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NATIONAL STANDARD

ANSI/CAN/UL/ULC 1390:2024

STANDARD FOR SAFETY

Solid Fuel Fireplace Inserts and Hearth-Mounted Stoves for Installation into Masonry Fireplaces

Approved American National Standard
ANSI

ANSI/UL 1390-2024

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SCC FOREWORD

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UL Standard for Safety for Solid Fuel Fireplace Inserts and Hearth-Mounted Stoves for Installation into Masonry Fireplaces, ANSI/CAN/UL/ULC 1390

First Edition, Dated November 13, 2024

Summary of Topics

This new First Edition of ANSI/CAN/UL/ULC 1390 dated November 13, 2024 is being issued as a new joint US/Canada Standard reflecting the latest ANSI and SCC approval dates and incorporating the proposals dated May 5, 2023, February 16, 2024, and July 26, 2024.

The new requirements are substantially in accordance with Proposal(s) on this subject dated May 5, 2023, February 16, 2024, and July 26, 2024.

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NOVEMBER 13, 2024

ANSI/CAN/UL/ULC 1390:2024

Standard for Solid Fuel Fireplace Inserts and Hearth-Mounted Stoves for Installation into Masonry Fireplaces

First Edition

November 13, 2024

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

The most recent designation of ANSI/UL 1390 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 date November 13, 2024.

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Preface

This is the First Edition of ANSI/CAN/UL/ULC 1390, Standard for Solid Fuel Fireplace Inserts and Hearth-Mounted Stoves for Installation into Masonry Fireplaces.

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 1390 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, identified as Normative, forms a mandatory part of this Standard.

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

This joint American National Standard and National Standard of Canada is based on, and now supersedes, the Fourth Edition of CAN/ULC 628:2022.

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 Solid Fuel Appliances, TC 127.

This list represents the TC 127 membership when the final text in this Standard was balloted. Since that time, changes in the membership may have occurred.

TC 127 Membership

Name	Representing	Interest Category	Region
E. Adair	Hearth Patio & Barbecue Association	Producer	USA
J. Brania	UL Solutions	Testing & Standard Org	USA
I. Brodzinski	UL Standards & Engagement	TC Project Manager	USA
J. Buckley	Buckley Rumford CO	Supply Chain	USA
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TC 127 Membership Continued on Next Page

TC 127 Membership Continued

Name	Representing	Interest Category	Region
K. Bush	Office of the Maryland State Fire Marshal	Authorities Having Jurisdiction / Regulator	USA
L-P. Côté	SBI International	Producer	Canada
N. Dawe	County Of Cobb	Authorities Having Jurisdiction / Regulator	USA
R. Dimmitt	Chimney Safety Institute Of America	General Interest	USA
E. Dufour	Security Chimneys International LTD	Producer	Canada
D. Feb	Standards Individuals	General Interest	USA
D. Freeman	Freeman Fire Inspectors, Ltd.	Commercial / Industrial User	USA
Z. Gadomski	WETBC	Commercial / Industrial User	Canada
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K. Kalakay	State of Michigan	Authorities Having Jurisdiction / Regulator	USA
T. Mcnulty	US Draft CO	Producer	USA
C. Neufeld	Blaze King Industries Inc	Producer	USA
K. Reasoner	Kozy Heat Fireplaces	Producer	USA
M. Romanow	Innovative Hearth Technologies	Producer	USA
M. Savage	Marion County, FL	Authorities Having Jurisdiction / Regulator	USA
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P. Stegmeir	P B S & Associates	Commercial / Industrial User	USA
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This Standard is intended to be used for conformity assessment.

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

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INTRODUCTION

1 Scope

1.1 These requirements cover solid-fuel burning fireplace inserts or hearth-mounted stoves intended to be vented through the throat or damper area of a masonry fireplace and masonry or factory-built chimney system. The appliances may be installed into new masonry fireplaces, or masonry fireplaces that have been operated for some time, i.e., in these cases the fireplace insert or hearth-mounted stove installations are retrofits.

1.2 Requirements for masonry fireplaces equipped with factory-built chimneys are provided in Annex A.

1.3 The requirements include testing with a continuous chimney liner from the appliance collar to the point of termination.

1.4 This standard addresses fireplace inserts or hearth-mounted stoves that may also incorporate catalytic combustors and/or secondary combustion systems.

1.5 Fireplace inserts or hearth-mounted stoves as covered by this standard are intended for installation in masonry fireplaces that comply with the requirements of applicable regulatory Codes.

1.6 Fireplace inserts and hearth-mounted stoves as covered by this standard are not intended for installation into factory-built fireplaces within the scope of:

a) In Canada, ULC 610, Standard for Factory-Built Fireplace Systems;

b) In the United States, UL 127, Standard for Factory-Built Fireplaces;

nor in steel liner assemblies within the scope of:

c) In Canada, ULC S639, Standard for Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces;

d) In the United States, UL 907, Standard for Fireplace Accessories;

nor in artificial fireplaces, or similar appliances (e.g., a tubular grate).

1.7 This Standard does not cover free-standing solid-fuel space heaters. Refer to:

a) In Canada, ULC S627, Standard for Space Heaters for Use with Solid Fuels;

b) In the United States, UL 1482, Standard for Solid-Fuel Type Room Heaters;

for the applicable requirements.

1.8 The appliances covered by this Standard are intended for installation and use in accordance with the applicable Codes and Regulations as determined by the Authority Having Jurisdiction (AHJ), such as:

a) In Canada:

1) The National Building Code of Canada; or

2) CSA B365 Series, Installation code for solid-fuel-burning appliances and equipment;

b) In the United States:

1) The series of International Building Codes;

2) The Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances, NFPA 211; or

3) Uniform Mechanical Code (IAPMO).

1.9 The requirements of this standard do not apply to appliances intended for installation into transportable buildings that are not designed to include a masonry fireplace.

1.10 This standard does not apply to the installation of fireplace inserts or hearth-mounted stoves into steel form fireplace units or steel firebox liners.

1.11 This standard does not apply to modular masonry fireplace systems.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard; or

b) Is superseded by a requirement in this standard.

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

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurements

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

4 Referenced Publications

4.1 The documents shown below are referenced in the 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 A653/A653M, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*

ASTM C1057, *Standard Practice for Determination of Skin Contact Temperature from Heated Surfaces Using a Mathematical Model and Thermesthesiometer*

CSA B365, *Installation code for solid-fuel-burning appliances and equipment*

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

CSA C22.2 No. 113, *Fans and Ventilators*

CSA C22.2 No. 60335-2-102, *Household and Similar Electrical Appliances – Safety – Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections*

NFPA 97, *Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances*

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*

UL 103, *Factory-Built Chimneys for Residential Type*

UL 127, *Factory-Built Fireplaces*

UL 507, *Electric Fans*

UL 969, *Marking and Labelling Systems*

UL 1482, *Solid-Fuel Type Room Heaters*

UL 1618, *Wall Protectors, Floor Protectors, and Hearth Extensions*

UL 1777, *Chimney Liners*

ULC 610, *Factory-Built Fireplace Systems*

ULC S627, *Space Heaters for Use with Solid Fuels*

ULC 629, *650 °C Factory-Built Chimneys*

ULC S635, *Lining Systems for Existing Masonry or Factory-Built Chimneys and Vents*

ULC S639, *Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces*

ULC S640, *Lining Systems for New Masonry Chimneys*

5 Glossary

5.1 For the purposes of this standard, the following definitions apply.

5.2 AIR CONTROL – a device to control the flow rate of inlet air into the fire chamber.

5.3 ALUMINUM-COATED STEEL – An aluminum-coated steel in which the bond between the steel and the aluminum is an iron-aluminum alloy.

5.4 APPLIANCE TEST ASSEMBLY – The combination of fireplace insert or hearth-mounted stove, chimney connector (as applicable), chimney liner, and chimney cap installed in the fireplace test structure.

5.5 AUTHORITY HAVING JURISDICTION (AHJ) – An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation or a procedure.

5.6 CHIMNEY LINER – A product conforming to:

a) In Canada:

1) The Class 3 requirements of ULC S635; or

2) The requirements of ULC S640;

b) In the United States, the requirements for a chimney liner intended for connection to a solid-fuel-fired appliance and rated for 1149 °C (2100 °F) operation in UL 1777.

NOTE: The Scopes of UL 1777 and ULC S640 cover liners for masonry chimneys only. The use of these products as part of the installation of fireplace inserts or hearth-mounted stoves into masonry fireplaces that are connected to factory-built chimneys is validated by testing in accordance with Annex A of this standard.

5.7 CHIMNEY TRANSITION – The point of transition between masonry and the factory-built chimney and may include existing masonry material, a bond-beam, and factory-built anchor or transition plate.

5.8 COMBUSTIBLE MATERIAL, NONCOMBUSTIBLE MATERIAL – These terms are defined in NFPA 97 and/or the National Building Code of Canada.

5.9 COMBUSTION AIR – Air that is supplied to combustion appliances to be used in the combustion of fuels and the process of venting combustion gases.

5.10 DAMPER – A valve or plate for regulating draft or flow of flue gases. May be either manually or automatically operated.

5.11 DAMPER AREA/THROAT – The transition opening between the firebox and smoke chamber of the masonry fireplace.

5.12 FIRE CHAMBER (FIREBOX) – The section of a masonry fireplace, a fireplace insert or a hearth-mounted stove in which fuel is burned, including the entire volume bounded by the hearth, the chamber walls and the chamber ceiling.

5.13 FIREPLACE INSERT – Any solid-fuel fired heat-producing appliance intended for installation within, or partially within the fuel burning space of a masonry fireplace and which substantially closes off the fireplace opening and is vented through the throat or damper area of the fireplace.

5.14 FIREPLACE TEST STRUCTURE – The combination of all floor, wall, ceiling, and structural support elements, and test enclosure, the masonry fireplace and masonry chimney, or factory-built chimney, as applicable, as well as air supply, heat management and exhaust systems, assembled prior to installation of the appliance test assembly.

5.15 FLOOR PROTECTION – Non-combustible surfacing applied to the floor area underneath and extending in front, to the sides and to the rear of a heat producing appliance.

NOTE 1: UL 1618 provides construction and testing requirements for Type 1 Ember Protector and Type 2 Thermal Floor Protector.

NOTE 2: UL 1618 has been processed and approved under ANSI accreditation in the United States only. The use of these products as part of the installation of fireplace inserts or hearth-mounted stoves into masonry fireplaces in both the United States and Canada is validated by the construction and testing requirements of this standard.

5.16 GLASS – Any transparent or translucent material employed in the construction of a heat producing appliance or intended as an accessory or component of an accessory for the appliance.

5.17 HEARTH – The floor area within the fire chamber of a masonry fireplace, fireplace insert, or hearth-mounted stove.

5.18 HEARTH EXTENSION – The noncombustible material applied to the floor area extending in front of and at the sides of a masonry fireplace hearth as required by the applicable building Code.

5.19 HEARTH-MOUNTED STOVE – Any free-standing solid-fuel fired heat-producing appliance intended for installation in front of, or inside, a masonry fireplace and is vented through the throat or damper area of the fireplace.

5.20 HYBRID SYSTEM – A fireplace of solid masonry units, such as bricks, stones, masonry units, or reinforced concrete, that may have a portion of a masonry chimney, that transitions to a factory-built chimney conforming to:

a) In Canada, ULC 629;

b) In the United States, UL 103.

5.21 MANTEL – A shelf or structure extending over a fireplace opening.

5.22 MASONRY FIREPLACE – A hearth and fire chamber of solid masonry units, such as bricks, stones, masonry units, or reinforced concrete, provided with a suitable chimney.

5.23 READILY ACCESSIBLE – Exposed, or capable of being exposed, for operation, inspection, maintenance, or repair without the use of tools to open or remove doors, panels, or coverings.

5.24 SIDE WALL – A facing ornament or decorative material, that projects more than 1.5 inches (38 mm) from the vertical surface, above and/or to the sides of a fireplace opening.

5.25 SMOKE CHAMBER – The area above the firebox and below the chimney of a masonry fireplace.

5.26 SOLID-FUEL – Refers to cordwood or coal, unless a different fuel is specified by the manufacturer. Examples of other fuels may include:

a) Wood chips;

b) Sawdust;

c) Peat logs;

d) Wood and other biomass pellets; and

e) Kernel corn.

NOTE: The terms “solid-fuel” and “solid fuel” are both applied in this standard.

5.27 TEST ENCLOSURE – Cladding material and associated structural supports that are included in the fireplace test structure, intended to simulate combustible construction materials.

5.28 TEST LABORATORY – The building space surrounding the test structure, from which the combustion air is drawn, and into which flues gases are vented from the chimney liner of the appliance test assembly.

5.29 TRANSPORTABLE BUILDING – A building constructed on running gear skids, or a recreational product providing accommodation that is constructed on a chassis with wheels or installed on a vehicle when in use.

5.30 TRIM (FACING) – A facing ornament or decorative material, which may be combustible, that projects less than 1.5 inches (38 mm) from the vertical surface, above and/or to the sides of a fireplace opening.

6 General

6.1 A fireplace insert or hearth-mounted stove intended for installation into a masonry fireplace and masonry chimney system shall meet the requirements contained in the body of this Standard.

6.2 A fireplace insert or hearth-mounted stove intended for installation into a hybrid system, consisting of a masonry fireplace with at least a portion of a factory-built chimney, shall meet the requirements contained in Annex A.

7 Electrical Features

7.1 The electrical features of fireplace inserts or hearth-mounted stoves shall comply with:

a) In Canada, CSA C22.2 No. 60335-2-102;

b) In the United States, the following sections in UL 1482:

1) Components;

2) Temperature Test – Electrical Components;

3) Dielectric Voltage-Withstand Test;

4) Leakage Current Test;

5) Stalled Motor Test;

6) Strain Relief Test;

7) Power Supply Cord;

8) Field Wiring Leads;

9) Push-Back Relief Test;

10) Short-Circuit Test;

11) Knockout Test;

12) Production Line Dielectric Voltage-Withstand Test; and

13) Production Line Grounding Continuity Test.

7.2 Fans and motors driving the fans used to circulate air around or through a fireplace insert or hearth-mounted stove shall be guarded or enclosed in accordance with the requirements of:

a) In Canada, CSA C22.2 No. 113;

b) In the United States, UL 507.

CONSTRUCTION

8 General

8.1 Fireplace inserts and hearth-mounted stoves shall have a fire chamber enclosed on all sides (including top and bottom) and shall be designed for the attachment of a chimney liner.

8.2 Each assembly shall include a complete set of installation and operating instructions in accordance with the Installation Instructions section and the Operating Instructions section of this Standard.

8.3 The fireplace insert or hearth-mounted stove shall be designed to permit the inspection and cleaning of the chimney liner by normal means without the removal of the fireplace insert or hearth-mounted stove.

8.4 A fireplace insert or hearth-mounted stove and related parts shall be constructed and assembled to assure its strength, rigidity, and durability when tested in accordance with these requirements and to withstand damage during handling and installation.

8.5 A joint in metal surfaces of a fire chamber or flue gas passageway within the fireplace insert or hearth-mounted stove shall be gas-tight, as attained by being welded, lock-seamed, riveted, or bolted. A joint shall not depend primarily on cement for tightness.

8.6 Each part or assembly shall be constructed for ready attachment of one to the other without requiring alteration, cutting, threading, drilling, welding, or similar operation by the installer; except that a special assembly or part designed to be cut to length or to fit by the installer may be provided if means are furnished for readily joining any altered part to a companion part or assembly.

8.7 Except for fire chamber materials, if insulating materials are required to protect combustible parts of the building, they shall be an integral part of the assembly and the manufacturer's instructions shall notify the installer that they must be included in the completed installation.

8.8 Two or more parts or subassemblies which must bear a definite relationship to each other shall be arranged and constructed to permit them to be incorporated into the complete assembly without need for alteration; or such parts or subassemblies shall be assembled and shipped from the factory as one element.

