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ANSI/CAN/UL/ULC 1370:2024

JOINT CANADA-UNITED STATES
NATIONAL STANDARD

STANDARD FOR SAFETY

Unvented Alcohol Fuel Burning Decorative Appliances

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ANSI/UL 1370-2024

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UL Standard for Safety for Unvented Alcohol Fuel Burning Decorative Appliances, ANSI/CAN/UL/ULC 1370

Second Edition, Dated November 13, 2024

Summary of Topics

This new edition of ANSI/CAN/UL/ULC 1370 dated November 13, 2024, combines requirements from UL 1370 and ULC-S674, and publishing as a new joint US/Canada Standard reflecting the latest ANSI and SCC approval dates and incorporating the proposal dated February 9, 2024 and July 26, 2024.

The new requirements are substantially in accordance with Proposal(s) on this subject dated February 9, 2024 and July 26, 2024.

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ANSI/UL 1370-2024

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ANSI/CAN/UL/ULC 1370:2024

Standard for Unvented Alcohol Fuel Burning Decorative Appliances

First Edition – July, 2011

Second Edition

November 13, 2024

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

The most recent designation of ANSI/UL 1370 as an American National Standard (ANSI) occurred on November 13, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, Preface or SCC Foreword.

This Standard has been designated as a National Standard of Canada (NSC) on November 13, 2024.

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Preface

This is the Second Edition of ANSI/CAN/UL/ULC 1370, Standard for Unvented Alcohol Fuel Burning Decorative Appliances.

ULSE is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC) as a Standards Development Organization (SDO). ULC Standards is accredited by the Standards Council of Canada (SCC) as a Standards Development Organization (SDO).

This Standard has been developed in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization.

This ANSI/CAN/UL/ULC 1370 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of ANSI and SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

Annex **A** is identified as Normative, as such, forms mandatory parts of this Standard.

Annex **B** is identified as Normative for Canada and Informative for the US. Informative text is for informational purposes only, and Normative text is considered to be mandatory.

This joint American National Standard and National Standard of Canada is based on, and now supersedes, the First Edition of UL 1370 and the First Edition of CAN/ULC-S674.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

Requests for interpretation of this Standard should be sent to ULC Standards. The requests should be worded in such a manner as to permit a "yes" or "no" answer based on the literal text of the requirement concerned.

Comments or proposals for revisions on any part of the Standard may be submitted at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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This Edition of the Standard has been formally approved by the Technical Committee (TC) on Unvented Alcohol Fuel Burning Decorative Appliances, TC 1370.

This list represents the TC 1370 membership when the final text in this Standard was balloted. Since that time, changes in the membership may have occurred.

TC 1370 Membership

Name	Representing	Interest Category	Region
E. Adair	Hearth Patio & Barbecue Association	Producer	USA
S. Ayers	U.S. Consumer Product Safety Commission (CPSC)	Non-voting member	USA
I. Brodzinski	UL Standards & Engagement	TC Project Manager – Non-voting member	USA
K. Bush	Office of the Maryland State Fire Marshal	Authorities Having Jurisdiction	USA
L. Gill	IPEX Management Inc.	Commercial / Industrial Users	Canada
R. Harper	Hearthman Specialties	General	USA
J. Hershberger	Johnson Gas Appliance Company	Producer	USA
J. Kuhn	The Sterno Group, LLC	Producer	USA
B. Manalo	MAD Design USA	Producer	USA
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International Classification for Standards (ICS): 97.100.99

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This Standard is intended to be used for conformity assessment.

The intended primary application of this Standard is stated in its scope. It is important to note that it remains the responsibility of the user of the standard to judge its suitability for this particular application.

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE

INTRODUCTION

1 Scope

1.1 These requirements apply to factory-built unvented decorative appliances, that burn liquid or gelled alcohol-based fuels, and are intended to be fixed, non-moveable appliances, including only the following:

- a) Floor-mounted appliances;
- b) Wall-mounted appliances;
- c) Free-standing appliances;
- d) Fireplace grates installed in existing masonry fireplaces, and rated below 40,000 Btu/h (11.7 kW) output; and
- e) Appliance combustion chambers installed into site-built enclosures.

1.2 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 fuel input rate of 0.25 US gal/h (0.95 L/h).

1.3 Floor-mounted, wall-mounted and free-standing appliances include an integral enclosure, fire chamber and fuel reservoir, or combination unit, and provision for refueling.

1.4 These appliances are not intended for:

- a) Use with fuel oils, kerosene, gasoline, and other non-alcohols;
- b) Use in spaces in which flammable vapors or gases may be present;
- c) Use as cooking appliances;
- d) Use in conjunction with blower assemblies;
- e) Installation in a bathroom; or
- f) Installation in a room where sleeping accommodation is provided.

1.5 These appliances are intended for installation in occupancies where use is permitted by local codes, such as:

a) In the United States:

- 1) NFPA 1, Uniform Fire Code;
- 2) NFPA 101, Life Safety Code;
- 3) Other applicable federal and state regulations.

b) In Canada:

- 1) The National Building Code of Canada; and
- 2) The National Fire Code of Canada;
- 3) Regulation of the authority having jurisdiction.

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.

4 Referenced Publications

4.1 The documents shown below are referenced in the requirements text of this Standard. 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.

ASTM A463/A463M, *Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process*

ASTM A653/A653M, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM B858, *Standard Test Method for Ammonia Vapor Test for Determining Susceptibility to Stress Corrosion Cracking in Copper Alloys*

ASTM E136, *Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*

ASTM F3429/F3429M, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*

CSA C22.2 No. 0.15, *Adhesive Labels*

Health Canada Consumer Chemicals and Containers Regulations

NFPA 1, *Fire Code*

NFPA 101, *Life Safety Code*

National Building Code of Canada

National Fire Code of Canada

UL 127, Factory-Built Fireplaces

UL 737, Fireplace Stoves

UL 969, Marking and Labeling Systems

UL 1482, Solid-Fuel Type Room Heaters

ULC 114, Standard Method of Test for Determination of Non-Combustibility in Building Materials

ULC 610, Factory-Built Fireplaces

ULC 627, Space Heaters for Use with Solid Fuels

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.

5.3 ETHYL ALCOHOL (ETHANOL) – A monohydric compound having the general formula of C_2H_5OH . The ethanol-based fuel may be provided in liquid or gelled form.

5.4 ISOPROPYL ALCOHOL (ISOPROPANOL) – A monohydric compound having the general formula of C_3H_7OH . The isopropyl alcohol-based fuel may be provided in liquid or gelled form.

5.5 AUTHORITY HAVING JURISDICTION (AHJ) – The governmental body responsible for the enforcement of any part of this Standard or the official or agency designated by that body to exercise such a function.

5.6 BURNER – A device for the final conveyance of fuel vapor, or a mixture of vapor and air, to the combustion zone.

5.7 CARTRIDGE or CAN – A container that is used to confine the fuel for shipment and transportation and in addition is used to hold the fuel while it is burning (i.e., acts as the burner also).

