.4 mm) high with all other letters of the marking at least 1/8 inch (3.2 mm) high. The cautionary notice shall be in a color contrasting with the background.

Table 20.1
Warning label

(Orange Background)	⚠ WARNING	(Orange Background)
·Improper Use Can Cause Uncontrolled Fire· **To Reduce Fire Risk:** Never Use Gasoline or Any Fuel Other Than (*Intended Fuel*) Never Re-use Original Packaged Fuel Container Always Store (*Intended Fuel*) Outdoors and Away From Other Fuel Containers Never Fuel Appliance While It Is Operating, or Hot **If Fire Occurs:** *Exit Quickly and Warn Others* *Call Fire Department* *Do Not: Try to Move Appliance, Try to Smother Fire, or Put Water on the Fire*		
*Hot Surfaces *Keep Children Away *Do Not Operate Without Installing the Protective Guard		

Table 20.1A
Warning label – applicable for cans or cartridges

(Orange Background)	⚠ WARNING	(Orange Background)
·Improper Use Can Cause Uncontrolled Fire· Never Use Any Fuel Except [describe can or cartridge] Always Store Cans or Cartridges in a Cool Place Never Insert a Can or Cartridge While Another is Still Hot or Burning Follow All Instructions Provided With the Appliance and Posted at [website] Appliance Has Hot Surfaces - Keep Children Away From Appliance		

Table 20.2
Caution label

(Yellow Background)	⚠ CAUTION	(Yellow Background)
	·Improper Use Can Cause Pollution and Health Problems·	
	To Reduce Risk:	
Use Only (*Intended Fuel*)		
Operate Only Per Manufacturers Instructions		
Keep The Appliance Clean - See Instruction Manual For Cleaning and Proper Operation		
Always Operate Appliance With Doors Of Room Open		
Follow All Applicable Code Requirements When Using Appliance		
	Keep Instruction Manual	

21 Marking Permanency Test

21.1 General

21.1.1 After being subjected to the conditions described in 21.2.1 – 21.4.1, a marking is identified to be permanent when immediately following removal from each test medium:

a) Each sample demonstrates adhesion and the edges are not curled.

b) The marking resists defacement or removal as demonstrated by scraping with a 2 pound-force (9 N) across the test panel with a flat metal blade 5/64 inch (2.0 mm) thick, held at right angles to the test panel.

c) The printing is legible and is not defaced by rubbing back and forth ten times with thumb or finger pressure (total of 20 rubs).

Exception: A pressure sensitive label, ink, paint stenciling or other method of marking that complies with the Standard for Marking and Labeling Systems, UL 969 is excluded from the tests specified in Section 21, Marking Permanency Test.

21.2 Air oven-aging test

21.2.1 Three samples of the marking applied to test surfaces as in the intended application are to be placed in an air oven maintained at the temperature developed on the surface where the marking will be placed during the Temperature Test, Section 15, for 24 hours and then cooled in a controlled atmosphere maintained at 73.4 ±3.6°F (23 ±2°C) and 50 percent relative humidity for 72 hours.

21.3 Humidity test

21.3.1 Three samples of the marking applied to test surfaces as in the intended application are to be placed in a controlled atmosphere maintained at 73.4 ±3.6°F (23 ±2°C) with a 50 ±5 percent relative humidity for 24 hours. The samples then are to be suspended in a humidity cabinet for 72 hours at 90 ±4°F (32 ±2°C) and 85 ±5 percent relative humidity.

21.4 Unusual-condition exposure test

21.4.1 When the marking is exposed to unusual conditions in service, such as oil, grease or cleaning solutions three samples of the marking applied to test surfaces as in the intended application are to be placed in a controlled atmosphere maintained at 73.4 ±3.6°F (23 ±2°C) with a 50 ±5 percent relative humidity for 24 hours. The samples then are to be immersed for 48 hours in a solution representative of service use maintained at the temperature the solution attains in service, and in no case less than 73.4°F (23°C).

INSTRUCTIONS

22 Instructions

22.1 General

22.1.1 The installation and operating instructions shall either be combined in a single manual or be separate manuals, and shall be packed with the combustion chamber of the appliance.

22.1.2 When the installation of an appliance part, such as a control or glass door assembly is not prohibited, detailed instructions for the installation shall be provided with the assembly.

22.1.3 The instructions shall make reference to the manufacturer's or private labeler's catalog designations, or equivalent, for the appliance and related parts, and shall include the manufacturer's or private labeler's name and address. All required WARNING and CAUTION statements shall be in bold faced, upper case letters.

22.1.4 The instructions shall include information and recommendations to have a Class B fire extinguisher located in close proximity to the unvented decorative appliance in case of fire.

22.1.5 For a fireplace grate, the instructions shall indicate the fireplace damper or other means to shut off the flue should be closed in an existing masonry fireplace before installation and operation of the fireplace grate.

22.2 Installation instructions

22.2.1 The installation instructions are to be used as a reference during the examination and tests of a factory-built unvented decorative appliance. The instructions are not required to be in final printed form for the investigation.

22.2.2 Installation instructions shall be illustrated and include directions and information required to complete the intended installation of the unvented decorative appliance and related parts, including reference to the existence of parts tested for use with the appliance.