8.9 Excluding options, parts of a fireplace insert or hearth-mounted stove that are necessary to obtain safe temperatures on adjacent construction, including mantel shielding and the applicable floor protector type(s), when required, shall be:

a) Factory-attached;

b) Shipped with the fireplace insert or hearth-mounted stove; or

c) Specified in the installation instructions for the fireplace insert or hearth-mounted stove.

8.10 A fireplace insert or hearth-mounted stove shall be shipped with any special parts necessary for connection to a chimney liner.

8.11 The fireplace insert or hearth-mounted stove shall have no edges, corners, or projections presenting a cut or puncture hazard.

8.12 Glass components shall not be rigidly mounted. Allowance for differential expansion and distortion shall be provided. The design of frames with not less than 0.125 inch (3 mm) total edge clearance or the

use of heat-resistant resilient mountings providing at least such clearances shall be considered as meeting this requirement.

8.13 A metal tag, to be permanently mounted in an easily accessible or visible location or a location as directed by the AHJ, including the following wording shall be provided with each fireplace insert or hearth-mounted stove:

> "This masonry fireplace may have been altered to accommodate a liner system and should be inspected by a qualified person prior to re-use as a conventional fireplace."; and
>
> « Ce système de foyer en maçonnerie a peut-être été modifié pour accepter un système de foyer encastrable et doit être inspecté par une personne qualifiée avant d'être réutilisé comme foyer conventionnel. »

The tag marking text shall be in characters not less than 0.20 inch (5 mm) high. In the United States, instructions and product markings may be provided in English only.

9 Flue Collar

9.1 Flue collars, which may be recessed, shall be made of material conforming to the requirements of 14.1. A collar shall permit the secure attachment of the chimney liner. Unless the chimney liner is supplied with the fireplace insert or hearth-mounted stove, the collar shall be sized to accept a trade-size chimney liner.

NOTE: Secure attachment can be accomplished using 3 holes in the collar to facilitate securement with fasteners.

10 Radiation Shields and Baffles

10.1 Where the manufacturer requires a radiation shield or a baffle, it shall be constructed, formed and supported so as to assure proper positioning and to prevent distortion or sagging when tested in accordance with these requirements.

11 Thermostatic Control

11.1 When present, a thermostatically controlled combustion air damper shall be so constructed that failure of a part will result in closure of the damper.

12 Doors

12.1 A fireplace insert or hearth-mounted stove shall be supplied with integral door(s) designed to close off the fire chamber from the living space.

12.2 Those portions of a handle or knob that are subjected to contact by a user shall be smooth and rounded.

12.3 All doors or any removable screens incorporating glass components, shall be provided with means to positively secure the door or screen in the closed position.

13 Catalytic Combustors and Secondary Combustion Systems

13.1 A by-pass, if present, shall have provision to by-pass the flue gas around a catalytic combustor and/or secondary combustor, as applicable without the necessity of having to remove the combustor and/or system, or other means to permit safe operation of the appliance should the combustor become blocked. If no by-pass is present, the requirements of this Section do not apply.

13.2 A catalytic combustor and/or secondary combustor, as applicable shall be located such that it is not subject to mechanical damage from fuel charging or ash removal or cleaning of flue gas passages.

13.3 A catalytic combustor and/or secondary combustor, as applicable, shall be located so as to minimize the likelihood of it becoming plugged by fly-ash during any of the tests to which the fireplace insert or hearth-mounted stove is subjected.

13.4 A catalytic combustor and/or secondary combustor, as applicable shall be readily removable for cleaning or replacement.

13.5 A catalytic combustor and/or secondary combustor, as applicable shall be mounted to withstand, without damage, normal impacts expected during use of the fireplace insert or hearth-mounted stove.

14 Materials

14.1 The fire chamber of the fireplace insert or hearth-mounted stove and other parts which are in contact with flue gases and which are readily visible shall be made of a material having the durability and resistance to fire and heat equivalent to hot-rolled sheet steel having a thickness not less than 0.042 inch (1.07 mm).

NOTE: Aluminum-coated steel, cast iron, unprotected low carbon steel, and painted low carbon steel not less than 0.042 inch (1.07 mm) in thickness are considered as meeting this requirement.

14.2 Requirements for thermal insulation in this section do not apply to a chimney liner.

14.3 Unless otherwise specified in this Section, the minimum thickness of metal, including coatings where shown, shall be as follows:

a) Aluminum-alloy sheets – 0.016 inch (0.41 mm);

b) Steel (uncoated or unpainted) – 0.042 inch (1.07 mm);

c) Porcelain-enamelled steel sheets – 0.032 inch (0.81 mm) [minimum metal thickness – 0.020 inch (0.50 mm)];

d) Cast iron – 0.125 inch (3.17 mm);

e) Galvanized-steel sheets not less than Z275 coating class in accordance with ASTM A653/A653M – 0.018 inch (0.45 mm);

f) Aluminum-coated steel sheets [not less than 0.40 oz/ft^2 (0.12 kg/m^2) of aluminum] – 0.018 inch (0.46 mm); and

g) Stainless-steel sheets – 0.012 inch (0.30 mm).

14.4 Materials used in the fireplace insert or hearth-mounted stove may be other than those specified in 14.3, however they shall be of equivalent strength and durability, and shall meet all of the other requirements of this standard.

14.5 Aluminum alloys containing more than 1 % magnesium shall not be used if the reflectivity of the material is employed to reduce a fire hazard.

14.6 The lining material of the fireplace insert or hearth-mounted stove and other parts in contact with flue gases shall be:

a) Low carbon steel, provided that the temperature attained by the material, when tested in accordance with the Performance section, does not exceed the values in Table 14.1 item E (Column 1 for Radiant Fire Test, Brand Fire Test, and Coal Fire Test; Column 2 for Flash Fire Test, Abnormal Radiant fire Test and Abnormal Brand fire Test); or

b) Other material with equivalent performance, when tested in accordance with the Performance section.

Table 14.1
Maximum Temperature Rises

Materials and components	Column 1		Column 2	
	°C	(°F)	°C	(°F)
A. MOTORS[a,b,m]				
1. Class A insulation systems on coil windings of alternating-current motors 7 inches (178 mm) or less in diameter (not including universal motors):				
a. In open motors;				
Thermocouple or resistance method	75	(135)	115	(207)
b. In totally enclosed motors;				
Thermocouple or resistance method	80	(144)	115	(207)
2. Class A insulation systems on coil windings of alternating-current motors more than 7 inches (178 mm) in diameter and of direct-current and universal motors:				
a. In open motors;				
Thermocouple method	65	(117)	115	(207)
Resistance method	75	(135)	115	(207)
b. In totally enclosed motors;				
Thermocouple method	70	(126)	115	(207)
Resistance method	80	(144)	115	(207)
3. Class B insulation systems on coil windings of alternating-current motors 7 inches (178 mm) or less in diameter (not including universal motors):				
a. In open motors;				
Thermocouple or resistance method	95	(171)	140	(252)
b. In totally enclosed motors;				
Thermocouple or resistance method	100	(180)	140	(252)
4. Class B insulation systems on coil windings of alternating-current motors more than 7 inches (178 mm) in diameter and of direct-current and universal motors:				
a. In open motors;				
Thermocouple method	85	(153)	140	(252)
Resistance method	95	(171)	140	(252)
b. In totally enclosed motors;				
Thermocouple method	90	(162)	140	(252)
Resistance method	100	(180)	140	(252)
B. COMPONENTS[m]				
1. Capacitors:				
a. Electrolytic types[c]	40	(72)	Not specified	

Table 14.1 Continued on Next Page

Table 14.1 Continued

Materials and components	Column 1		Column 2	
	°C	(°F)	°C	(°F)
b. Other types[d]	65	(117)	Not specified	
2. Relay, solenoid, and other coils with:				
a. Class 105 insulation systems;				
Thermocouple method	65	(117)	115	(207)
Resistance method	85	(153)	115	(207)
b. Class 130 insulation systems				
Thermocouple method	85	(153)	140	(252)
Resistance method	105	(189)	140	(252)
3. Transformer enclosure:[b]				
a. Class 2 transformers	60	(108)	85	(153)
b. Power and ignition transformers	65	(117)	90	(162)
C. INSULATED CONDUCTORS[e,f,m]				
1. Appliance wiring material				
75 °C rating	50	(90)	65	(117)
80 °C rating	55	(99)	70	(126)
90 °C rating	65	(117)	80	(144)
105 °C rating	80	(144)	95	(171)
200 °C rating	175	(315)	200	(360)
250 °C rating	225	(405)	250	(450)
2. Flexible cord – Types SO, ST, SJO, SJT, HSJ, HSJO				
60 °C rating	35	(63)	60	(108)
75 °C rating	50	(90)	65	(117)
90 °C rating	65	(117)	80	(144)
105 °C rating	80	(144)	95	(171)
3. Other types of insulated wires	See note e			
D. ELECTRICAL INSULATION – GENERAL[f,m]				
1. Class C electrical insulation material	Not specified			
2. Class (180) electrical insulation material	As determined by test			
3. Fiber used as electrical insulation or cord bushings	65	(117)	90	(162)
4. Phenolic composition used as electrical insulation or as parts where malfunction results in a risk of fire or electric shock	125	(225)	150	(270)
5. Thermoplastic material	25 °C (77 °F) less than its temperature rating			
6. Varnished cloth insulation	60	(108)	85	(153)
E. METALS[g]				
1. Aluminum alloys –				
a. 1100 (2S)	183	(330)	239	(430)
b. 3003 (3S)	239	(430)	294	(530)
c. 2014, 2017, 2024, 5052[h]	294	(530)	350	(630)
2. Aluminum-coated steel, heat-resistant type[i]	572	(1030)	708	(1275)

Table 14.1 Continued on Next Page

Table 14.1 Continued

Materials and components	Column 1		Column 2	
	°C	(°F)	°C	(°F)
3. Carbon steel – Coated with Type A19 ceramic	572	(1030)	628	(1130)
4. Galvanized steel[j]	267	(480)	350	(630)
5. Low-carbon steel, cast iron[k,l]	461	(830)	517	(930)
6. Stainless steel –				
a. Types 302, 303, 304, 321, 347	686	(1235)	767	(1380)
b. Type 316	667	(1200)	748	(1345)
c. Type 309S	867	(1560)	950	(1705)
d. Types 310, 310B	894	(1610)	975	(1755)
e. Type 430	728	(1310)	808	(1455)
f. Type 446	961	(1730)	1042	(1875)
F. GENERAL				
1. Operating knobs, handles, and levers[o]				
a. Metallic	50	(122)	Not specified	
b. Glass	78	(172)	Not specified	
c. Plastic [n]	85	(185)	Not specified	
d. Wood	150	(302)	Not specified	
e. Other materials[p]	See note p		Not specified	
G. GLASS COMPONENTS				
1. Not operating knobs, handles, and levers[o]				
a. Fully Tempered Soda-Lime Glass	200	(390)	200	(390)
b. Untempered Borosilicate Glass	210	(410)	470	(880)
c. Tempered Borosilicate Glass	240	(465)	270	(520)
d. Other Glazing Materials	See note q		See note q	

NOTE: Users are reminded that, throughout this standard, conversions between Celsius and Fahrenheit temperatures for:

a) Fixed temperature values include a 32 °C offset;

b) Temperature rises, or differences, do not include a 32 °C offset.

[a] The motor diameter is to be measured in the plane of the laminations of the circle circumscribing the stator frame, excluding lugs and boxes used solely for motor cooling, mounting, assembly, or connection.

[b] Coil or winding temperatures are to be measured by thermocouples unless the coil is inaccessible for mounting of these devices (for example, a coil immersed in sealing compound) or unless the coil wrap includes thermal insulation or more than 2 layers, 1/32 inch (0.8 mm) maximum, of cotton, paper, rayon, or the like. For a thermocouple-measured temperature of a coil of an alternating-current motor, having a diameter of 7 inches (178 mm) or less, the thermocouple is to be mounted on the integrally applied insulation on the conductor. At a point on the surface of a coil where the temperature is affected by an external source of heat, the temperature rise measured by a thermocouple is not prohibited from exceeding the indicated maximum by the amount noted below, when the temperature rise of the coil, as measured by the resistance method, is not more than that specified in the table.

1) 5 °C or 9 °F for Class A insulation on coil windings of alternating-current motors having a diameter of 7 inches (178 mm) or less, open type.

2) 10 °C or 18 °F for Class B insulation on coil windings of alternating-current motors having a diameter of 7 inches (178 mm) or less, open type.

3) 15 °C or 27 °F for Class A insulation on coil windings of alternating-current motors having a diameter of more than 7 inches (178 mm), open type.

4) 20 °C or 36 °F for Class B insulation on coil windings of alternating-current motors having a diameter of more than 7 inches (178 mm), open type.

Table 14.1 Continued on Next Page

Table 14.1 Continued

Materials and components	Column 1		Column 2	
	°C	(°F)	°C	(°F)
[c] For an electrolytic capacitor which is physically integral with or attached to a motor, the temperature rise on insulating material integral with the capacitor enclosure is to be not more than 65 °C or 117 °F.				
[d] A capacitor that operates at a temperature rise higher than 65 °C (117 °F) is to be judged on the basis of its marked temperature rating.				
[e] For standard insulated conductors other than those specified, reference shall be made to the National Electrical Code. The Column 1 maximum temperature rise shall be equivalent to the temperature rating of the insulated conductor, minus an ambient temperature of 25 °C (77 °F), with the corresponding Column 2 maximum temperature 15 °C and 27 °F above Column 1.				
[f] The limitations on phenolic composition and on rubber and thermoplastic insulation do not apply to compounds that have been investigated and found to have special heat-resistant properties.				
[g] The specified maximum temperature rises apply to parts whose malfunction causes the product to be not capable of use.				
[h] 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.				
[i] When the reflectivity of aluminum-coated steel is employed to reduce the risk of fire, the maximum allowable temperature rise is 461 °C or 830 °F.				
[j] 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.				
[k] 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 does not expose adjacent combustible construction to the fire in the fire chamber.				
[l] The specified maximum temperature rise shall not apply to parts of 1/4 inch (6.4 mm) or heavier steel and 5/16 inch (7.9 mm) thick or thicker cast iron.				
[m] Maximum temperature rises are based on an ambient temperature of 25 °C (77 °F).				
[n] 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.				
[o] Temperatures are maximum temperatures, based on an ambient temperature of 21 °C or 70 °F.				
[p] Other handle materials shall have a maximum absolute temperature determined by the calculation method specified in ASTM C1057, such that the temperature limit does not result in a tissue temperature of greater than 50 °C (122 °F) at a tissue depth of 0.003 inch (0.008 cm) with a contact time of 5 seconds.				
[q] As specified by the material supplier for normal and extreme service conditions, and adjusted for an ambient temperature of 20 °C (68 °F).				

14.7 Thermal insulation material shall be of a metal or a mineral base or equivalent.

14.8 Thermal insulation shall comply with the following conditions when the fireplace insert or hearth-mounted stove is tested in accordance with this standard:

a) The products resulting from the combustion or volatilization of any component of the insulation shall be discharged into the chimney liner;

b) The insulation material shall remain in its intended position;

c) The thermal conductivity of the insulation material shall not be increased; and

d) The thermal insulation shall not show evidence of softening, melting, or other evidence of failure.

14.9 Insulating fibrous materials shall be protected to prevent physical contact during normal use and maintenance to reduce the risk of damage.

14.10 Thermal insulation which is not self-supporting shall be applied to solid surfaces in a manner to prevent sagging. An adhesive or cement for attaching such material shall retain its adhesive qualities at

any temperature the adhesive may attain when tested in accordance with these requirements and at minus 18 °C (0 °F).

14.11 A water-absorbing insulation material shall not become wetted by condensation or rain when installed as intended if such wetting will depreciate its durability or insulating value.

14.12 Glass components shall be formed from heat-resistant glass, or other materials having heat-resistant properties suitable for their application. The temperatures of the surface of glass components shall not exceed the design limits for the materials used. (See Table 14.1 item G.)