5.8 COMBUSTIBLE – A material, construction, surface, etc., that fails to meet the acceptance criteria of ULC 114 or ASTM E136.

5.9 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.

5.10 COMBUSTION CHAMBER – Combustion chamber - the portion of an appliance in which combustion occurs.

5.11 ENCLOSURE:

a) APPLIANCE ENCLOSURE – The surfaces that surround and contain all parts of a floor-mounted appliance, a wall-mounted appliance, or a free-standing appliance, including the fire chamber and fuel reservoir, or combination unit.

b) **SITE-BUILT ENCLOSURE** – The assembly of components and materials installed with an appliance combustion chamber, as defined in the manufacturer's installation instructions.

c) **TEST ENCLOSURE** – The elements of the test structure installed to simulate the framing, wallboards, ceiling boards, surface finishes, etc., of a field installation.

NOTE: For testing of appliance combustion chambers, the test enclosure will conform to the manufacturer's installation instructions for a site-built enclosure.

5.12 **FIRE CHAMBER** – The volume within the appliance where the fuel is intended to be combusted.

5.13 **FUEL RESERVOIR** – A chamber, basin or receptacle for holding fuel.

5.14 **GEL** – A continuous solid network enveloped in a continuous liquid phase, where the solid phase occupies less than 10 % (volume) of the material.

5.15 **NONCOMBUSTIBLE** – A material, construction, surface, etc., that meets the acceptance criteria of ULC 114 or ASTM E136.

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

5.17 **TEST STRUCTURE** – The laboratory-built structure used to test decorative unvented alcohol fueled appliances.

5.18 **UNVENTED DECORATIVE APPLIANCE** – A factory-built product that burns liquid or gelled alcohol-based fuels, intended to be a fixed non-moveable appliance.

5.19 **FLOOR-MOUNTED APPLIANCE** – An unvented decorative appliance intended for attachment to a floor, which may be in contact with a wall, as specified by the manufacturer's installation instructions.

5.20 **WALL-MOUNTED APPLIANCE** – An unvented decorative appliance intended for attachment to a wall, as specified by the manufacturer's installation instructions.

5.21 **FREE-STANDING APPLIANCE** – An unvented decorative appliance intended for attachment to a floor, with clearances from walls, other appliances, etc., as specified by the manufacturer's installation instructions.

5.22 **FIREPLACE GRATE** – An unvented decorative appliance intended for installation in an existing masonry fireplace, as specified by the manufacturer's installation instructions.

5.23 **APPLIANCE COMBUSTION CHAMBER** – An unvented decorative appliance intended for installation into a site-built enclosure, as specified by the manufacturer's installation instructions.

CONSTRUCTION

6 General

6.1 Each unvented decorative appliance shall include all the essential components necessary for its intended function when installed in accordance with the manufacturer's installation instructions.

6.2 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.

6.3 The unvented decorative appliance shall be completely assembled by the manufacturer before shipment from the factory, or may be site-assembled, in which case complete instructions must accompany the unassembled appliance.

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

Exception No. 2: A fire chamber and fuel reservoir, or combination unit, that complies with the requirements in [7.5.3](#) 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 [23.4\(n\)](#).

6.4 A fireplace grate shall be provided with means to secure it within an existing masonry fireplace.

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 and shall meet the following criteria:

- a) Parts formed from drawn- or machined-brass rod or bar stock shall comply with the Moist Ammonia Air Stress Cracking Test, Section [18](#);
- b) A fuel confining part or a part that comes into contact with fuel shall be made of 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); and
- c) A material used for the gaskets and seals to confine alcohol-based fuels shall be compatible with the intended fuel as determined by tests in Section [19](#), Gasket Test.

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 Appliance enclosures and site-built enclosures

7.4.1 Appliance enclosures

7.4.1.1 An appliance enclosure shall be provided for the protection of the fire chamber and fuel reservoir, or combination unit.

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

7.4.1.2 An appliance 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.

7.4.1.3 Sheet metal appliance enclosures shall have a minimum thickness of 0.025 in (0.635 mm).

7.4.2 Site-built enclosures

7.4.2.1 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. Refer to Section [23](#), Installation Instructions.

7.5 Fire chamber, and fuel reservoir, or combination unit

7.5.1 The fire chamber and fuel reservoir, or combination unit, shall comply with this section and Fuel confining parts, [7.2](#).

7.5.2 Fuel containers used to refill these appliances shall be fitted with a flame mitigation device (FMD) that conforms to the requirements of:

- a) In the U.S., the Portable Fuel Container Safety Act;
- b) In Canada, the Health Canada Consumer Chemicals and Containers Regulations.

NOTE: The above regulations require conformance with ASTM F3429/F3429M.

7.5.3 A fire chamber and fuel reservoir, or a combination unit, 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 fire chamber and fuel reservoir, or combination unit, with respect to the appliance.

7.5.4 The fire chamber and fuel reservoir, or combination unit, shall be designed to limit the amount of fuel loaded into the fire chamber and have provisions to prevent spillage of fuel onto combustible surfaces, for example a pouring device and a level indicator. A manufacturer specified jug or decanter can be used with an incorporated fuel limiter, that will limit the amount of fuel poured into the reservoir. The maximum total fuel volume of all fuel reservoirs and the fire chamber shall be 2.6 US gal (10 L).

7.5.5 The thickness of uncoated sheet steel used in the fire chamber and fuel reservoir, or combination unit, construction shall not be less than 0.042 in (1.07 mm). A preservative shall be applied to uncoated surfaces to prevent rusting prior to use.

7.5.6 The wall thickness of aluminum-coated steel, galvanized steel, terne sheet, and corrosion-resistant sheet metal shall be not less than 0.016 in (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.

7.5.7 Zinc coating on sheet steel shall not be less than Grade G90. Galvanized steel conforming to ASTM A653, certified as such by the steel mill, as evidenced by a marking on each bundle or roll, ordinarily conforms to the above.

7.5.8 The coating of aluminum-coated steel sheet shall not be less than T1 40, (120 g/m²) of sheet conforming to ASTM A463.

7.5.9 A joint of a fire chamber and fuel reservoir, or combination unit, 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. Brazing or welding of coated sheets less than 0.042 in (1.07 mm) thick shall not damage the coating of surfaces in contact with the fuel when the fire chamber and fuel reservoir, or combination unit, is full. All connections shall be made through solid threaded bosses or fittings mechanically secured to the fire chamber and fuel reservoir, or combination unit.

7.5.10 Safety measures shall be provided to prevent fuel filling while the flame is not fully extinguished.

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 inch (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 inch (mm)	Wall thickness inch (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 inch (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 inch (mm)	Wall thickness inch (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 sensitive safety shutoff system

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

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 %, 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 fire chamber flame when the oxygen in the surrounding atmosphere is depleted to the concentration specified by the manufacturer, but not lower than 18.0 %.