22.2.3 The instructions shall include particular details concerning, as applicable:

a) The parts required and the step-by-step process for installing the unvented decorative appliance, including methods of the support, and the securing the assemblies. Nails, lag bolts, or other fastening means required to secure parts are to be specified. Component part descriptions shall be illustrated and described in written form, including accurate identification of major parts such as combustion chamber, firestop, and the roof cap.

b) The methods and precautions required to enclose the appliance and its parts with walls, partitions, and other structures, including the framing of appliance openings. Any required clearances (air spaces) shall be specified and illustrated.

c) The materials or parts to be employed for hearth extensions and their elevation relative to the fire chamber. When a factory-built hearth extension is used during the performance tests in these requirements, its use shall be specified in the installation instructions.

d) The instructions shall include the word ″WARNING″ and the following or equivalent statement: ″THIS APPLIANCE HAS NOT BEEN TESTED WITH AN UNVENTED GAS LOG SET. TO REDUCE RISK OF FIRE OR INJURY, DO NOT INSTALL AN UNVENTED GAS LOG SET INTO THIS APPLIANCE.″

e) Statements concerning the use of either required sealing strips of noncombustible materials between the appliance hearth and factory-built hearth extension or the use of a sand-cement grout between the hearth and an on-site-constructed hearth extension.

f) An illustration of the vertical relationship between the appliance, sealing strips, and the hearth extension and a warning statement to the effect that the hearth extension shall be installed only as illustrated.

g) The minimum hearth extension areas to be covered with relation to the appliance. When the area of the appliance opening is 6 square feet (0.6 m^2) or larger, the hearth extension floor area shall be specified to extend at least 20 inches (508 mm) in front of, and at least 12 inches (305 mm) beyond each side of, the appliance opening. When the area of the appliance opening is less than 6 square feet, the corresponding minimum hearth extension floor area shall be specified to extend 16 and 8 inches (406 and 203 mm), respectively, in front of and beyond each side of the opening.

h) The methods and parts to be employed for maintaining ventilation and air circulation.

i) The methods and parts to be employed that are intended to prevent contact with building insulation. When the appliance assembly is required to be marked with air space clearances, the instructions shall include the word ″WARNING″ and the following or equivalent statement: ″DO NOT PACK REQUIRED AIR SPACES WITH INSULATION OR OTHER MATERIALS.″

j) Any limitations with respect to installation and use of the appliance, such as the minimum or maximum height of the combination of fire chamber, the joining of two or more parts to constitute the intended assembly, and the required installation clearances.

k) Installation of doors when doors are provided. When the appliance has been tested with doors, the instructions shall include the manufacturer's specific part numbers for doors that are used. When the appliance has not been tested with doors, the instructions shall include the word ″WARNING″ and the following or equivalent statement: ″THIS APPLIANCE HAS NOT BEEN TESTED FOR USE WITH DOORS. TO REDUCE THE RISK OF FIRE OR INJURY, DO NOT INSTALL DOORS.″

l) The manufacturer's specifications including the mantel depth (that is, maximum distance from front edge of the mantel to the wall), width, material (noncombustible or combustible, as appropriate), and distance above appliance opening when the appliance is intended for use with a mantel.

m) Where the unvented decorative appliance is intended for mounting on a wall, the instructions shall include the specific installing instructions, including securement, requirements for stability, and the required distance from the floor, ceiling, and any other required clearances.

n) Initial setup and operating instructions, including minimum clearances to adjacent flammable materials while the unvented decorative appliance is in operation. When further actions are required by the user to:

1) Complete installation of a guard or grille that is folded or telescoped, or

2) Attach a guard or grille that is not attached to the unvented decorative appliance at the factory,

they shall be completely described in the instructions.

o) Instructions on how to fill the fuel reservoir or use the can, cartridge or fuel source.

p) Lighting Instructions.

q) Maintenance.

r) The following or equivalent cautionary statement preceded by the word WARNING:

1) Risk of Explosion –

i) Never use any fuel other than the fuels specifically identified for use in the unvented decorative appliance. Never use gasoline.

ii) Never refill unvented decorative appliance fuel reservoir when appliance is operating or still hot.

iii) Never use unvented decorative appliance in areas where flammable vapors or gas may be present.

iv) Never store or transport the fuel in other than a metal or plastic container that is:

A) Acceptable for use with the specific fuel,

B) Non red in color,

C) Is in the original container for the (specific alcohol) Fuel.

2) Never store fuel in the living space.

3) Due to high surface temperatures, keep children, clothing, and furniture away.

4) Risk of Indoor Air Pollution – Use unvented decorative appliance only in well-ventilated areas. People with breathing problems should consult a physician before using the unvented decorative appliance.

5) Do not use unvented decorative appliance to heat or boil water or use as a cooking appliance.

s) The following or equivalent information for provision of combustion and ventilating air for unvented appliances: ″In a house of typical construction, that is, one that is not of unusually tight construction due to heavy insulation and tight seals against air infiltration, an adequate supply of air for combustion and ventilation is provided through infiltration. However, if the unvented decorative appliance is used in a small room where less than 200 cubic feet (5.7 m^3) of air space is provided for each 1000 Btu per hour of unvented decorative appliance rating (considering the maximum burner adjustment), the door(s) to adjacent room(s) should be kept open or a window to the outside should be opened at least 1 inch (25.4 mm) to guard against potential buildup of indoor air pollution. Do not use the appliance in a bathroom or any other small room.″

t) For an unvented decorative appliance that requires further actions by the user to:

1) Attach a disassembled guard or grille, or

2) Complete installation of a guard or grille that is folded or telescoped and is not provided with an interlock that would prevent unvented decorative appliance operation unless the guard or grille is attached to the appliance in its final intended position,

the following or equivalent cautionary statement preceded by the word ″CAUTION:″ ″Risk of burns. Do not operate the appliance without the guard or grille completely attached.″

u) Periodic Service – Details on the items that require periodic service, recommended intervals for such service, and instructions for performing the service. The following information shall be included for all unvented decorative appliances:

1) Cleaning of appliance combustion surfaces,

2) Adjustment and replacement of ignition device.