PERFORMANCE

15 General Requirements for Tests

15.1 Tests are to be conducted on each design series of fireplace insert or hearth-mounted stove. For each design series of fireplace insert or hearth-mounted stove, tests are to be conducted on as many different worst-case samples necessary to determine conformance with these requirements.

15.2 A fireplace insert or hearth-mounted stove intended to burn coal shall also be subjected to the Fire Tests for Coal-Fired Fireplace Inserts or Hearth-Mounted Stoves, Section 21.

15.3 Where the fireplace insert or hearth-mounted stove is equipped with a circulating air blower, the operating temperature tests shall be conducted with the blower inoperative.

15.4 Maximum temperatures developed at any time during a test shall be used to determine compliance with the Radiant Fire Test, the Brand Fire Test, the Flash Fire Test and, if applicable, the Fire Tests for Coal-Fired Fireplace Inserts or Hearth-Mounted Stoves, Sections 18 – 21 (e.g., flue gas temperatures may peak before wall temperatures).

15.5 The Brand Fire Test and the Flash Fire Test shall be operated in that sequence, with the applicable fuel types and conditions according to Sections 19 and 20. The Radiant Fire Test, Section 18, may be operated before the start, or after the end, of the sequence.

15.6 Throughout the fire tests, there shall be no evidence of spillage of products of combustion, or flame from the fireplace insert or hearth-mounted stove. Intermittent or sporadic wisps of smoke (smoking not over 15 seconds at a time) is not to be regarded as spillage. Where the fireplace insert or hearth-mounted stove incorporates a catalytic combustor, this requirement shall apply when the appliance is operated with the feed door open and the combustor bypass open, if so equipped.

NOTE: If multiple doors are present, each door should be tested individually.

Exception: When the unit is fueled through an opening in the top of the unit that is intended to be open only when fuel is added, light intermittent or sporadic flickers of flame not exceeding 6 inches (152 mm) above the opening are permitted.

15.7 With reference to the requirements of 15.6, the following method is to be used in observing spillage of flame from fireplace inserts or hearth-mounted stoves other than the top loading type:

a) Any time the door is opened for fueling the unit for the Brand and Flash Fires Tests, Sections 19 and 20, flame spillage is to be observed.

b) When the maximum temperatures have been attained during the Brand Fire Test, Section 19, the air inlets are to be adjusted to that point of their operating range that creates maximum flame spillage. The feed door then is to be opened at a moderate rate 2 minutes after fuel is added and

similarly reopened 2 minutes after every subsequent fuel loading until it is evident that there is no spillage of flame from the unit.

16 Temperature Measurement

16.1 General requirements for thermocouples

16.1.1 Thermocouples shall conform to the requirements of Table 16.1.

Table 16.1
Requirements for Thermocouples

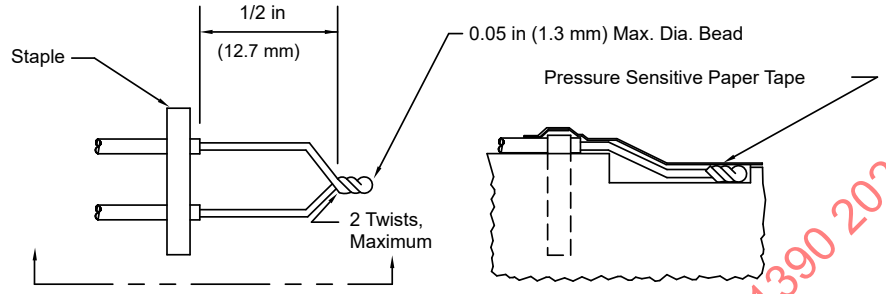
Measurement Type	Material/Design	Bead Size	Stripped Wire	Location description	Attachment method
Test laboratory temperature	Type K (chromel-alumel) or Type J (iron-constantan) thermocouples of wire not larger than 24 AWG (0.21 mm^2)	18 AWG (0.51 mm diameter)	0.5 inch (12.5 mm) length	Sufficiently distant from the test installation to prevent heat transfer to the thermocouple.	Located centrally within a 6.0 inch (152 mm) length of aluminum-painted NPS 2 steel pipe open at both ends.
Zone A (simulated living space) ambient temperature				6.0 inches (152 mm) away from the side wall, 72 inches (1829 mm) from the back wall, and 48 inches (1219 mm) above the floor.	Located centrally within a 6.0 inch (152 mm) length of aluminum-painted NPS 2 steel pipe open at both ends.
Zone B (simulated attic) ambient temperature				2 feet (610 mm) away from the front center line of the chimney enclosure and at the midpoint between the floor and ceiling.	Located centrally within a 6.0 inch (152 mm) length of aluminum-painted NPS 2 steel pipe open at both ends.
Zone C (simulated roof top) ambient temperature				2 feet (610 mm) horizontally from the chimney center line and 1 foot (305 mm) above the roof deck.	Located centrally within a 6.0 inch (152 mm) length of aluminum-painted NPS 2 steel pipe open at both ends.
Test enclosure, structure and appliance wood or plastic surfaces.				See Figure 17.1 – Figure 17.8, as applicable.	See Figure 16.1, "Wood Surfaces"
Test enclosure, structure and appliance metal surfaces.				See Figure 17.1 – Figure 17.8, as applicable.	See Figure 16.1, "Metal Surfaces"
Test enclosure, structure and appliance cement-like surfaces.				See Figure 17.1 – Figure 17.8, as applicable.	The 0.5 inch (12.7 mm) stripped length 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

Table 16.1 Continued on Next Page

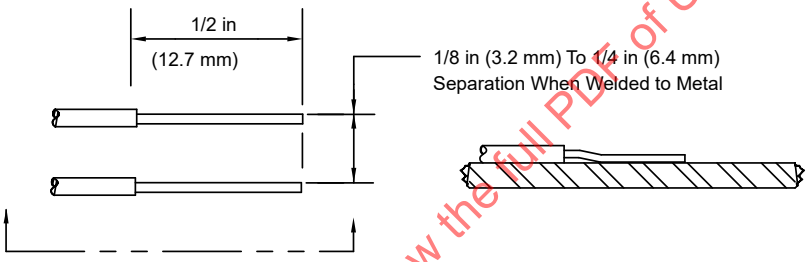
Table 16.1 Continued

Measurement Type	Material/Design	Bead Size	Stripped Wire	Location description	Attachment method
					material. Furnace cement is to be smoothed over such indentations to maintain thermal contact.
Handles and controls				Adjacent surfaces at risk of contact by the user.	Cemented or taped to the surface in a manner to maintain thermal contact with the surface.
Flue gas temperature	Type K chromel-alumel thermocouple, size 24 AWG (0.21 mm^2), with an untwisted welded bare bead junction.	See Figure 16.2	See Figure 16.2	Inserted up to the centerline of the section of the chimney liner, no more than 3 in above the flue collar of the fireplace insert or hearth-mounted stove.	See Figure 16.2

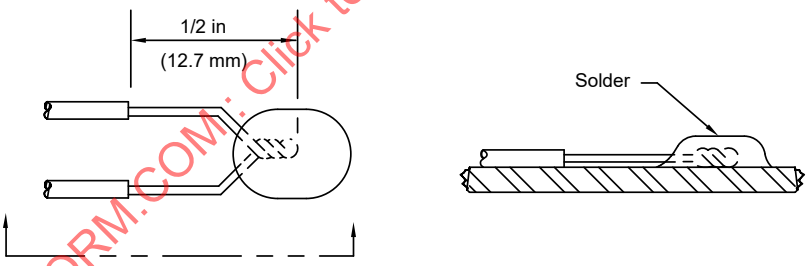
Figure 16.1
Thermocouple Installation Methods



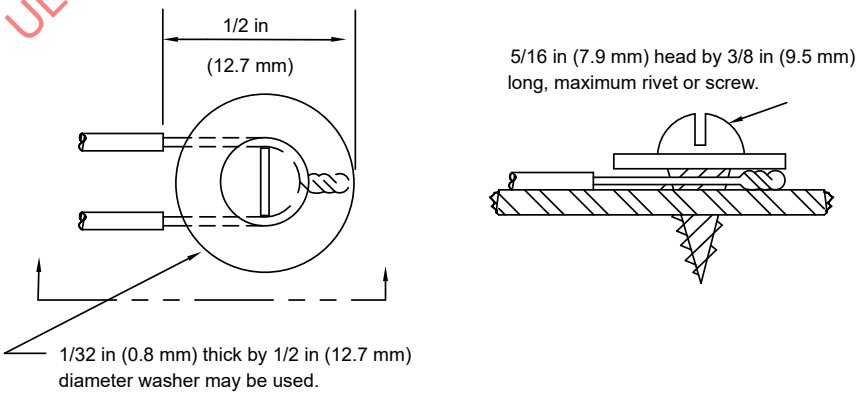
THERMOCOUPLE FOR WOOD SURFACES



THERMOCOUPLE WELDED TO METAL SURFACE



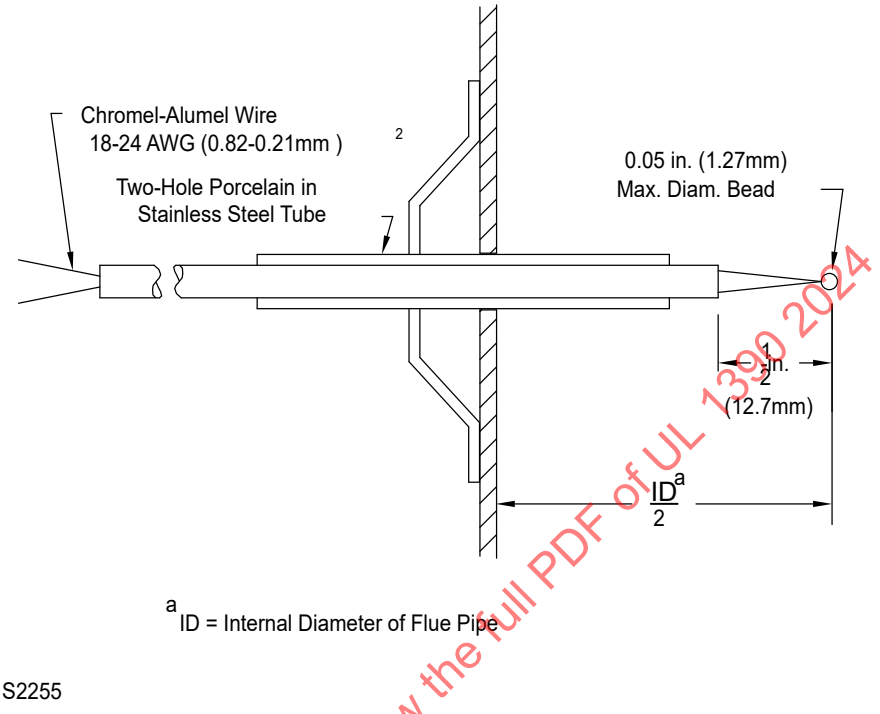
THERMOCOUPLE SOLDERED TO METAL SURFACES



TC-100 THERMOCOUPLE SECURED TO METAL SURFACES

Figure 16.2

Flue Gas Thermocouple and Support Bracket



16.1.2 All wood-mounted thermocouples shall be covered with flat black pressure-sensitive tape or equivalent.

16.2 Temperatures of test structure surfaces

16.2.1 Thermocouples are to be placed on surfaces of the fireplace test structure at various locations as required to measure maximum temperatures during tests. A minimum number of typical thermocouple locations are shown in Figure 17.1 – Figure 17.8, and shall include the front, sides and rear surfaces of the fireplace and chimney. Additional thermocouples may be added as deemed necessary by the testing agency.

NOTE: Thermocouples below the masonry fireplace are inserted between the two layers of plywood flooring.

16.3 Temperatures of the appliance test assembly surfaces

16.3.1 Thermocouples installed to monitor temperatures of the fireplace insert or hearth-mounted stove, and the chimney liner are to be located at points attaining maximum temperatures. Additional thermocouples may be placed at other locations as deemed necessary that are in contact with, or subject to radiation from, surfaces of the chimney. Additional thermocouples may be added as deemed necessary by the testing agency.

16.3.2 The minimum number of thermocouple locations shall also include the following:

a) Hearth-mounted stove or fireplace insert glass;

b) Hearth-mounted stove or fireplace insert knobs and controls;

c) Hearth-mounted stove or fireplace insert feed doors;

d) Hearth-mounted stove or fireplace insert ash doors;

e) Hearth-mounted stove or fireplace insert legs or support stands; and

f) Interface of a nominal 2 inch (51 mm) × 4 inch (102 mm) wood lintel at the top-front edge of the masonry fireplace opening.

16.3.3 Thermocouples shall be attached to the center and corners of the area in which the manufacturer intends to apply the marking label. Temperatures shall be monitored and maximum temperature readings shall be recorded. This information shall then be used to determine the appropriate material to be used for the marking label.

16.3.4 For purposes of determining temperature rise on fireplace insert or hearth-mounted stove parts, on a chimney connector, as applicable, and on the test enclosure and the fireplace test structure, the temperatures of such are to be referenced to Zone ambient temperatures as specified in Table 16.1. Temperatures of joists and rafters are to be referenced to the average of the ambient temperatures above and below the joist or rafter area. Temperatures of floor or roof material are to be referenced to the ambient temperatures above the floor or roof. Temperatures of ceiling material are to be referenced to the ambient temperature below the ceiling.

16.4 Temperatures of test enclosure surfaces

16.4.1 Thermocouples shall be attached to the interior surface of the plywood cladding layer, adjacent to the exterior surface of the fireplace and chimney.

16.4.2 Mantel and trims shall be installed in accordance with the manufacturer's installation instructions, prior to the placement of thermocouples.

16.4.3 As an alternative to the requirements of 16.4.2, manufacturers may request that temperatures are measured during testing on mantels and trims, at a sufficient number of different distances from the fireplace insert or hearth-mounted stove to ensure compliance with the requirements for maximum surface temperatures. These minimum distances shall then be specified in the manufacturer's installation instructions. Refer to Figure 17.1 – Figure 17.8.

17 Test Installation

17.1 General

17.1.1 The locations on all surfaces where thermocouples are mounted shall be painted matte black, for a distance of at least 1 inch (25 mm) from each sensor.

17.1.2 Sufficient time shall be allowed to elapse between steps in the process that rely on the curing of materials. For example, between the construction of the masonry fireplace and subsequent assembly and/or testing steps, such that curing processes for mortars, grouts, etc., will have completed.

NOTE: For masonry construction, the curing period is typically 28 days.

17.1.3 The test structure shall not incorporate warm air circulating ducts or combustion air ducts.

17.2 Fireplace test structure

17.2.1 General

17.2.1.1 The fireplace test structure is to be erected within a test laboratory which is reasonably free of drafts, and having ventilation capable of maintaining the buildup of carbon monoxide to less than 50 ppm throughout the period of any test. The chimney liner is to exhaust into the same space or into a space freely communicating with that from which the combustion air is taken. The test laboratory is to be such that during any one test the test laboratory temperature does not increase more than 11 °C (20 °F) above the test laboratory temperature at the beginning of the test.