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 fire 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. Rotation of a knob is not considered to comply with this requirement. The external manual shutoff device shall be visible, readily accessible, and integral to the appliance while the appliance is in operation. The device shall enable the user to stay a safe distance away from the burner and shall be operable in case of burner runaway.

Note: For example, a device attached or tethered to the appliance is considered integral.

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.

9.2 The performance of an unvented decorative appliance shall be evaluated upon the basis of operation tests conducted on sample appliance(s). Appliance samples of each size and type, or a sufficient number of sizes and types to be representative of the entire range of sizes and types in a design series, are to be subjected to all of the tests prescribed herein. If multiple samples are tested, duplicated testing of equivalent functions may be omitted, if this is justified by an engineering analysis. If optional features affecting performance are furnished, sample unvented decorative appliance(s) 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 Section [14](#), Operation Tests and Section [15](#), Temperature Tests) bleached cheesecloth shall be used as specified in [9.6](#).

9.6 Bleached cheesecloth shall be 36 in (910 mm) wide, running 14 – 15 yd/lb (28 – 30 m/kg), and having a thread 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 mm²).

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 mm²) to 24 AWG (0.21 mm²).

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.

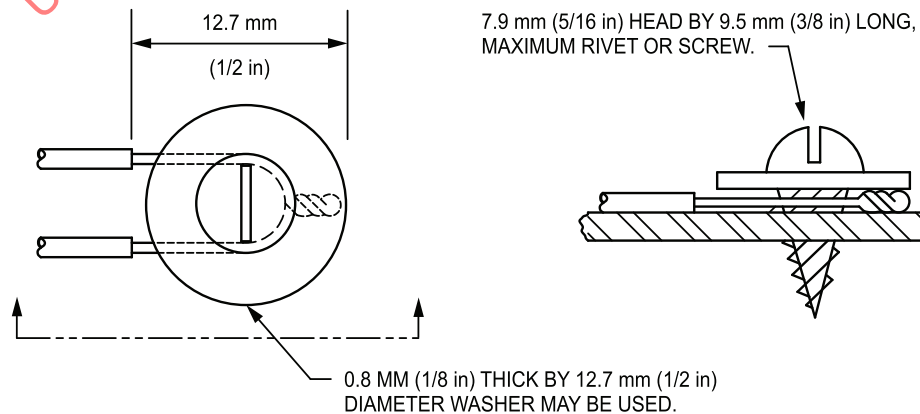
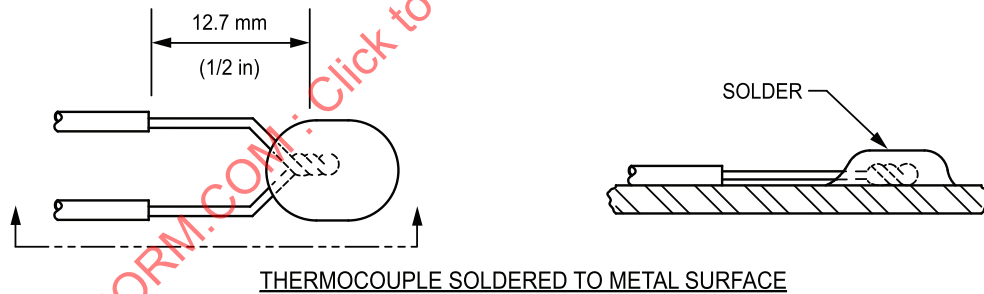
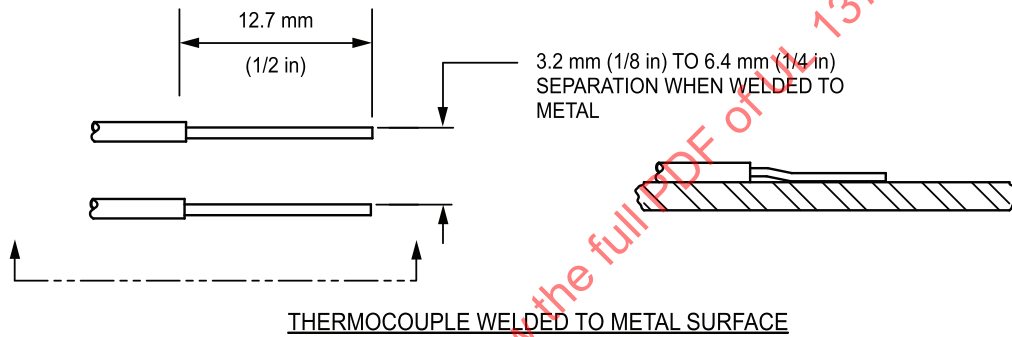
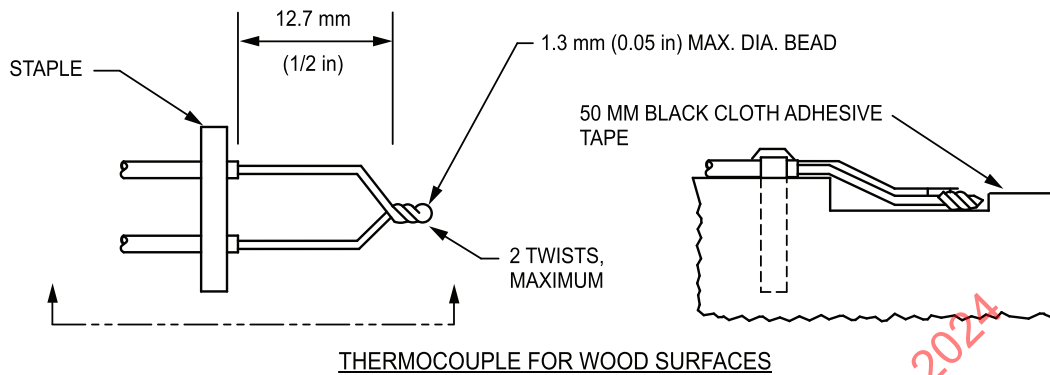
10.1.4 The wiring methods for thermocouple circuitry, including junctions, terminals, switches, plugs, and jacks are to be designed and constructed to provide independent continuous routing of both thermocouple leads to the recording equipment.

10.1.5 The ambient temperature shall be determined by a shielded thermocouple, i.e., positioned centrally within a vertically oriented 6 inch (152 mm) length of 2 inch (50.8 mm) steel pipe, aluminum painted, and open at both ends.

10.1.6 The ambient temperature 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.

10.1.7 The measurements of temperature rises on the fire chamber and fuel reservoir, or combination unit, on the appliance enclosure, the test enclosure, and the test structure are to be referenced to the recorded ambient temperature determined as indicated in [10.1.6](#).

10.1.8 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**

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10.1.9 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](#).

10.1.10 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.

10.1.11 Thermocouples shall be attached to surfaces other than those described in [10.1.8](#) or [10.1.10](#) 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](#).