17.2.1.2 The fireplace test structure shall be assembled as illustrated by Figure 17.1 – Figure 17.8.

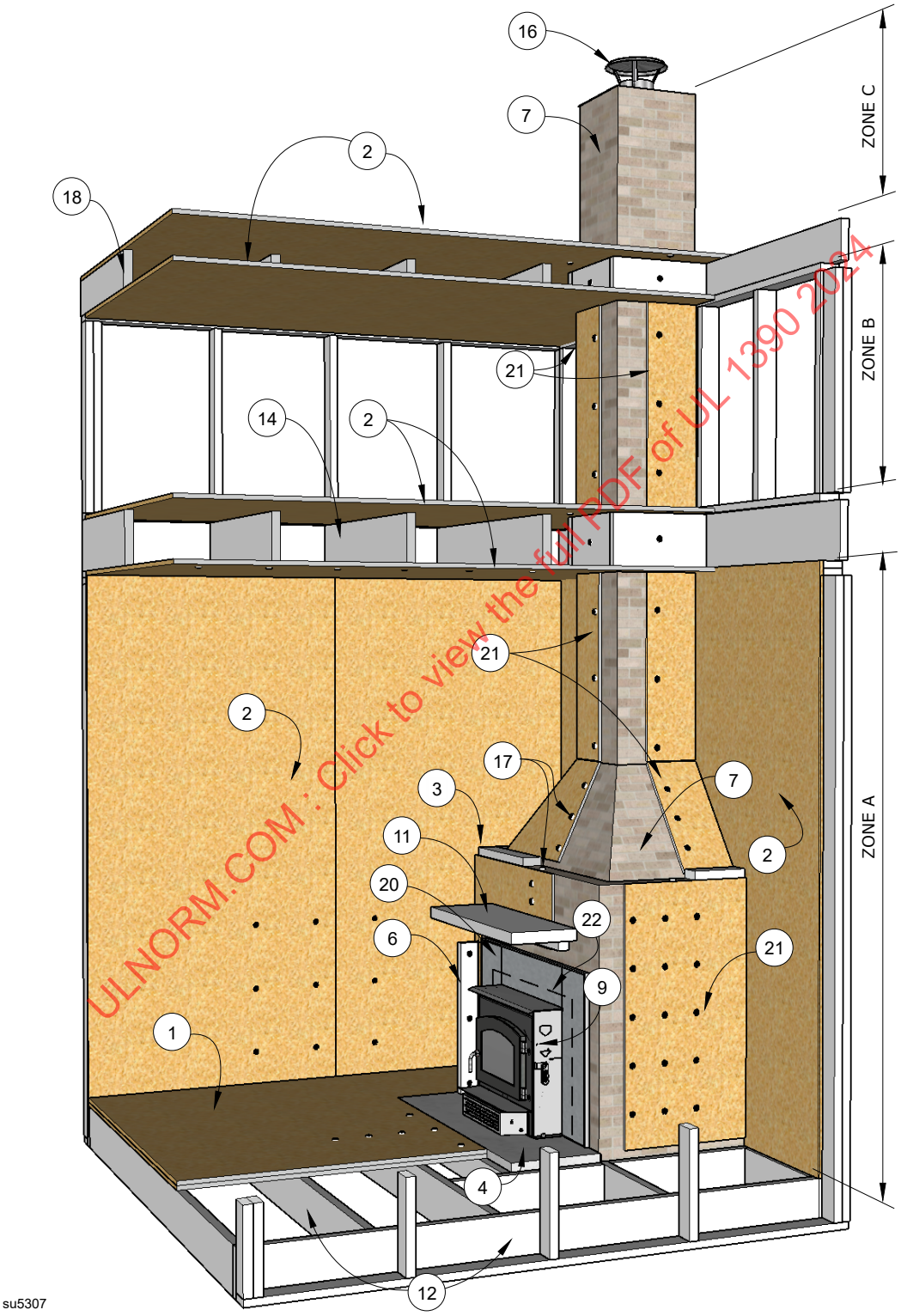
17.2.1.3 All attributes of the fireplace test structure not specified in Figure 17.1 – Figure 17.8 shall comply with the applicable requirements of:

a) In Canada, the National Building Code of Canada;

b) In the United States, NFPA 211, the series of International Building Codes (ICC), or the Uniform Mechanical Code (IAPMO).

Figure 17.1

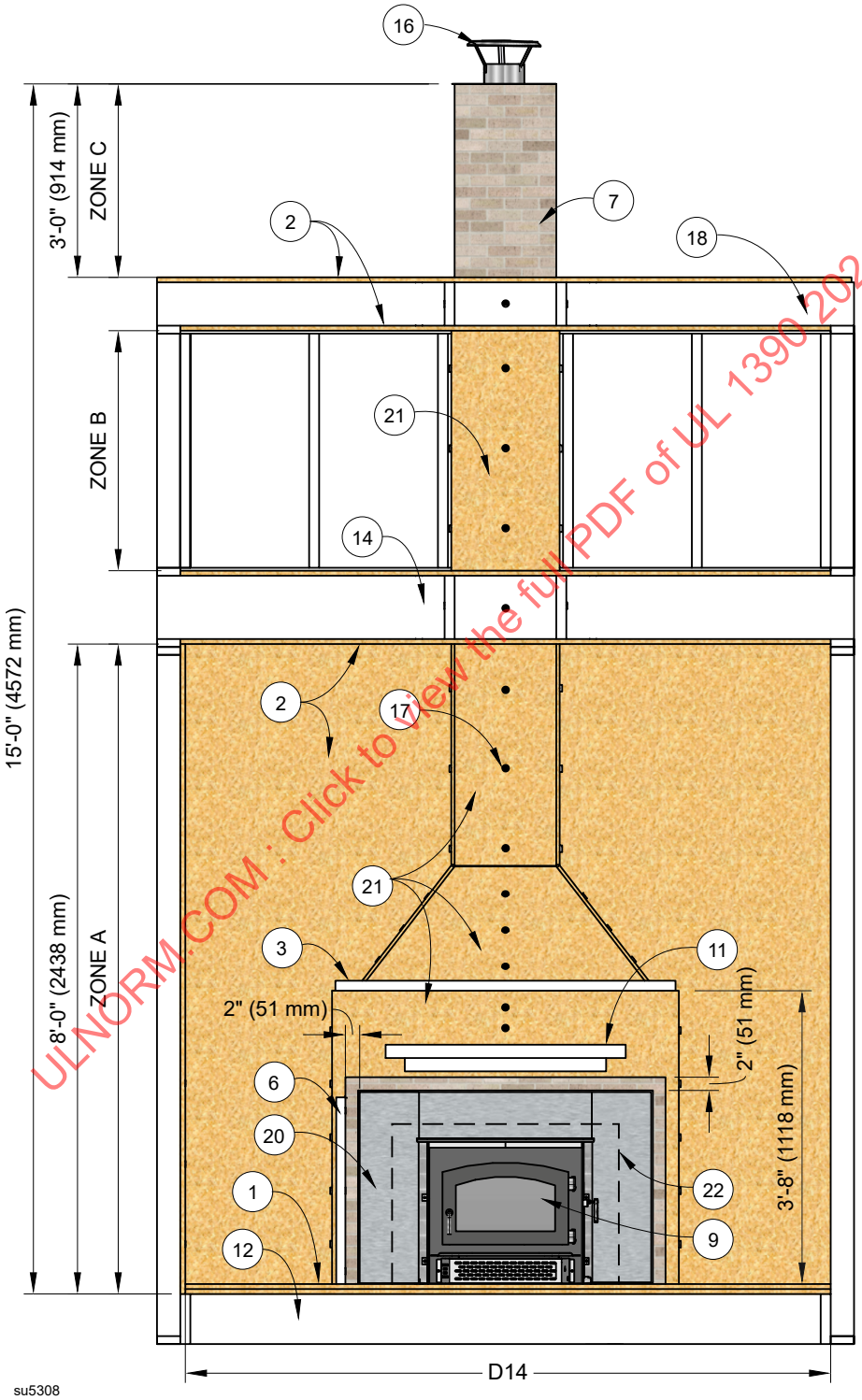
Test Structure and Appliance Test Assembly Isometric View



NOTE: Plywood cladding is not shown on the fireplace and chimney surfaces for illustration purposes only. Similarly, floors, ceilings and structural elements are cutaway in this view for illustration purposes only.

Figure 17.2

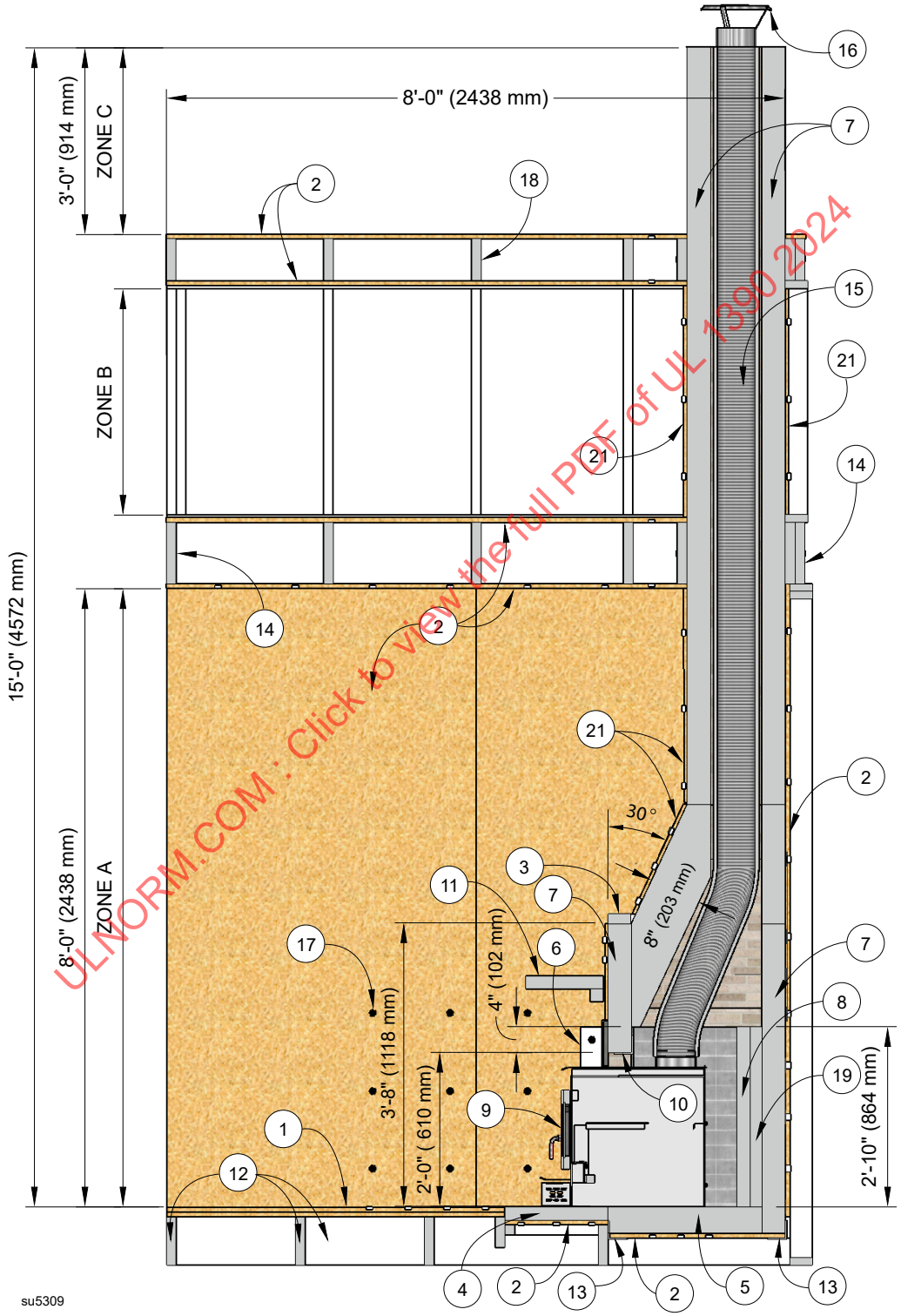
Test Structure and Appliance Test Assembly Front View



NOTE: Plywood cladding is not shown on the fireplace and chimney surfaces for illustration purposes only. Similarly, floors, ceilings and structural elements are cutaway in this view for illustration purposes only.

Figure 17.3

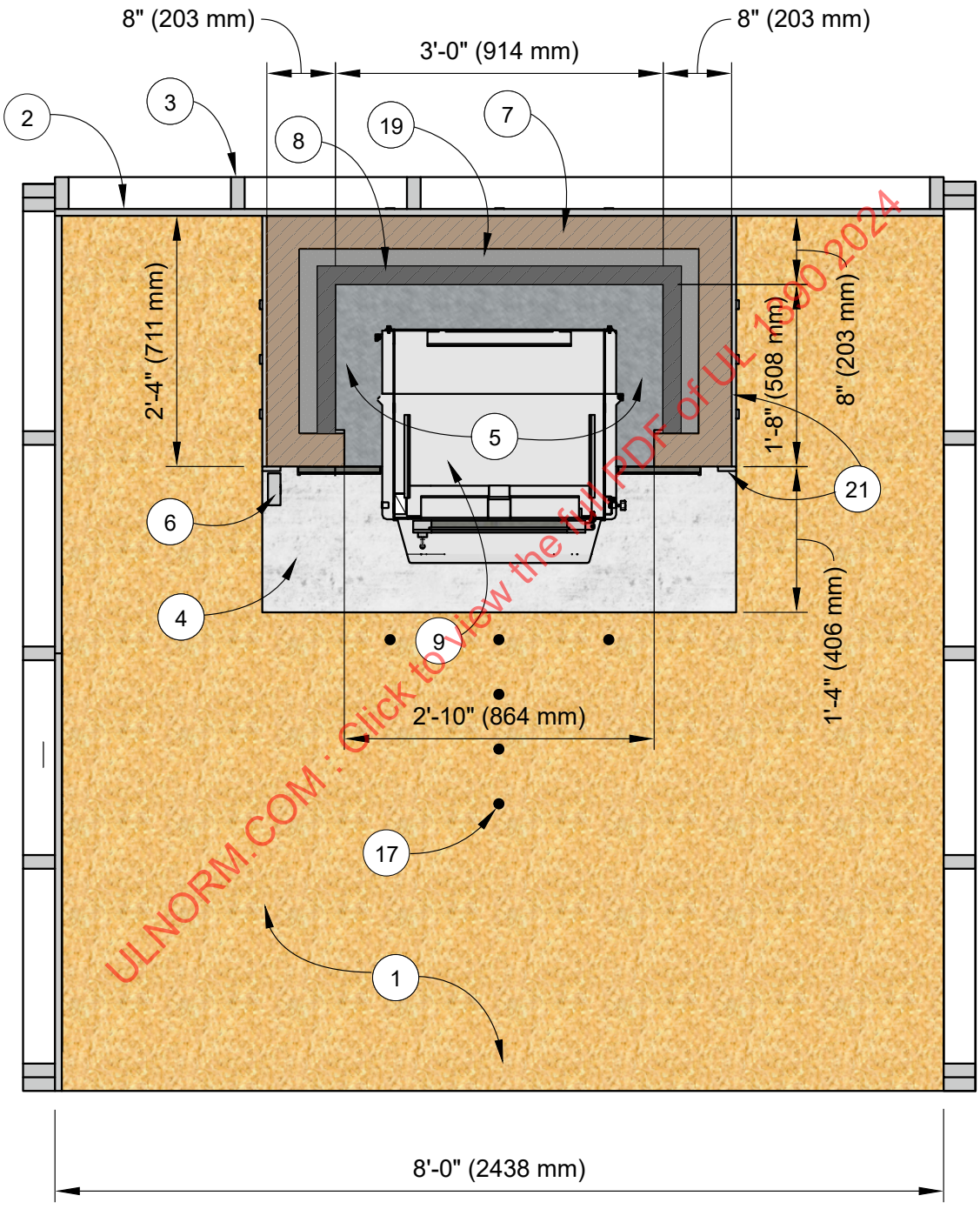
Test Structure and Appliance Test Assembly Section View



NOTE: The section plane is through the centre of the chimney and chimney liner.

Figure 17.4

Fireplace Detail Top View



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NOTE: The section plane is below the top surface of the fireplace insert or hearth-mounted stove.

Figure 17.5

Test Structure and Mantel Bottom View

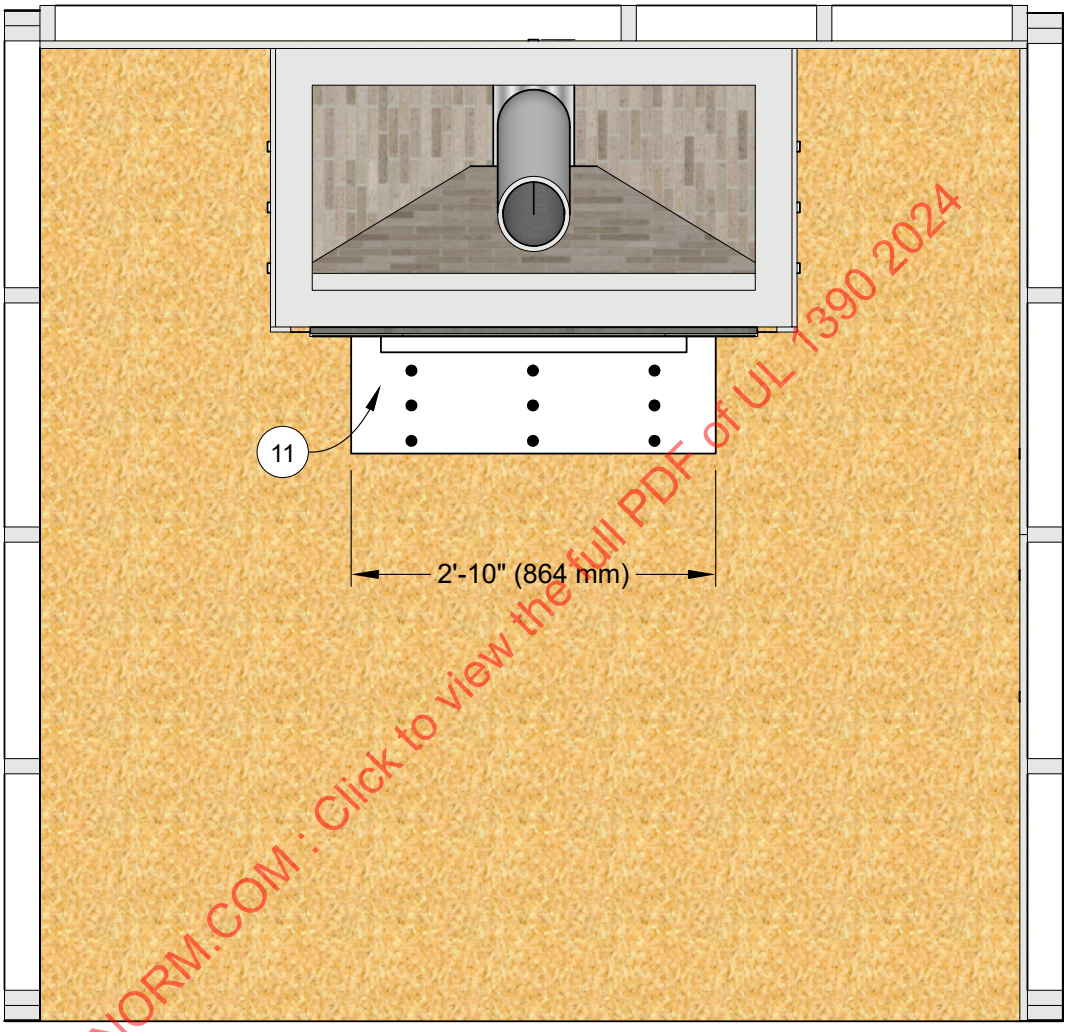

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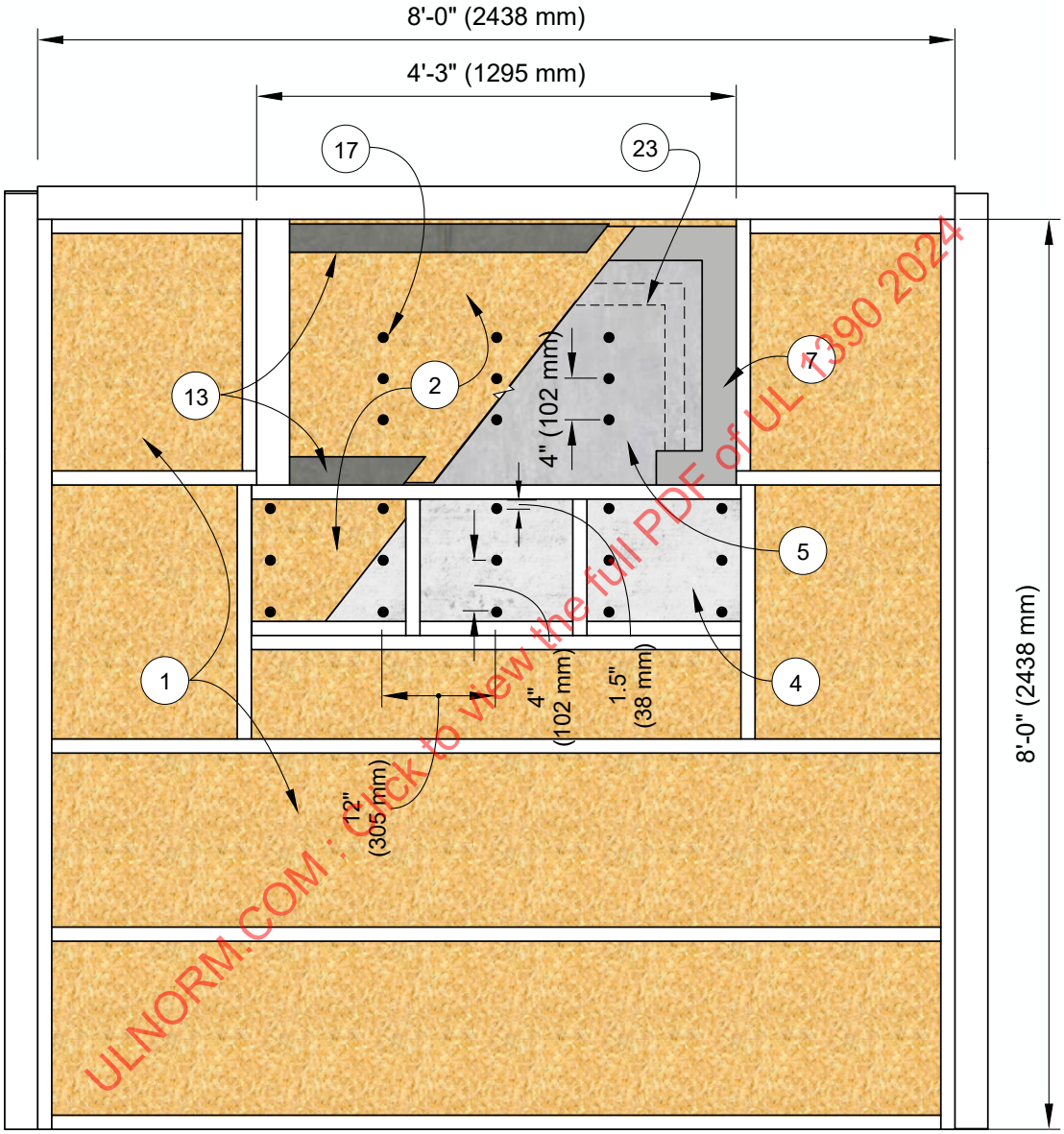
Figure 17.6

Test Structure and Appliance Test Assembly Bottom View



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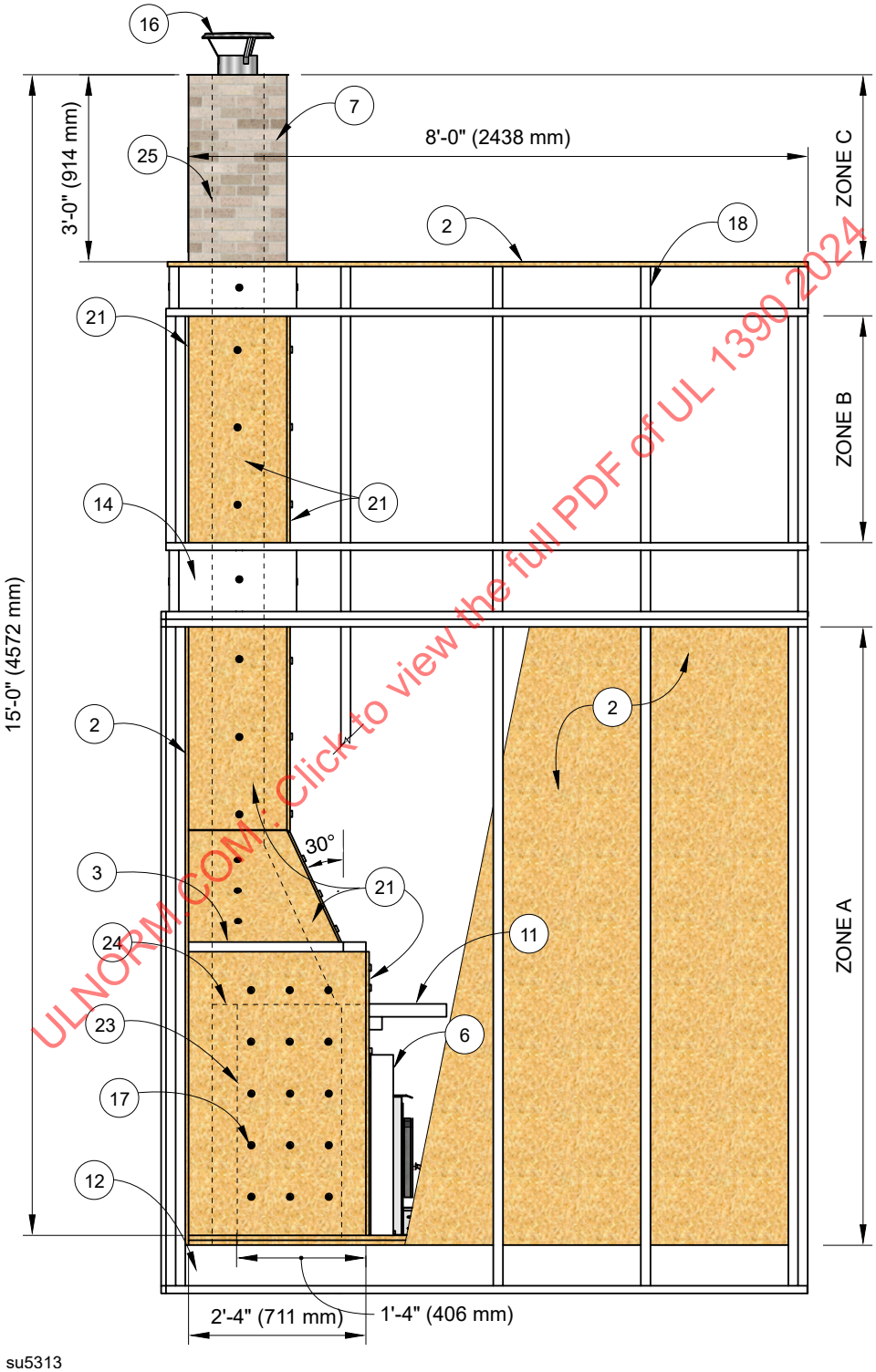
NOTE: Plywood cladding is not shown on the masonry fireplace and floor protection surfaces for illustration purposes only.

Figure 17.7

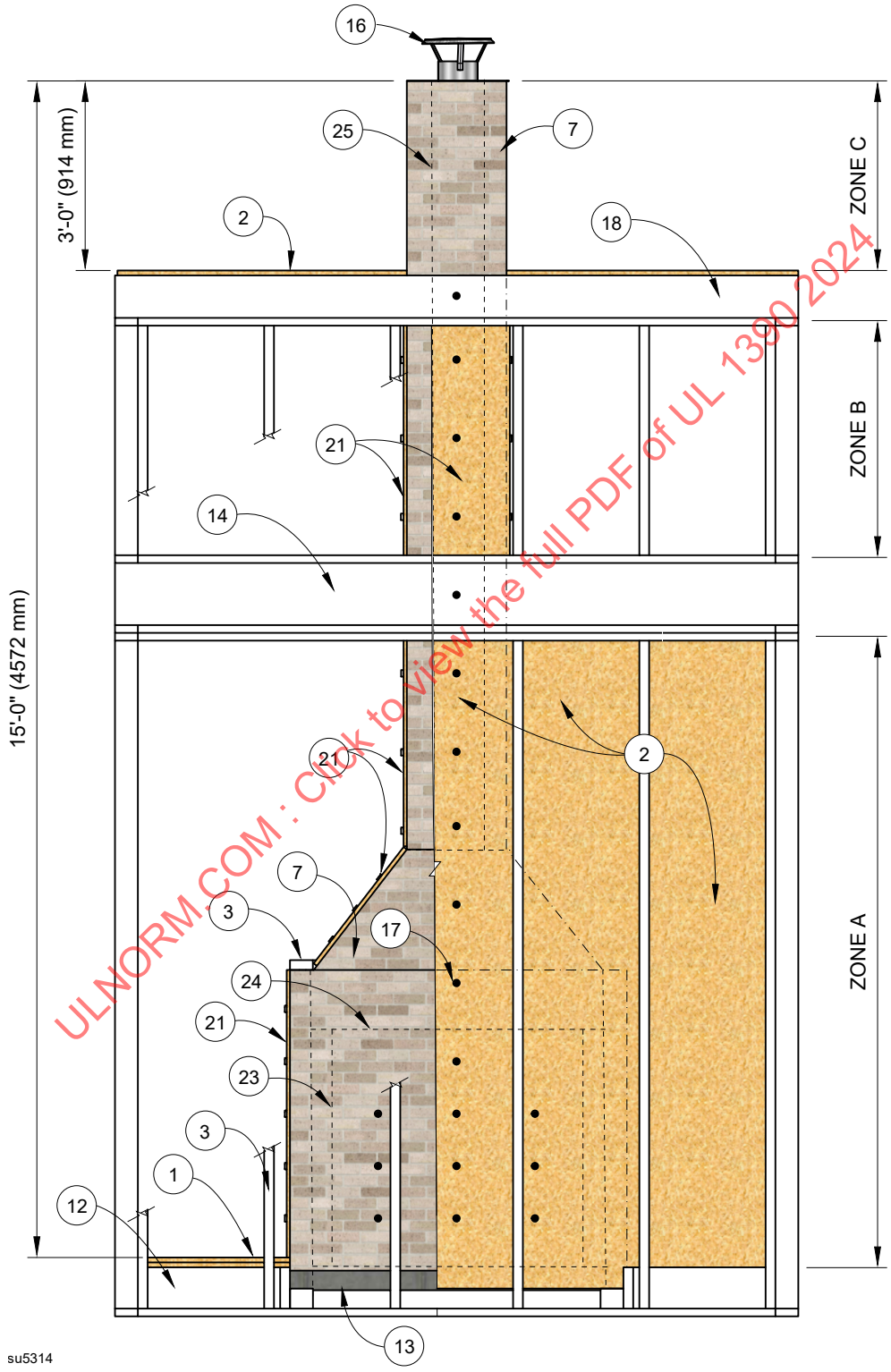
Test Structure and Appliance Test Assembly Left Elevation



NOTE: Plywood cladding and structural elements are not shown for illustration purposes only.

Figure 17.8

Test Structure and Appliance Test Assembly Rear Elevation



NOTE: Plywood cladding and structural elements are not shown for illustration purposes only.