10.1.12 For test enclosure elements in contact with a fire chamber and fuel reservoir, or combination unit, part, junctions of thermocouples are to be placed on the fire chamber and fuel reservoir, or combination unit, part surface.

Exception No. 1: Where a point or line contact of a spacer to a test 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.

10.1.13 At least one thermocouple shall be attached to each location on the unvented decorative appliance, that is intended for a pressure sensitive label, ink, paint stenciling, or similar type of marking.

10.2 Products of combustion analysis

10.2.1 The concentration of carbon monoxide in combustion 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 $\pm 2\%$ and rated precision not more than $\pm 1\%$. The sample shall not pass through a cold trap.

10.2.3 A hood with a mixing chamber, constructed as illustrated in [Figure 10.2](#) and [Figure 10.3](#), employing a probe as illustrated in [Figure 10.4](#), shall be used to collect combustion products for analysis in accordance with the test described in [13.10](#). The hood assembly footprint shall be of the size to encompass the perimeter of the appliance, but not less than 24 inches (609.6 mm) by 30 inches (762 mm). The longitudinal axis of the probe is to be parallel with the shorter dimension, and perpendicular to the longer dimension of the hood footprint. 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 Polytetrafluoroethylene (PTFE) that do not adsorb nitrogen dioxide.

Figure 10.2
Hood Assembly

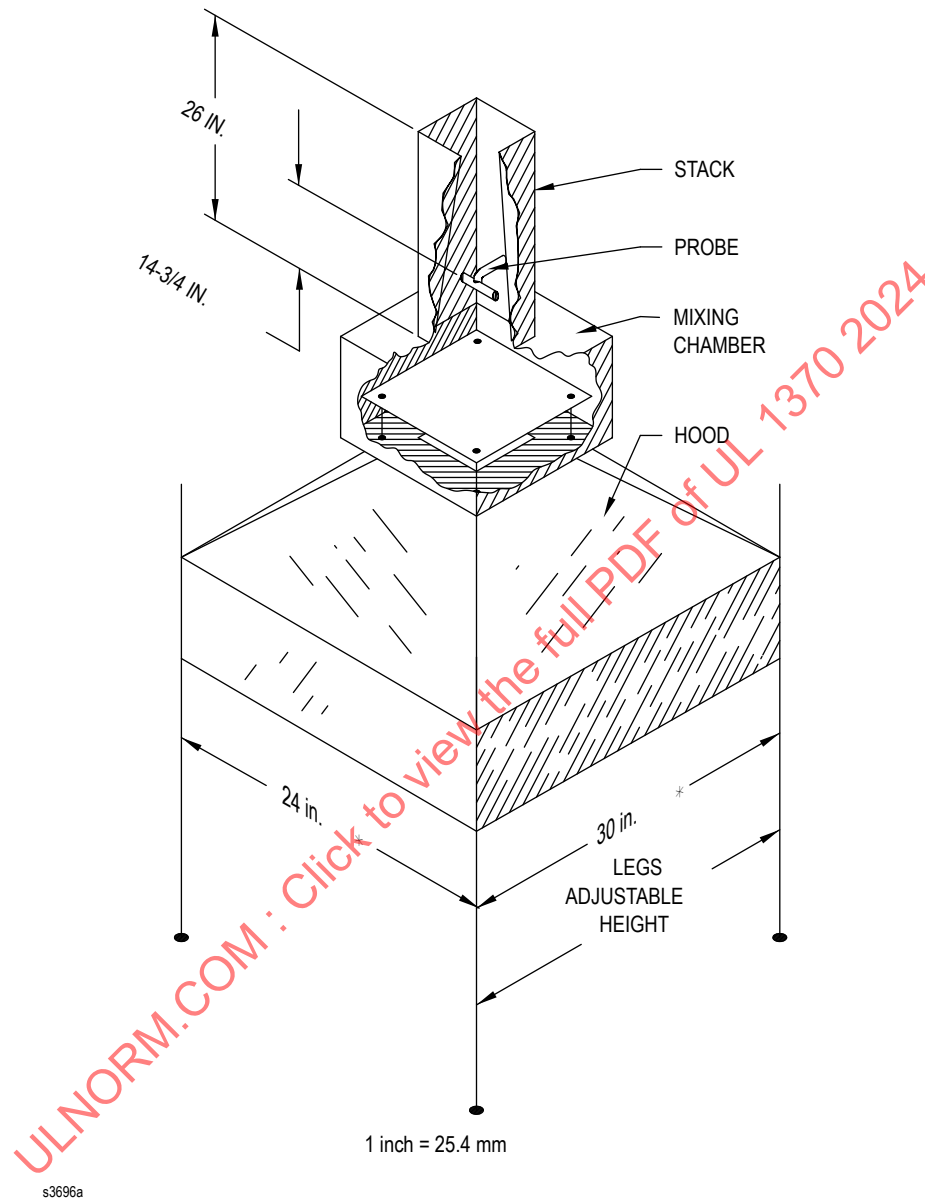
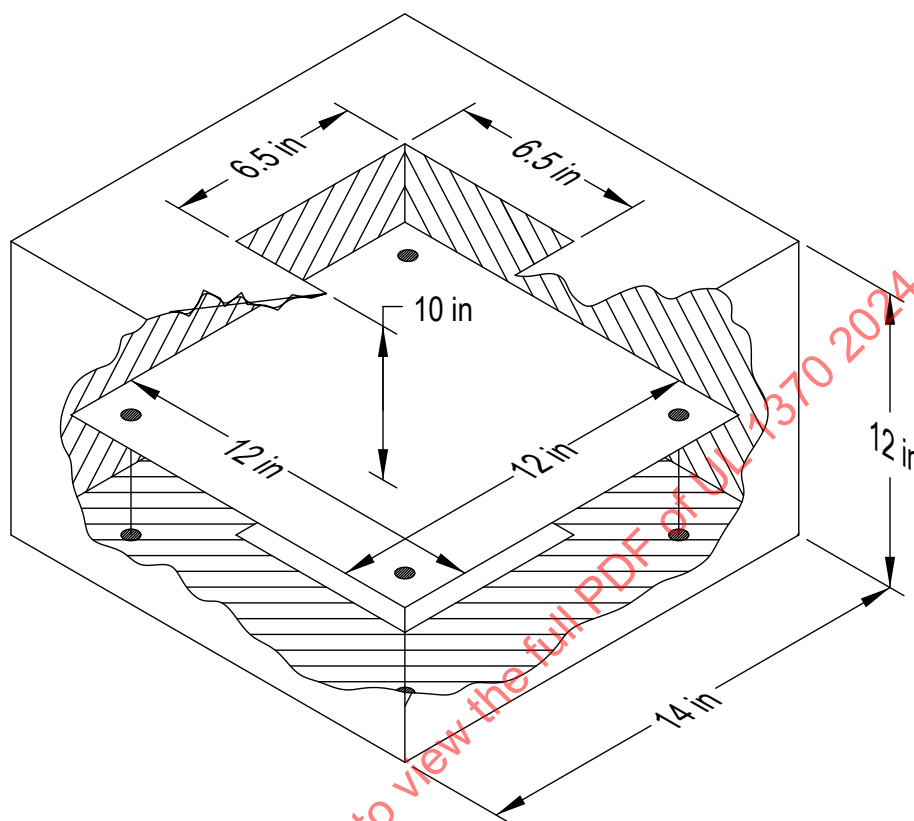