Legend for Figure 17.1 – Figure 17.8

1	3/4 inch (19.1 mm) Thick (Nominal) Plywood, two layers
2	3/4 inch (19.1 mm) Thick (Nominal) Plywood, one layer
3	2 × 4 inches (51 × 102 mm) Wood Framing
4	2 inches (51 mm) Thick Hearth Extension
5	4 inches (102 mm) Thick Fire Place Hearth
6	2 × 4 inches (51 × 102 mm) Wood Side Trim
7	Clay brick, 2-1/4 × 4 × 8 inches (57 × 102 × 203 mm). Refer to 17.2.1.8.
8	Fire brick, 2-1/2 × 4-1/2 × 9 inches (57 × 108 × 229 mm), oriented with 4-1/2 inches (108 mm) dimension vertical. Refer to 17.2.1.8.
9	Fireplace insert or hearth-mounted stove
10	3 × 3 × 1/4 inch (76 × 76 × 6.4 mm) Lintel Steel Angle
11	12 inches (305 mm) Wood Mantle
12	2 × 8 inches (51 × 203 mm) Wood Floor Structure
13	3 × 3 × 1/4 inches (76 × 76 × 6.4 mm) Steel Angle Support
14	2 × 10 inches (51 × 254 mm) Wood 2nd Floor Framing Support
15	Chimney Liner, as specified by the manufacturer of the fireplace insert or hearth-mounted stove. The example shown is 6 inches (152 mm) I.D. with 1/2 (12.7 mm) thick wrap Insulation.
16	Chimney Cap
17	Thermocouple location example
18	2 x 6 inches (51 x 152 mm) Roof Structure
19	Mortar Fill, for a total wall thickness of 8 inches (203 mm), including the firebrick and clay brick layers. Refer to 17.2.1.8.
20	Faceplate or surround
21	3/8 inch (9.5 mm) Thick (Nominal) Plywood, one layer
22	24 × 34 inches (610 × 864 mm) Fireplace Opening
23	Face of Firebox
24	Top of Firebox
25	Inside face of chimney

17.2.1.4 The thickness of mortar bed joints shall be 3/8 inch (9.5 mm) or less.

17.2.1.5 Figure 17.1 – Figure 17.8 show the configuration for the testing of a fireplace insert. For a hearth-mounted stove installation, the appliance will project into the living space, and the dimensions of the hearth extension should be adjusted accordingly.

17.2.1.6 Any gaps, for example at joints between the masonry fireplace hearth and floor protection, shall not exceed 3/8 inch (9.5 mm), and shall be sealed with a non-combustible sealant.

17.2.1.7 The load presented by the masonry fireplace, the fireplace insert or hearth-mounted stove, and all remaining elements of the test structure, including the chimney, shall be supported so as to prevent settlement or rotation. The design of the support shall permit installation and maintenance of the required thermocouples.

17.2.1.8 Depending on the jurisdiction in which the instructions indicate that the fireplace insert or hearth-mounted stove may be installed (refer to 27.7), the fireplace lining, including the floor, shall comprise:

a) The materials and layer thicknesses shown in Figure 17.1 – Figure 17.8, for Canada only;

b) Walls comprising an 8 inch (203 mm) thick layer of reinforced Portland cement concrete, or of refractory cement concrete, with a floor as shown in Figure 17.1 – Figure 17.8, for both Canada and the United States; or

c) Other materials and layer thicknesses yielding a higher rate of heat conduction to adjacent combustible construction, with minimum criteria specified by the manufacturer of the fireplace insert or hearth-mounted stove.

NOTE: For (b) please reference NFPA 211 requirements for masonry fireplace construction and firebox lining.

17.2.2 Masonry fireplace

17.2.2.1 The clearances between the exterior surfaces of a fireplace insert and the interior rear and side surfaces of the firebox shall be not greater than 5 inches (127 mm).

17.2.2.2 The interior surface of the smoke chamber shall be corbelled, unparged, and constructed at a 30° angle from vertical.

17.2.2.3 Sufficient time shall be allowed to elapse between steps in the process that rely on the curing of materials. For example, between the construction of the masonry fireplace and subsequent assembly and/or testing steps, such that curing processes for mortars, grouts, etc., will have completed.

NOTE: For masonry construction, the curing period is typically 28 days.

17.2.3 Living space

17.2.3.1 That part of the fireplace test structure representing the living space in which the fireplace insert or hearth-mounted stove is to be tested is to consist of a back wall, one side wall and a ceiling. The side wall, back wall and ceiling are to consist of one layer of 0.75 inch (19.1 mm), nominal, thickness plywood.

17.2.3.2 The side wall is to be placed perpendicular to the back wall at the minimum distance specified in the manufacturer's installation instructions for the fireplace insert or hearth-mounted stove, but not more than 48 inches (1219 mm) from the near side of the fireplace opening. The ceiling and back wall are to join the side wall. The ceiling and back wall are to extend at least 48 inches (1219 mm) beyond that side of the fireplace opening which is opposite the side wall.

17.2.3.3 As an alternative to the requirements of 17.2.3.2, manufacturers may request that temperatures are measured during testing on side walls at a sufficient number of different distances from the fireplace insert or hearth-mounted stove to ensure compliance with the requirements for maximum surface temperatures. These minimum distances shall then be specified in the manufacturer's installation instructions.

17.2.3.4 The floor component of the test structure supporting the fireplace system shall be 2 layers of 0.75 inch (19.1 mm), nominal, thickness plywood. The hearth extension material and dimensions shall be as specified by the manufacturer of the fireplace insert or hearth-mounted stove. The test structure shall position the supported heights of the hearth extension and the flooring components such that their top surfaces are flush and level.

17.3 Appliance test assembly

17.3.1 The appliance test assembly shall include:

a) The fireplace insert or hearth-mounted stove installed in accordance with the manufacturer's instructions, and as shown in Figure 17.1 – Figure 17.8; and

b) A continuous chimney liner installed in accordance with its manufacturer's instructions, or as shown in Figure 17.1 – Figure 17.8;

1) Of the type specified in the manufacturer's instructions for the fireplace insert or hearth-mounted stove; and

2) Extending from the fireplace insert or hearth-mounted stove to the flue termination.

NOTE: Figure 17.1 – Figure 17.8 show the typical installation for a fireplace insert. Thermocouple locations, etc., shown are also appropriate for a hearth-mounted stove.

17.3.2 The chimney liner shall be installed, supported and terminated to achieve adequate ventilation, sufficient to meet the requirements specified in Table 14.1 items E to G.

NOTE: Adequate ventilation is to prevent the development and migration of positive pressures and/or heat.

17.3.3 Where the manufacturer's installation instructions for the fireplace insert or hearth-mounted stove:

a) Specify that the fireplace opening shall not be closed off, the testing shall be performed in that condition, i.e., for a hearth-mounted stove only; or

b) Specify that the fireplace opening shall be closed off, and where:

1) A faceplate or surround to close-off the fireplace opening, is provided by the manufacturer, this shall be installed; or

2) A faceplate or surround is not provided, a field-fabricated faceplate of minimum 24-gauge thickness sheet metal or equivalent shall be installed to close-off the fireplace opening.

17.4 Enclosure of the test structure

17.4.1 The test enclosure shall be in direct contact with all external surfaces of the masonry fireplace and masonry chimney, as shown in Figure 17.1 – Figure 17.8.

17.4.2 Except for the side bounded by the rear wall of the test structure, the test structure cladding surface in contact with the masonry surfaces shall consist of one layer of 0.375 inch (9.5 mm), nominal, thickness plywood, painted flat black on all the surfaces in contact with the masonry.

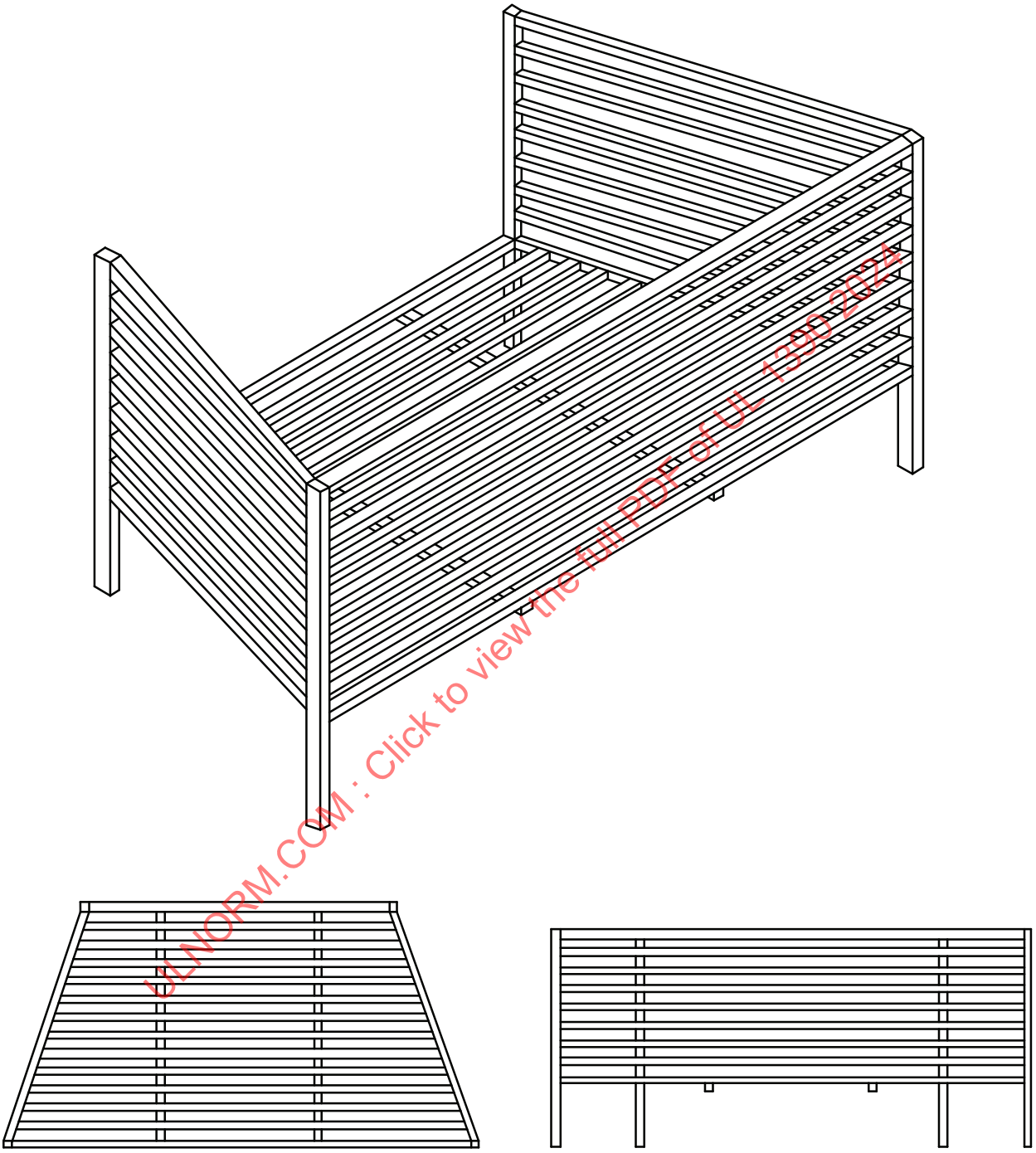
17.4.3 Mantels and trims shall be of the material types, dimensions, and minimum clearance distances from the surfaces of the fireplace insert or hearth-mounted stove as specified by the manufacturer's installation instructions for the fireplace insert or hearth-mounted stove.

18 Radiant Fire Test

18.1 A basket grate is to be constructed of 0.375 inch (9.5 mm) square steel bar stock spaced 1 inch (25.4 mm) apart on centers as illustrated in Figure 18.1. The grate is to be open at the back for placement within the fire chamber as illustrated in Figure 18.2.

Figure 18.1

General Form of Charcoal Basket Grate



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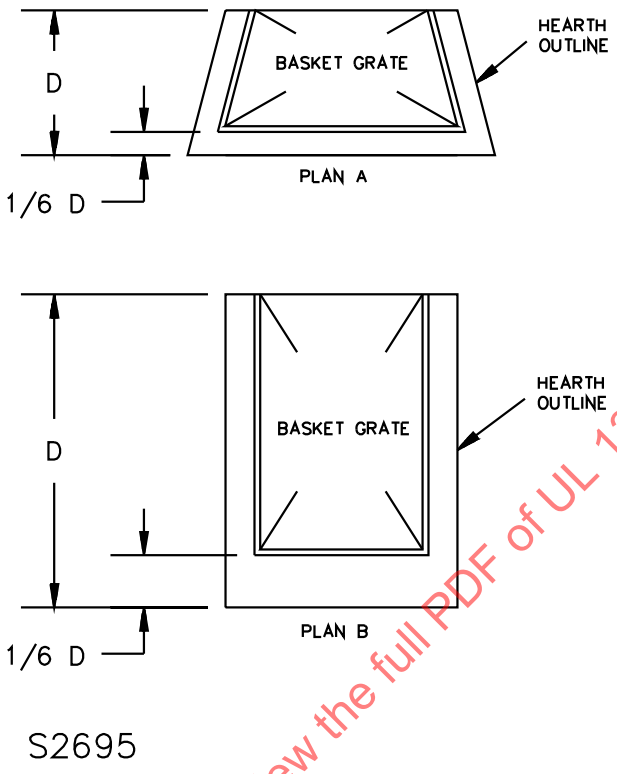
A – Top view

B– Front view

Figure 18.2

Typical Relationship of Grate to Hearth



18.2 The basket grate is to have an inside surface area in the plan view equal to two-thirds of the total hearth area of the fireplace insert or hearth-mounted stove. In the plan view, the shape of the basket grate is to conform closely to the shape of the hearth, as shown in Figure 18.2. The dimensions are to be such that when placed in position the front inside edge of the basket grate is located back from the main feed door opening a distance equal to one-sixth of the maximum fire chamber depth (horizontal). The inside depth (vertical) of the basket grate is to be 6 inches (152 mm) and the basket grate is to stand on legs that support the inside bottom of the basket grate 4 inches (101 mm) above the hearth.

18.3 With reference to 18.2, when the configuration or size of the fireplace insert or hearth-mounted stove so requires, the height of both the legs and the fuel-containing portion of the basket grate are to be reduced in equal proportions as required to obstruct no more than 75 % of the height of the door opening.

18.4 The basket-type grate is to be loaded to a depth (vertical) of 6 inches (152 mm) with charcoal briquettes[a] formed in the shape of a 2.0 by 1.9 inch (50 by 48 mm) square pillow having rounded edges and a maximum thickness of 1.2 inches (30 mm). The briquettes shall have a count weight of 17/lb (38/kg), a heat content (dry basis) of 11,500 Btu/lb (26,750 J/kg), and a moisture content of 5 %.

[a] A briquette capable of being used for this test is manufactured by the Kingsford Company, Pleasanton, CA 94566.

18.5 After ignition, additional briquettes are to be added at 7.5 minute intervals and at each interval the fire is to be poked or stirred prior to the addition of fuel in an effort to maintain a 6 inch (152 mm) bed of fuel burning at maximum intensity. Poking and stirring are to be accomplished by inserting a flat bar of steel at the midpoint of the grate at one end and sliding it through the fire bed, and then inserting the bar at the bottom of the grate at the other end and sliding in the opposite way through the fire bed. Ashes in the ash pan or on the hearth underneath a basket grate are to be removed after each addition of fuel.

18.6 Temperatures at all points of measurement are to be recorded at intervals not exceeding 30 minutes until it is apparent that the maximum temperatures have been attained. Maximum temperatures are attained when three successive readings taken at 30-minute intervals show no change or show a decrease, or after brands have been added to the fire at the rate required by 18.5 for a maximum of 8 hours, or until the testing laboratory has determined that the structure is sufficiently heated.

18.7 When the fireplace insert or hearth-mounted stove is operated as described in 18.4 – 18.6 the maximum temperature rise above Zone ambient temperature shall not exceed:

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

b) 50 °C (90 °F) on concealed surfaces of the fireplace test structure, such as beneath the fireplace insert or hearth-mounted stove, or beneath the floor protector, or behind a radiation shield or a baffle.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

18.8 The temperature rise of any part of the fireplace insert or hearth-mounted stove shall not exceed the maximum values specified in Table 14.1, Column 1, for the material employed.

18.9 The temperature rise of any part of the chimney liner shall not exceed the maximum values specified in Table 14.1, Column 1 for the material employed.

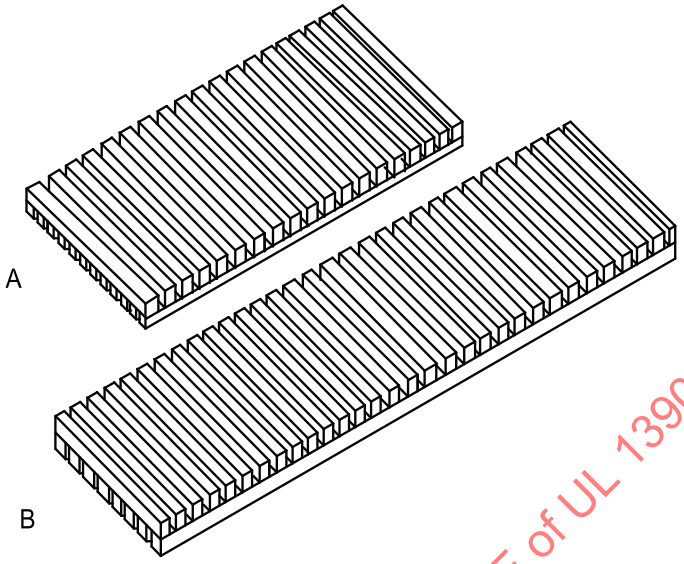
18.10 The temperature rise of the flue gases entering the chimney liner shall not exceed 900 °C (1620 °F) above Zone A ambient temperature and may only exceed 625 °C (1125 °F) above Zone A ambient temperature for a cumulative period of not more than 20 % of the duration of the test.

19 Brand Fire Test

19.1 The firebrands are to be constructed as illustrated in Figure 19.1, and are to employ strips of dry (moisture content of between 5 % and 10 %) Douglas Fir or Spruce finished to 0.75 by 0.75 inch (19.1 by 19.1 mm), weighing 0.020 ±0.002 lb/in^3 (554.0 ±55.4 kg/m^3) and spaced 1 inch (25.4 mm) apart on centers.

Figure 19.1

Brands



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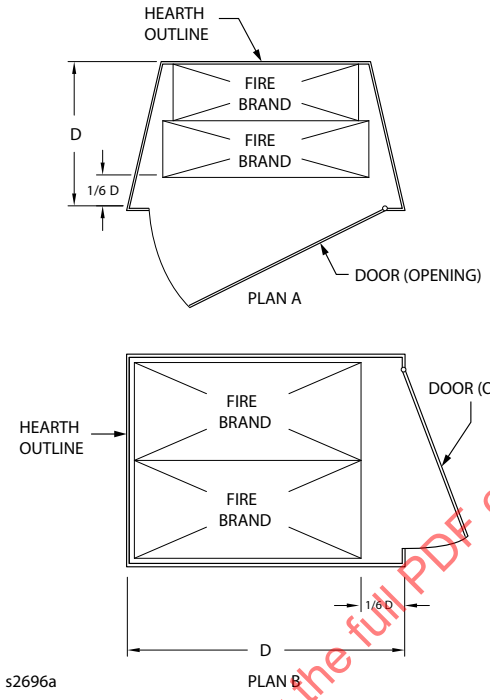
A – Typical rear brand

B – Typical front brand

19.2 Each brand is to have an area in the plan view equal to one-third of the total hearth area of the fireplace insert or hearth-mounted stove. Their dimensions are to be such that the front edge of the brand when located as illustrated in Figure 19.2 is to be one-sixth of the maximum hearth depth (horizontal) back from the main feed door of the fireplace insert or hearth-mounted stove fire chamber. When required by the hearth configuration, two individual brands are to be used whose total area is equal to one-third of the hearth area. When the hearth of the fireplace insert or hearth-mounted stove has sloping sides, the area used for each brand is to be one-third of the average of the maximum and minimum hearth areas as determined on horizontal planes of the fire chamber.

Figure 19.2

Typical Relation of Brands to Hearth



19.3 The brands are to be placed on the hearth area with their long axes aligned with the long axis of the hearth, two examples are illustrated in Figure 19.2.

19.4 Fireplace inserts or hearth-mounted stoves having fire chambers or fire chamber openings of unconventional configurations, that is, conical, parabolic, or round, are to use brands that comply with the intent of 19.1 – 19.3.

19.5 Fireplace inserts or hearth-mounted stoves of unconventional configurations or constructions are to be tested using a quantity of brands consistent with the intent of these requirements. The quantity of brands to be used is to be such that the brands do not extend into the fire chamber above the highest point of the fire chamber opening.

19.6 After ignition, one brand is to be added every 7.5 minute interval, or at a slower or faster rate, in order that a fire resulting in the maximum flue gas temperatures can be maintained. The refueling rate is to be such that there is an ember build up to a level of one-half of the fire chamber opening height consistent with maintaining the maximum flue gas temperature. Ashes are not to be removed from the hearth unless an ashpan is provided, and then only at every second refueling.

Exception: When embers build up to a level of one-half of the fire chamber opening height, a slower feed rate is to be used to maintain a fuel bed not exceeding this height.

19.7 When a buildup of coals occurs within the fireplace insert or hearth-mounted stove during the test, the coals are to be levelled prior to the addition of the next brand.

19.8 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 attained when three successive readings taken at 30-minute intervals show no change or show a decrease, or after brands have been added to the fire at the rate required by 19.6 for a maximum of 8 hours, or until the testing laboratory has determined that the structure is sufficiently heated.

19.9 When the fireplace insert or hearth-mounted stove is operated as described in 19.1 – 19.8, the maximum temperature rise above Zone ambient temperature shall not exceed:

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

b) 50 °C (90 °F) on concealed surfaces of the fireplace test structure, such as beneath the fireplace insert or hearth-mounted stove, beneath the floor protector, or behind a radiation shield or a baffle.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

19.10 The temperature rise of any part of the fireplace insert or hearth-mounted stove shall not exceed the maximum specified in Column 1 of Table 14.1 for the material employed.

19.11 The temperature rise of the flue gases entering the chimney liner shall not exceed 900 °C (1620 °F) above Zone A ambient temperature and may only exceed 625 °C (1125 °F) above Zone A ambient temperature for a cumulative period of not more than 20 % of the duration of the test.

20 Flash Fire Test

20.1 When the fireplace insert or hearth-mounted stove is operated as described in 20.2 – 20.4, the maximum temperature rise shall be not more than 78 °C (140 °F) above Zone ambient temperature on exposed or concealed combustible surfaces of the fireplace test structure.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

20.2 If necessary, sufficient ashes and coals remaining on the hearth from the Brand Fire Test shall be removed, so as to provide enough height within the fireplace insert or hearth-mounted stove for the brands specified in 20.3.

20.3 Eight brands are to be stacked on the hearth floor, four in front (left) and four in the rear (right) with the long strips placed downward. Each stack of four brands is to be tied together with wire not larger than 18 AWG (0.82 mm^2).

20.4 After ignition, the doors of the fireplace insert or hearth-mounted stove shall be closed, and they shall remain closed throughout the test. For this test only, temperatures at all points of measurement are to be recorded at intervals not exceeding 5 minutes until it is apparent the maximum temperatures have been attained. Maximum temperatures are attained when three successive readings taken at 5-minute intervals show no change or show a decrease.

20.5 When the fireplace insert or hearth-mounted stove is operated as described in 20.1 – 20.4, the maximum temperature rise above Zone ambient temperature shall not exceed:

a) 78 °C (140 °F) on exposed surfaces of the fireplace test structure; and

b) 78 °C (140 °F) on concealed surfaces of the fireplace test structure, such as beneath the fireplace insert or hearth-mounted stove, beneath the floor protector, or behind a radiation shield or a baffle.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

20.6 The temperature rise of any part of the fireplace insert or hearth-mounted stove, shall not exceed the maximum specified in Table 14.1, Column 2, for the material used.

20.7 The temperature rise of the flue gases entering the chimney liner shall not exceed 1100 °C (1980 °F) above Zone A ambient temperature and may only exceed 900 °C (1620 °F) above Zone A ambient temperature for 10 minutes.

21 Fire Tests for Coal-Fired Fireplace Inserts or Hearth-Mounted Stoves

21.1 Coal fire test

21.1.1 A fireplace insert or hearth-mounted stove intended to burn coal is to be loaded to one-half the full depth (vertical) of the fuel charging chamber volume with the size and type of coal specified by the manufacturer's instructions. The fuel charging chamber is to be identified as the volume of the fire chamber below the lower level of the feed door opening(s). However, when the charging chamber of a fireplace insert or hearth-mounted stove is intended to contain fuel above the lower level of the feed door(s) (for example, in the case of a fireplace insert or hearth-mounted stove whose door(s) serves both to feed the fire chamber and to remove the ashes), the charging chamber is to be loaded to a depth (vertical) that complies with the intent of this test procedure. Hoppers, or fuel chambers designed to act as hoppers, shall be filled to capacity.

21.1.2 After ignition, coal is to be added to the fireplace insert or hearth-mounted stove at the rate required to maintain the fuel level at the one-half-full depth (vertical) until maximum temperatures are attained.

21.1.3 The first fuel loading after ignition is to occur at 30 minutes and subsequent loadings are to be increased or decreased (as required) so that the volume of the fuel consumed between loadings is an equivalent volume to one-half the intended fuel depth (vertical). During this test, the fireplace insert or hearth-mounted stove is to be loaded at intervals of not less than 15 minutes nor more than 60 minutes, according to the following:

a) When one-half of the intended fuel depth (vertical) is consumed in 30 minutes, fuel is to be added at 30-minute intervals.

b) When less than one-half of the intended fuel depth (vertical) is consumed in 30 minutes, the loading interval is to be increased to 45 minutes. When less than one-half the intended fuel depth (vertical) is consumed in 45 minutes, the interval is to be increased to 60 minutes.

c) When more than one-half of the intended fuel depth (vertical) is consumed in 30 minutes, the loading interval is to be reduced to 15 minutes.

d) The subsequent fuel loading intervals are to be maintained at 15, 30, 45, or 60 minutes, according to the determinations in (a), (b), or (c).

21.1.4 Ashes in the ash pan or on the hearth underneath the basket to be removed after each fuel loading operation.

21.1.5 The coals are to be shaken at each fuel loading interval by use of an integral mechanism or by manually slicing with a flat bar of steel through the coals.

21.1.6 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 attained when three successive readings taken at 30-minute intervals show no change or show a decrease.

21.1.7 After maximum temperatures are obtained with the fuel depth (vertical) specified in 21.1.2, the fuel depth (vertical) is to be increased to the full fuel charging chamber volume and the test sequence repeated until the maximum temperatures are obtained for the full fuel depth (vertical).

21.1.8 When the fireplace insert or hearth-mounted stove is operated as described in 21.1.1 – 21.1.7, the maximum temperature rise above Zone ambient temperature shall not exceed:

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

b) 50 °C (90 °F) on concealed surfaces of the fireplace test structure and beneath the floor protector.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

21.1.9 The temperature rise on any part of the fireplace insert or hearth-mounted stove, and on a chimney connector, as applicable, shall not exceed the maximum values specified in Column 1 of Table 14.1 for the material employed.

21.1.10 The temperature rise of the flue gases entering the chimney liner shall not exceed 900 °C (1620 °F) above Zone A ambient temperature and may only exceed 625 °C (1125 °F) above Zone A ambient temperature for a cumulative period of not more than 20 % of the duration of the test.

21.1.11 After completion of the coal fire test specified in 21.1.1 – 21.1.10, the test is to be repeated using a size or type of coal different from that specified by the manufacturer’s instructions.

21.2 Abnormal radiant fire test

21.2.1 A fireplace insert or hearth-mounted stove intended to burn coal is to be loaded to a depth (vertical) of 6 inch (150 mm) or to one-half the volume of the coal loading chamber, whichever is the greater depth (vertical), with charcoal briquettes formed in the shape of a 2.0 by 1.9 inch (50 by 48 mm) square pillow having rounded edges and a maximum thickness of 1.2 inches (30 mm). The briquettes are to have a count weight of 17/lb (38/kg), a heat content (dry basis) of 11,500 Btu/lb (26.75 J/kg), and a moisture content of 5 %.

21.2.2 When the fireplace insert or hearth-mounted stove is operated as described in 18.5 and 18.6, the maximum temperature rises shall be not more than 78 °C (140 °F) above Zone ambient temperature on the following surfaces:

a) Exposed surfaces of the fireplace test structure; and

b) Concealed surfaces of the fireplace test structure and beneath the floor protector.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

21.2.3 The temperature rise on any part of the fireplace insert or hearth-mounted stove, and on a chimney connector, as applicable, shall not exceed the maximum values specified in Column 2 of Table 14.1 for the material employed.

21.2.4 The temperature of the flue gases entering the chimney liner shall not exceed 760 °C (1400 °F).

Exception: The temperature of the flue gases are permitted to exceed 760 °C (1400 °F) when the temperature does not exceed 927 °C (1700 °F) for a cumulative period not exceeding 10 minutes of the test duration.

21.3 Abnormal brand fire test

21.3.1 When a fireplace insert or hearth-mounted stove intended to burn coal is operated as described in 19.2 – 19.6, the maximum temperature rise shall be not more than 78 °C (140 °F) above Zone ambient temperature on the following surfaces:

a) Exposed surfaces of the fireplace test structure; and

b) Concealed surfaces of the fireplace test structure and beneath the floor protector.

NOTE: In general, for appliance test standards, “exposed surfaces” are those visible to an occupant of the test structure living space.

21.3.2 Each fire brand for the coal burning fireplace insert or hearth-mounted stove is to have an area equal to one-third the grate area or one-third the largest wall area of the fire chamber, whichever area is greater.

21.3.3 The temperature rise on any part of the coal burning fireplace insert or hearth-mounted stove, and on a chimney connector, as applicable, shall not exceed the maximum values specified in Column 2 of Table 14.1 for the material employed.

21.3.4 The temperature rise of the flue gases entering the chimney liner shall not exceed 900 °C (1620 °F) above Zone A ambient temperature and may only exceed 625 °C (1125 °F) above Zone A ambient temperature for a cumulative period of not more than 20 % of the duration of the test.

22 Tests of Glass Components

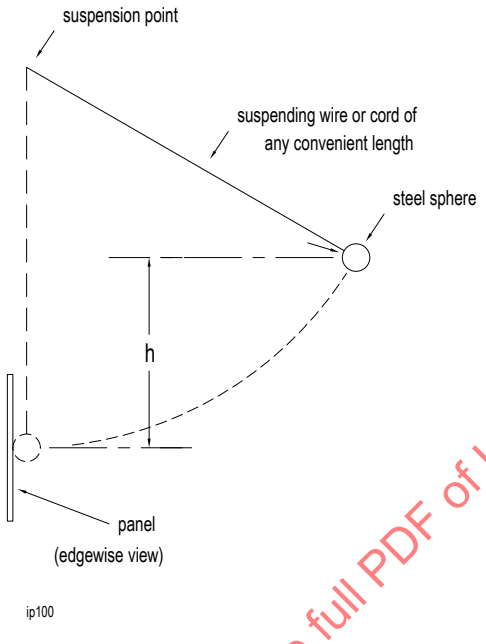
22.1 Impact test

22.1.1 Glass components, when mounted in accordance with the manufacturer’s instructions, shall withstand, without breaking, the impact described in 22.1.2.

22.1.2 An impact is to be applied to the center of the glazing panel by means of a 1.18 lbm (0.54 kg), 2 inch (50.8 mm) diameter steel sphere swung through a pendulum arc from a height (h) of 16.25 inches (413 mm). The at-rest suspension point of the steel sphere is to be 1 inch (25.4 mm) in front of the plane of the panel. The test shall be conducted in a cold condition at the completion of firing tests.

Figure 22.1

Impact Test Of Glass Components



Height (h) of 16.25 inches (413 mm)

22.1.3 Where 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 their extreme closed or open position.

22.2 Water shock test

22.2.1 While at the maximum temperature developed during the Radiant Fire Test applicable to the fuel specified by the manufacturer of the fireplace insert or hearth-mounted stove, each glazing panel shall withstand, without cracking or breaking, the application of:

a) A wet cloth, fully saturated with water at room temperature, wiped across the surface of each glazing panel; and

b) Three misted water sprays, projected across the surface of each glazing panel from a household cleaning bottle with a gun-type nozzle, applied after the panel is dried and again attains the maximum temperature under the heated condition.