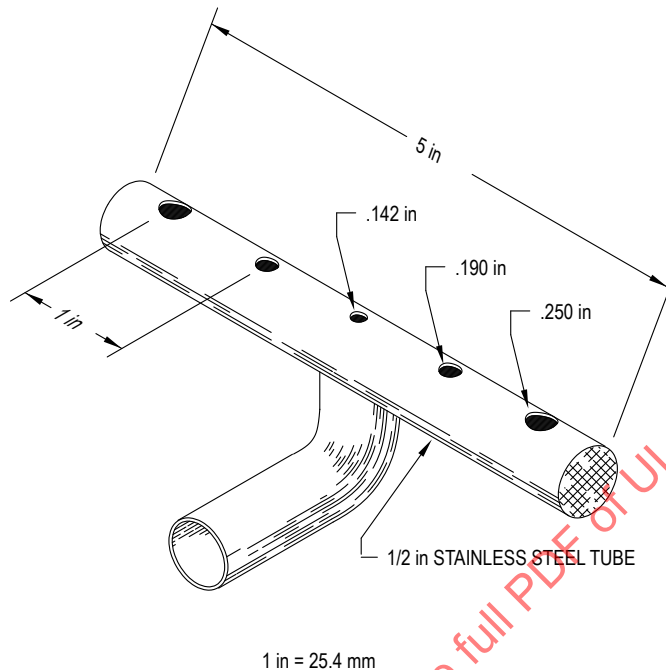
Figure 10.3
Mixing Chamber



1 in = 25.4 mm

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Figure 10.4
Multiport Sample Probe



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11 Temperature Test Installation

11.1 General

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

11.1.2 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.

11.1.3 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.

11.1.4 Ventilating, combustion, or cooling-air openings into the unvented decorative appliance assembly are to be sealed unless the openings are more than 1.5 inches (38.1 mm) above the floor, are arranged so that unintentional closure does not occur, and the openings are unlikely to be blocked by the user to overcome a nuisance (such as downdrafts, a cold room, or an overheated room).

11.1.5 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.

11.1.6 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 1.5 by 3.5 inch (38 by 89 mm)] or trade

size 2- by 6-inch [nominal 1.5 by 5.5 inch (38 by 140 mm)] floor supports placed on 16 inch (406 mm) centers.

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

11.1.8 The ceiling construction immediately above the unvented decorative appliance shall be constructed with one thickness of 3/4 inch (19 mm) plywood.

11.1.9 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 (2.4 m) 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 (1.2 m) 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 (1.2 m) beyond the side of the unvented decorative appliance opening which is opposite the side wall.

11.1.10 When installation instructions require that specific areas of the unvented decorative appliance not be in contact with combustible material, those areas shall be fully exposed to the living space in which the unvented decorative appliance is located.

11.1.11 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.

11.1.12 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, refer to Test Installations section of UL 127 or ULC 610. This installation method, for example, "chase installation," shall be illustrated in the installation instructions.

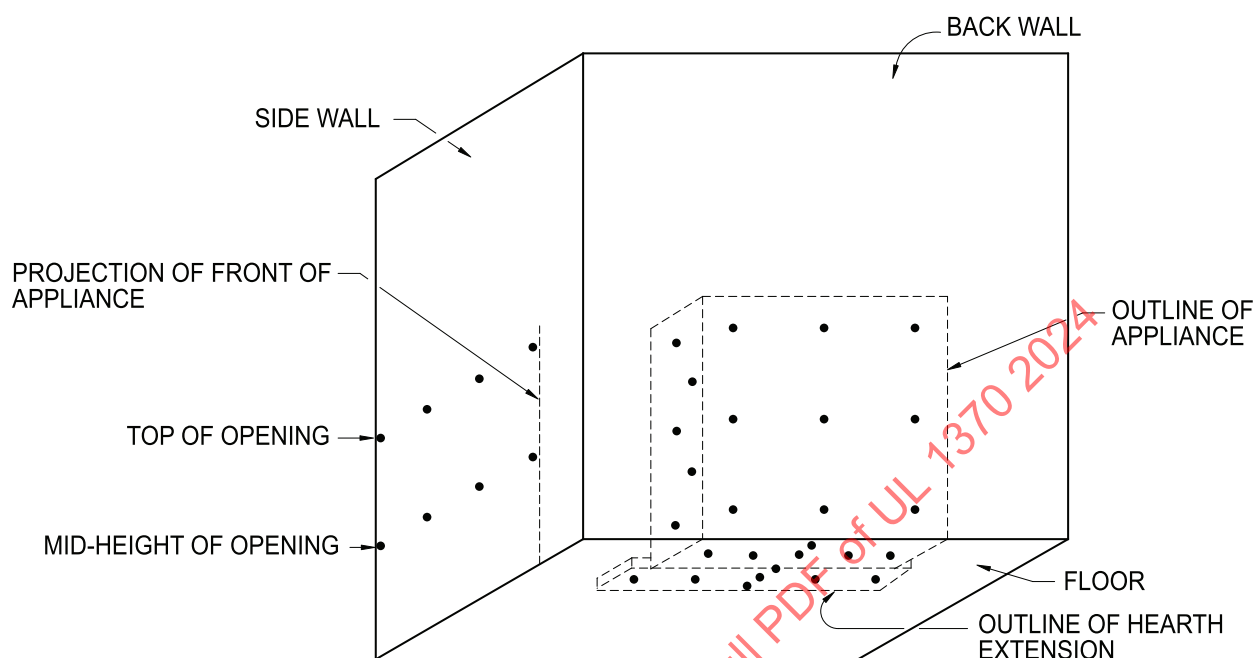
11.2 Complete appliances

11.2.1 Floor-mounted appliances and wall-mounted appliances

11.2.1.1 The temperature test installation for floor-mounted appliances and wall-mounted appliances shall conform to the requirements of this section.

11.2.1.2 The unvented decorative appliance shall be installed in a structure similar to that illustrated by [Figure 11.1](#) and constructed to accommodate the appliance to be tested. Combustible test 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.

Figure 11.1
Typical Thermocouple Locations (•) Back, Side, and Floor of Test Structure



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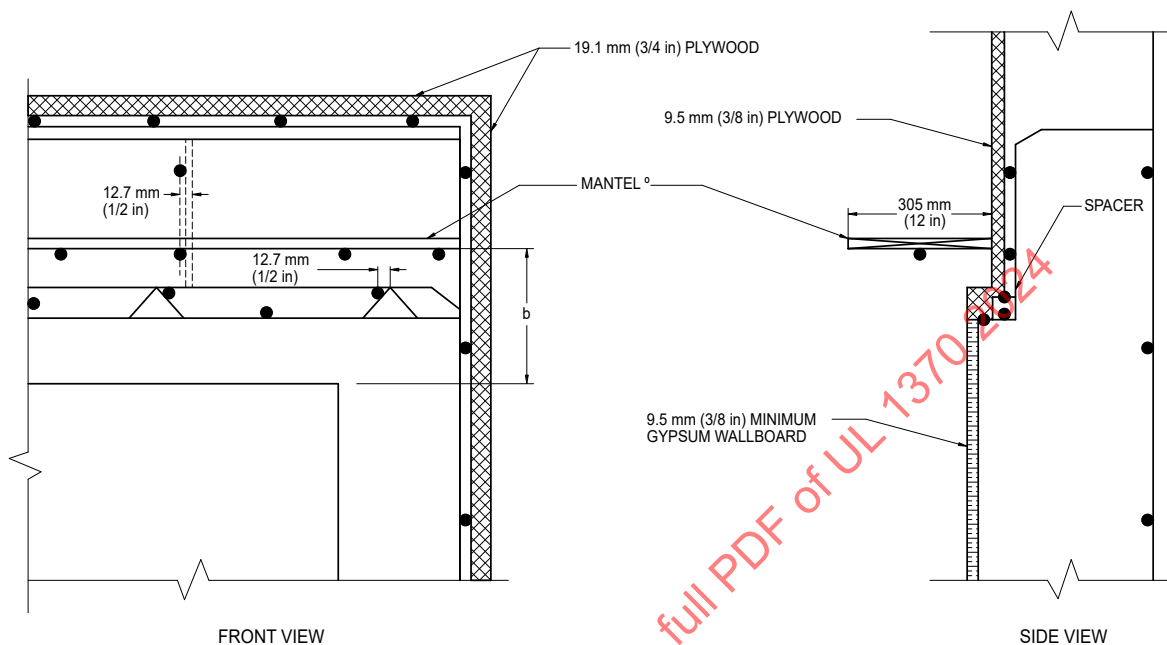
11.2.1.3 The unvented decorative appliance shall be located in relation to the back wall of the test structure in accordance with the minimum clearances specified by the installation instructions. Other areas of the unvented decorative appliance in contact with combustible construction, when the manufacturer's installation instructions indicate that the appliance may be 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.

11.2.1.4 A minimum number of typical thermocouple locations to be attached to wood surfaces of the test enclosure is shown in [Figure 11.1](#).

11.2.1.5 Thermocouples shall be attached to the various surfaces of the fire chamber and fuel reservoir, or combination unit, in at least the typical locations shown in [Figure 11.2](#).

11.2.1.6 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 11.1](#) are to be placed 1/2 inch (12.7 mm) and 1.5 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 11.2
Typical Thermocouple Locations (Combustion Chamber Surfaces)



su0271

11.2.2 Free-standing appliances

11.2.2.1 The test installation for free-standing appliances shall conform to the applicable requirements of the Performance – Test Installation section of UL 1482 or UL 737, or ULC 627.

11.3 Fireplace grates

11.3.1 The test installation for fireplace grates shall conform to the applicable requirements of the Performance – Optional Unvented Decorative Log Temperature Test section of UL 127 or the applicable test in ULC 610.

11.4 Appliance combustion chambers

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

12 Fire Chamber and Fuel Reservoir, or Combination Unit, Capacity

12.1 For all tests that specify a full fuel reservoir or fire chamber, the fire chamber and fuel reservoir, or combination unit, shall be filled in accordance with [12.2](#).

12.2 With respect to the requirement in [7.5.4](#), 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 liquid or gelled fuel cans or cartridges that can be properly loaded into the fire 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, including use of the specified fuel type, 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 collected 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 % and the oxygen content of the room is not to be reduced to 15.1 % by

volume or less, corrected to 60 °F (15.5 °C) and 30.0 in 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	Fuel capacity US gallons	Test room size	
		ft ³	(m ³)
2	0.53 US Gal	1050	(29.8)
3	0.79 US Gal	1575	(44.6)
4	1.06 US Gal	2100	(59.5)
5	1.32 US Gal	2625	(74.4)
6	1.59 US Gal	3150	(89.3)
7	1.85 US Gal	3675	(104.1)
8	2.11 US Gal	4200	(119)
9	2.38 US Gal	4725	(133.9)
10	2.64 US Gal	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, and the concentration of 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 % 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 concentrations is to be recorded 1 h after the start of the test or when 50 % 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 % and the nitrogen dioxide concentration of the combustion products is not to exceed 0.002 % 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 Flame stability test

14.1.1 An unvented decorative appliance, when lighted as described in [14.1.2](#) and [14.1.3](#), shall not cause significant ignition of vapour, as evidenced by flame flash or audible 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, including use of the specified fuel type, 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 Floor heating test

14.2.1 Two layers of cheesecloth are to be placed on the floor beneath the unvented decorative appliance and be extended 12 inches (305 mm) beyond in all directions. Two thickness of cheesecloth, stretched taut, are to be placed vertically in a plane parallel to and 12 inches (305 mm) 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 manufacturer's instructions.

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

14.3 Test for operation under draft

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 flame 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 [5.22](#)).

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 feet (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 mph (1.34 m/s) as measured by the average of the readings taken with an anemometer at the midpoint of four 6 inch (152 mm) squares forming a plane area 12 inch (305 mm) square at right angles to the axis of the air stream and 6 feet (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 Specific tests for liquid fuel unvented decorative appliances

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 (305 mm) beyond in all directions. Two thickness of cheesecloth, stretched taut, are to be placed vertically in a plane parallel to and 12 inches (305 mm) 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 appliance plus 10 %. The unvented decorative appliance is to be lighted from a cold start at maximum fire input, per the manufacturer's 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 % and lighted again at maximum fire input, per the manufacturer's 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 (473 mL), or the amount to fill to maximum capacity plus 10 % of fuel is to be added to the reservoir burner and observations made for ignition of cheesecloth. No ignition of the cheesecloth shall occur.

14.5 External fuel containers ignition test

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 (76.2 mm) deep with a minimum open surface area of 28.26 in² (18232 mm²) and a level overflow rim is to be filled to within 0.25 inch (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 fire 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 inch (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 The procedure of [14.5.1](#) – [14.5.5](#) shall be repeated with an open fuel container located on each side of an unvented decorative appliance that is constructed with open access to the fire chamber.

14.6 Test of external manual shutoff

14.6.1 The shutoff test shall be completed once the maximum temperature has been reached. Maximum temperatures are identified to have been attained when three successive readings taken at 30 minute intervals show no change or show a decrease.

14.6.2 To comply with the requirements of [14.6.1](#), the flame shall be extinguished and there shall be no visual distortion of the manual shutoff device.

15 Temperature Tests

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

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

15.3 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.

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

15.5 Except for fireplace grates, 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.

15.6 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 Tests.

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

Table 15.1
Maximum Temperature Rises

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

Table 15.1 Continued on Next Page

Table 15.1 Continued

Device or material	°F	(°C)
^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 fire chamber 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 site-built enclosure or appliance 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 (21 °C).		

15.7 For fireplace grates, the temperature rise of any part of the unvented decorative appliance assembly, shall conform to the applicable requirements of the Performance – Optional Unvented Decorative Log Temperature Test section of UL 127 or the applicable test in ULC 610.

16 Stability Test

16.1 When a minimum force of 150 lbf (68 kg) is applied to the appliance in any direction, the appliance is not to tip over or become disengaged from its mounting means.

16.2 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, in accordance with the manufacturer's instructions.

Exception: Appliances with a minimum weight of 100 lb (45.46 kg) that otherwise meet the requirements of this Section and/or Section [A7](#), Stability Tests, are considered fixed and not required to be secured by screws, bolts, or the equivalent.

16.3 For a floor-mounted, wall-mounted or free-standing appliance, when leveling means are provided, the unvented decorative appliance is to be raised to the highest position allowed by the leveling means.

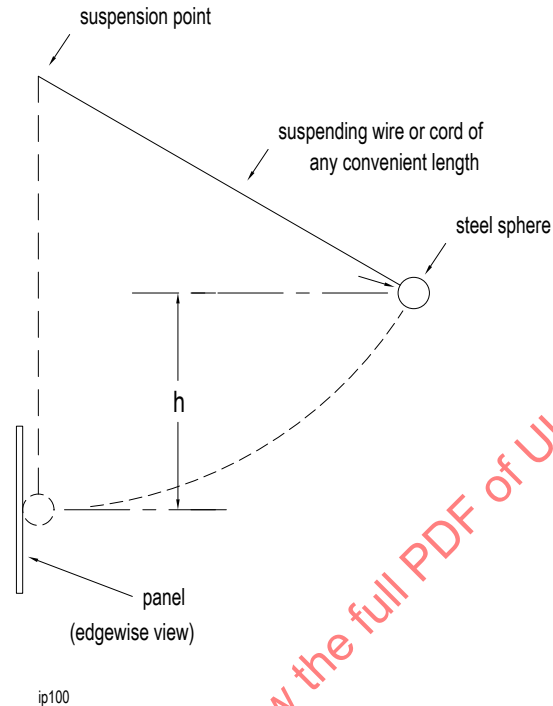
16.4 The tipping force is to be a horizontal force exerted in any direction at the topmost point of any part of the unvented decorative appliance. In addition, for a wall-mounted appliance, this test shall be repeated in any direction at the lowest point of any part of the appliance.

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 inch (50.8 mm) diameter steel sphere swung through a pendulum arc from a height of 11.81 inches (300 mm). The suspension point of the steel sphere shall be 39.37 inches (1000 mm) above the center of the glass and the at-rest position of the steel sphere shall be 1 inch (25 mm) in front of the point of impact. (See [Figure 17.1](#).)

Figure 17.1
Glass Impact Test



17.3 The test shall be conducted during the Temperature Tests while at maximum temperatures developed during that test and following the Temperature Tests 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 Moist Ammonia Air Stress Cracking Test

18.1 After being subjected to conditions in [18.2](#) – [18.3](#), a pressure confining brass part containing more than 15 % zinc shall:

- a) Show no evidence of cracking when examined using 25x magnification; and
- b) Perform as intended when tested as described in [18.4](#).

18.2 One test sample of each size is to be subjected to the physical stresses normally imposed on or within a part as the result of assembly with other components. Samples with female tapered pipe threads, intended to be used for installing the product in the field shall have the threads engaged and tightened to the torque specified in [Table 18.1](#). Samples with female threads other than tapered pipe threads shall be torqued as specified by the manufacturer. PTFE tape or pipe compound shall not be used on any threads. Samples with male threads are to be evaluated as received.

Table 18.1
Torque Requirements for Threaded Connections

Nominal thread size inches	Torque	
	lb·in	(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 The samples shall then be tested in accordance with the Apparatus, Reagents and Materials, Test Media, Test Sample Preparation, and Test Procedure Sections of ASTM B858, with the test solution pH level high 10.5 ± 0.1 and the exposure temperature shall be 77 ± 1.8 °F (25 ± 1 °C), and with the examination in accordance with [18.4](#).

18.4 After the exposure period, the samples are to be examined for cracks or other signs of stress corrosion using a microscope having a magnification of 25X.

18.5 Pressure-confining brass parts exhibiting degradation as indicated in [18.1](#) as a result of the test exposure described in [18.2](#) and [18.3](#) shall withstand, without rupture, a hydrostatic test pressure of five times the rated pressure, for 1 min.

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 % of original	Not specified	50 % of original
Tensile Strength – Minimum force at breaking point.	850 psi (5.86 MPa)	50 % of original	1200 psi (8.27 MPa)	50 % of original

Table 19.2
Accelerated-Aging Conditions

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

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 Tests, 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 % of their original volume. Visual examination of the immersed sample is to indicate no sign of deterioration, such as cracking, melting, warping, discoloration, or damage.

MARKINGS

Advisory Note: Markings required by this Standard may have to be provided in other languages to conform with the language requirements of the country or region where the product is to be used. In Canada, there are two official languages, English and French. Annex B provides translations in French of the English safety markings specified in this Standard.

20 General

20.1 Markings on unvented decorative appliances shall, unless otherwise required to be placed at a specific location, be grouped together and located where they are visible and legible after the appliance is installed.

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

20.2 All markings shall be permanent. For the purposes of this requirement, markings that are molded; die-stamped; stamped or etched in metal that is permanently secured may be deemed permanent. For other marking methods, such as a pressure-sensitive label, ink or paint stenciling, refer to Section 21, Marking Permanency Test. Usage, handling, and storage of the product are to be evaluated in determining the permanence of the marking.

20.3 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; and
- d) "ANSI/CAN/UL/ULC 1370".

NOTE: Users should be aware that the authority having jurisdiction may also require the mark of the certifying agency be included on the product.

20.4 The appliance shall be in the format specified in Table 20.1 or Table 20.2, as applicable, and Table 20.3, including all information verbatim and in the order depicted. 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. 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.

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 this section.

**Table 20.1
Warning Label**

 WARNING	 AVERTISSEMENT
Improper Use Can Cause Uncontrolled Fire	– Une utilisation inappropriée peut causer un incendie non maîtrisé –
To Reduce Fire Risk:	Pour réduire le risque d'incendie :
Never Use Gasoline or Any Fuel Other Than (Intended Fuel)	Ne jamais utiliser d'essence ou de carburant autre que le (carburant prévu)
Never Re-use Original Packaged Fuel Container	Ne jamais réutiliser le contenant de carburant d'origine

Table 20.1 Continued on Next Page

Table 20.1 Continued

 WARNING	 AVERTISSEMENT
Always Store (Intended Fuel) at Room Temperature in Another Location Separate from the Unvented Decorative Appliance and Away from Other Fuel Containers	Toujours entreposer (le carburant prévu) à la température ambiante dans un endroit distinct de l'appareil décoratif non raccordé et loin des autres contenants de carburant
Never Fuel Appliance While It Is Operating, or Hot	Ne jamais remplir de carburant un appareil décoratif non raccordé lorsqu'il est en fonctionnement ou lorsqu'il est chaud
Always let the Combustion Chamber Cool in Accordance with the Manufacturer's Instructions	Toujours laisser refroidir la chambre de combustion conformément aux directives du fabricant.
If Fire Occurs:	Si un incendie se déclare :
Exit Quickly and Warn Others	* Sortir rapidement et avertir les autres occupants *
Call Fire Department	* Appeler le service d'incendie *
Do Not: Try to Move Appliance, Try to Smother Fire, or Put Water on the Fire	* Ne pas déplacer l'appareil décoratif non raccordé, étouffer l'incendie ou mettre de l'eau sur le feu *
Hot Surfaces *Keep Children Away	* Surfaces chaudes * * Éloigner les enfants *
Do Not Operate Without Installing the Protective Screens, Grilles or Guards	* Ne pas faire fonctionner sans les écrans, grilles ou cloisons de protection *

Table 20.2
Warning Label – Applicable for Cans or Cartridges

 WARNING	 AVERTISSEMENT
·Improper Use Can Cause Uncontrolled Fire·	– Une utilisation inappropriée peut causer un incendie non maîtrisé –
Never Use Any Fuel Except [describe can or cartridge]	n'utilisez jamais de carburant à l'exception de : (décrire la canette ou la cartouche)
Always Store Cans or Cartridges in a Cool Place	Conservez toujours les canettes ou les cartouches dans un endroit frais
Never Insert a Can or Cartridge While Another is Still Hot or Burning	N'insérez jamais une canette ou une cartouche alors qu'une autre est encore chaude ou en flamme
Follow All Instructions Provided With the Appliance and Posted at [website]	Suivez toutes les instructions fournies avec l'appareil et publiées sur [site Web]
Appliance Has Hot Surfaces – Keep Children Away From Appliance	L'appareil a des surfaces chaudes - Gardez les enfants loin de l'appareil

Table 20.3
Caution Label

 CAUTION	 ATTENTION
·Improper Use Can Cause Pollution and Health Problems·	– Une utilisation inappropriée peut causer des problèmes de pollution et de santé –
To Reduce Risk:	Pour réduire le risque :
Use Only (Intended Fuel)	Utiliser seulement (le carburant indiqué)
Operate Only Per Manufacturer's Instructions	Faire fonctionner uniquement selon les directives du fabricant
Keep The Appliance Clean – See Instruction Manual For Cleaning and Proper Operation	Maintenir l'appareil décoratif non raccordé en bon état de propreté - Se reporter au manuel d'utilisation pour le nettoyage et le fonctionnement

Table 20.3 Continued on Next Page

Table 20.3 Continued

 CAUTION	 ATTENTION
Always Operate Appliance With Doors Of Room Open	Toujours ouvrir les portes de la pièce adjacente lorsque l'appareil est en fonctionne
Follow All Applicable Code Requirements When Using Appliance	Respecter toutes les exigences appropriées des code de construction lorsque l'appareil est en fonctionne
Keep Instruction Manual	Conserver le manuel d'utilisation

20.5 An unvented decorative 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.

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

20.7 An unvented decorative appliance shall be marked with the following or equivalent statement: "Use a fuel only."

^a Specific liquid or gelled alcohol-based fuel utilized during the testing of the appliance.

20.8 An unvented decorative 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."

20.9 An unvented decorative appliance shall be marked: "See (manufacturer's or private labeler's name) installation and operating instructions for this model."

20.10 An unvented decorative appliance 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) "WARNING: Risk of fire. A minimum of a air space clearance to insulation and building materials must be maintained";
- b) "Minimum Room size: b ft³ (c m³)"; and
- c) "For installation and use only in a manufacturer approved enclosure".

Exception No. 1: An unvented decorative appliance 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 Manufacturer's specified minimum room size

^c Manufacturer's specified minimum room size

20.11 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."

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

21 Marking Permanency Tests

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 lbf (9 N) force across the test panel with a flat metal blade 5/64 inch (2.0 mm) thick, held at right angles to the test panel; and
- 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 UL 969 or CSA C22.2 No. 0.15, as applicable is excluded.

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 maximum temperature developed on the unvented decorative appliance surface where the marking will be placed, that was recorded during the Temperature Tests, Section [15](#), for 24 hours and then cooled in a controlled atmosphere maintained at 73.4 ± 3.6 °F (23 ± 2 °C) and 50 % 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 % relative humidity for 24 hours. The samples then are to be suspended in a humidity cabinet for 72 hours at 90 ± 3.6 °F (32 ± 2 °C) and 85 ± 5 % 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 % 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

Advisory Note: Markings required by this Standard may have to be provided in other languages to conform with the language requirements of the country or region where the product is to be used. In Canada, there

are two official languages, English and French. Annex [B](#) provides translations in French of the English safety markings specified in this Standard.

22 General

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

22.2 When the installation of an appliance part, such as a control or glass door assembly is specified by the manufacturer, detailed instructions for the installation shall be provided with the assembly.

22.3 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.

NOTE: The instructions may include a copy of the certification label.

22.4 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.

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

23 Installation Instructions

23.1 Complete installation instructions shall be provided by the manufacturer.

NOTE : A copy of the certification label should be included with the installation instructions.

23.2 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.

23.3 The installation instructions shall require that construction of site-built enclosures be in accordance with reasonable concepts of safety, substantiality and durability.

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

- a) That the installation of the unvented decorative appliance must comply with the requirements of, applicable local codes, and manufacturer installation and clearance requirements, refer to [6.4](#), as applicable.
- b) 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 the fire chamber;
- c) 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 (refer to [11.2.1.3](#) and [14.3.6](#));

- d) 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;
- e) 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";
- f) Statements concerning the use of either required sealing strips of noncombustible materials between the appliance enclosure or combustion chamber, as applicable and factory-built hearth extension or the use of a sand-cement grout between the enclosure or combustion chamber, as applicable and an on-site-constructed hearth extension;
- g) 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;
- h) The minimum hearth extension areas to be covered with relation to the appliance. When the area of the appliance opening is 6 ft² (0.6 m²) 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 ft², 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;
- i) The methods and parts to be employed for maintaining ventilation and air circulation;
- j) 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";
- k) Any limitations with respect to installation and use of the appliance, the joining of two or more parts to constitute the intended assembly, and the required installation clearances;
- l) 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";
- m) 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;
- n) 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;
- o) 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