23 Impact Strength Test

23.1 The fire chamber of the fireplace insert or hearth-mounted stove shall resist without dislodgment, cracking or other damage the impact of a 4.92 inch (125 mm) diameter sphere having a mass of 3.53 lb (1.60 kg). A crack in a refractory lining shall not be cause for rejection provided the lining remains in place and its effectiveness is not impaired.

NOTE: A standard five-pin bowling ball is of the required mass and dimension.

23.2 The application of the impact shall be determined on the basis of the method of firing.

23.3 For a vertically fueled fireplace insert or hearth-mounted stove, the sphere shall be dropped from a height of 9.05 inches (230 mm) above the plane of the feed door(s) to strike centrally on the base of the fire chamber.

23.4 For a horizontally fueled fireplace insert or hearth-mounted stove, the sphere shall be rolled down an inclined plane of 30° for a distance of 35.4 inches (900 mm) and then directed by a horizontal continuation of the plane for a distance of 11.8 inches (300 mm) to impact the wall of the fire chamber.

23.5 The fire chamber shall be subjected to three successive impacts.

23.6 Where the design of the fireplace insert or hearth-mounted stove is such that this test is not feasible, an impact test meeting the intent of this requirement shall be conducted.

24 Tests for Catalytic Combustors and Secondary Combustion Systems

24.1 Where the fireplace insert or hearth-mounted stove incorporates a catalytic combustor and/or secondary combustion system, the Brand Fire Test, and the Flash Fire Test, for the appropriate fuel type(s), shall be performed in the sequence as shown in the table below:

Table 24.1
Conditions of Test

Combustor and/or System	By-pass	Door(s)
Installed	Closed	Closed
Removed[b]	Open	Closed
Removed	Closed	Closed
Removed[a]	Closed	Open
Blocked[a,b]	Open	Open
Blocked[b]	Open	Closed

NOTE: Test conditions unlikely to produce worst-case results need not be evaluated.

[a] Test to be conducted in this condition only if the fireplace insert or hearth-mounted stove is intended to be operated with doors open.

[b] If a by-pass is not used in the design of the fireplace insert or hearth-mounted stove, this test need not be conducted.

24.2 Spillage of smoke shall not exceed the limits specified in 15.6 and 15.7 when the bypass is closed, as applicable.

Exception: where the manufacturer's operation instruction require that the bypass be open during refueling, this requirement shall not apply.

24.3 Where the by-pass is interlocked to the door to prevent opening the door when the by-pass is closed, the conditions of 24.2 need not apply.

MARKINGS

25 General

25.1 The following information shall be permanently marked on the fireplace insert or hearth-mounted stove and, unless otherwise required to be placed at a specific location, shall be grouped together and located where they are visible or readily accessible after the fireplace insert or hearth-mounted stove is installed:

a) Manufacturer's or private labeler's name or identifying symbol;

b) Distinctive type (or model designation), model number, serial number and date of manufacture;

c) "Install, Use and Maintain Only in Accordance With (Manufacturer's or Private Labeler's name) Installation And Operating Instructions" and « Installez, utilisez et entretenir uniquement conformément aux instructions d'installation et d'utilisation de (nom du fabricant ou détaillant) »;

d) “UL/ULC 1390:YYYY”, where YYYY is the edition year of the standard; and

e) "Only to be installed into a masonry fireplace" and « À installer uniquement dans un foyer en maçonnerie ».

In the United States, instructions and product markings may be provided in English only.

25.2 Where the fireplace insert or hearth-mounted stove incorporates a catalytic combustor and/or secondary combustion system, additional marking shall include the following:

a) The part number of the Combustor or System;

b) "Install, Use and Maintain Only in Accordance With (Manufacturer's or Private Labeler's name) Installation And Operating Instructions" and « Installez, utilisez et entretenir uniquement conformément aux instructions d'installation et d'utilisation de (nom du fabricant ou détaillant) »; and

c) A Caution that the combustor or system is fragile and to handle carefully.

25.3 The following information shall be grouped together and permanently marked on the fireplace insert or hearth-mounted stove as text, or as a link to a website via a text URL, or as a machine-readable code such as a QR code, or a combination of these media:

a) “A chimney liner must extend from this appliance to the top of the chimney” and « Un chemisage de cheminée doit s'étendre de cet appareil jusqu'au sommet de la cheminée »;

b) A statement requiring the use of the provided insulation materials;

c) Types of solid-fuel to be used;

d) The identification of components essential for the installation;

e) Requirements for floor protectors;

f) “Refer to the manufacturer’s instructions for clearances to, and protection of, combustible materials” and « Reportez-vous aux instructions du fabricant pour les dégagements, et la protection, des matériaux combustibles »;

g) Where the fireplace insert or hearth-mounted stove is equipped with glass components, the following statements: “Replace glass only with '*' "and « Remplacer les vitres uniquement par '*' » * Manufacturer’s part number or description;

h) "DO NOT USE GRATE OR ELEVATE FIRE – BUILD WOOD FIRE DIRECTLY ON HEARTH." and « N'UTILISEZ PAS DE GRILLE, NI N'ÉLEVEZ PAS LE FEU – CONSTRUISEZ UN FEU DE BOIS DIRECTEMENT SUR L’ÂTRE. »;

i) Contact information for the manufacturer of the fireplace insert or hearth-mounted stove; and

j) A statement specifying whether the fireplace opening is to be closed off by a faceplate after the installation of the fireplace insert or hearth-mounted stove. Refer to 17.3.3.

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

25.4 When the information is also provided electronically, it shall include the items listed under 25.1.

25.5 A marking required to be permanent shall be molded; die-stamped; paint-stenciled, stamped, or etched metal that is permanently secured to the fireplace insert or hearth-mounted stove; or indelibly stamped on a pressure-sensitive label. Usage, handling, and storage of the product are evaluated in determining the permanence of the marking. Adhesive attached marking and labeling systems shall comply with UL 969 or CSA C22.2, No. 0.15, compatible with the peak temperature recorded at the location identified in 16.3.3).

NOTE: The requirements of UL 969 and CSA C22.2 No. 0.15 include legibility of the marking text after the temperature exposure.

25.6 Any label shall be affixed to the fireplace insert or hearth-mounted stove in a manner that will destroy the label if it is removed.

INSTALLATION INSTRUCTIONS

26 General

26.1 Complete printed installation instructions shall be included by the manufacturer with each fireplace insert or hearth-mounted stove. The front cover page shall include the following statement: "Keep these instructions for future use".

NOTE: An example of the certification label should be included within the installation instructions.

26.2 The instructions shall include a statement that the authority having jurisdiction (such as municipal building department, fire department, fire prevention bureau, etc.) should be consulted before installation to determine the need to obtain a permit and inspection. This statement shall be in prominent lettering and placed on the front cover or inside cover page of the instructions.

26.3 The instructions shall require that the installer shall confirm that the manufacturer's certification label is present on, and attached to, the fireplace insert or hearth-mounted stove, at the time of installation.

26.4 The instructions shall be illustrated and shall include such directions and information for proper installation and maintenance including the parts and materials required and the step-by-step process for the installation of the fireplace insert or hearth-mounted stove, as specified in Sections 27 – 31.

26.5 The instructions shall be written in such a manner that any potentially unclear verbiage is explained, for example, definition of R or K values.

26.6 The instructions shall require that the installation of the fireplace insert or hearth-mounted stove comply with the applicable requirements of:

a) In Canada:

1) The National Building Code of Canada; or

2) CSA B365 Series;

b) In the United States:

1) The series of International Building Codes (ICC);

2) NFPA 211; or

3) Uniform Mechanical Code (IAPMO).

26.7 The instructions shall include:

a) Any limitations with respect to installation and minimum installation clearances to all parts of:

1) The existing fireplace and chimney system; and

2) The fireplace insert or hearth-mounted stove and chimney liner system;

b) Requirements for the attachment of support members, and the joining of two or more parts to constitute a proper assembly;

c) “It is STRONGLY RECOMMENDED that this appliance is only installed by an installer acceptable to the AHJ”;

d) That, where the fireplace insert or hearth-mounted stove incorporates glass parts, any replacement parts and their installation procedures conform to those specified by the manufacturer; and

d) "DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE".

26.8 The instructions shall make reference to the manufacturer's catalogue designations, part numbers, descriptions, or the equivalent, of the fireplace insert or hearth-mounted stove and related parts, and shall include the manufacturer's name and address.

26.9 In the United States, instructions and product markings may be provided in English only.

27 Inspection and Verification of the Existing Fireplace and Chimney System

27.1 The instructions shall require that the installer verifies that the existing fireplace and chimney system is appropriate for installation of the fireplace insert or hearth-mounted stove, with defined criteria for the masonry fireplace system that correspond to the test program executed in accordance with Sections 15 – 24.

27.2 The instructions shall require that the fireplace and chimney system be subjected to a Level II inspection, in accordance with:

a) In Canada, WETT;

b) In United States, NFPA 211.

27.3 The instructions shall include the statement: "WARNING: If questions arise or remain following the completion of a Level II inspection as to the suitability of a fireplace and chimney system to house the chimney liner or fireplace insert or hearth-mounted stove then additional access to, and inspection of suspect areas shall be performed prior to installation" and « AVERTISSEMENT: Si des questions surviennent ou restent suivant l’inspection de niveau II du foyer préfabriqué, de la structure de cheminée pour accueillir la gaine, du foyer encastrable, une inspection des zones suspectes doit être réaliséeavant l'installation ».

NOTE: Examples of the conditions that may require an additional inspection include, but are not limited to:

a) R-value and material makeup of an existing hearth extension;

b) Verification of clearances to the masonry fireplace or chimney where inaccessible;

c) Presence of firestops and fireblocking per the applicable Codes; and

d) Sealing of abandoned gas lines.

27.4 The requirements for inspection shall state that all deficiencies or damage that may present a hazard and are not addressed by the fireplace insert or hearth-mounted stove and chimney liner system be repaired prior to the installation of the chimney liner or fireplace insert or hearth-mounted stove, and that if all deficiencies or damage cannot be repaired the installation shall not proceed.

NOTE: Examples of the types of deficiencies or damage intended to be addressed include, but are not limited to:

a) Charred, rotted, water damaged, or otherwise heavily deteriorated wood touching or near the fireplace and chimney system;

b) Masonry deficiencies such as decay or mortar failure or insufficient thickness;

c) Inadequate structural integrity of the chimney:

d) Abandoned or improperly-sealed inlets; and

e) Creosote and soot deposits.

27.5 The instructions shall include the statement "a fireplace insert or hearth-mounted stove shall not be used as a means of repairing a defective fireplace or chimney" and « un foyer encastrable ou un poêle à installer sur un foyer ne doit pas être utilisé comme moyen de réparer un foyer ou une cheminée défectueux ».

27.6 The instructions shall include particular details concerning the types, construction requirements and size limitations (e.g., height, width and depth of opening) of the fireplaces into which the fireplace insert or hearth-mounted stove may be installed.

27.7 The instructions shall include particular details concerning the minimum material properties and layer thicknesses for the smoke chamber, walls and floors of the fireplace, corresponding to those implemented in the test program, refer to 17.2.1.8.

28 Permitted Modifications to the Masonry Fireplace

28.1 The instructions shall require that, except as provided in 28.2, masonry or steel shall not be removed from the fireplace.

28.2 The instructions may permit that masonry or steel, including the fireplace damper, be removed from the smoke shelf and adjacent damper frame if necessary to accommodate a chimney liner, provided that the removal will not weaken the structure of the masonry fireplace and existing chimney or reduce the thickness of the masonry walls below the values incorporated in the fireplace test structure, refer to 17.2.

28.3 The instructions may permit that, where the existing firebox or smoke chamber wall thicknesses are in question or insufficient. masonry materials identified as acceptable:

a) In Canada, in the National Building Code of Canada;

b) In the United States, in NFPA 211;

may be installed or applied per their instructions, so as to ensure the specified minimum masonry thickness.

29 Installation of the Chimney Liner

29.1 The chimney liner shall be required to conform to:

a) In Canada:

1) The Class 3 requirements of ULC-S635; or

2) The requirements of ULC-S640;

b) In the United States, the requirements for a chimney liner intended for connection to a solid-fuel-fired appliance and rated for 1149 °C (2100 °F) operation in UL 1777.

NOTE: The scopes of UL 1777 and ULC-S640 cover liners for masonry chimneys only. The use of these products as part of the installation of fireplace inserts or hearth-mounted stoves into masonry fireplaces that are connected to factory-built chimneys is validated by testing in accordance with Annex A of this standard.

29.2 The instructions shall specify the minimum chimney height measured from the flue collar of the fireplace insert or hearth-mounted stove as validated by testing in accordance with the Performance section.

29.3 The instructions shall include all of the necessary steps to complete the installation, but may refer to the chimney liner manufacturer's instructions, as appropriate.

29.4 The instructions shall include a requirement that:

a) The chimney liner must be mechanically secured to the fireplace insert flue collar or the flue collar connection from the hearth-mounted stove;

b) The chimney liner is continuous and extends from:

1) The fireplace insert flue collar; or

2) The flue collar connection from the hearth mounted stove;

to the flue termination [see 25.3(a) and 17.3.1(b)]; and

c) The fireplace insert or hearth-mounted stove must be secured in place, if applicable.

29.5 The instructions shall include the necessary steps for completion of the flue termination, the modification or replacement of the chimney cap, top plate, and/or flashing, as applicable.

29.6 The instructions shall address the appropriate termination of the chimney liner, either by specifying the necessary steps, or by reference to the chimney liner manufacturer's instructions.

30 Installation of the Floor Protection

30.1 Floor protection requirements

30.1.1 The instructions shall include details concerning the parts or materials to be employed for floor protection.

30.1.2 The instructions shall require that any gaps between the masonry fireplace hearth, the hearth extension, and/or floor protection be sealed with non-combustible material that meet or exceed the specified K and/or R values.

30.2 Installation of ember protection

30.2.1 The instructions shall require that any combustible material beneath the fireplace insert or hearth-mounted stove be protected by a continuous, durable, noncombustible pad that will provide ember protection. The ember protection shall extend:

a) In Canada, in accordance with CSA B365;

b) In the United States, in accordance with NFPA 211.

30.3 Installation of thermal protection

30.3.1 The instructions shall include details concerning the parts and materials to be employed for radiation protection, including minimum areas to be covered and their relation to the fireplace insert or hearth-mounted stove, including dimensions and K and/or R values, together with explanations and guidance.

30.3.2 The instructions shall require that any gaps between the masonry fireplace hearth, the hearth extension, and/or floor protection be sealed with non-combustible material that meet or exceed the specified K and/or R values.

31 Installation of the Fireplace Insert or Hearth-Mounted Stove

31.1 The instructions shall include particular details concerning:

a) The parts and materials required and the step-by-step process for installing a fireplace insert or hearth-mounted stove and a caution regarding the consequences of using makeshift methods or unapproved components during installation;

b) Methods of connecting the fireplace insert or hearth-mounted stove to the chimney liner;

c) The position of the fireplace insert or hearth-mounted stove in relation to the fireplace opening;

d) The specification for the faceplate or the surround, corresponding to the tested configuration (refer to 17.3.3), specifically:

1) Whether the use of a faceplate or surround is mandatory, restricted, or optional;

2) Whether a faceplate or surround maybe field-fabricated, or must be supplied by the manufacturer of the fireplace insert or hearth-mounted stove;

3) Permitted modifications to a faceplate or surround supplied by the manufacturer, if applicable; and

4) The materials and dimensions for a field-fabricated faceplate or surround, if applicable;

e) Requirements for the means of management of the passage of room air between:

1) The exterior surfaces of the fireplace insert or hearth-mounted stove and the interior surfaces of the firebox of the masonry fireplace;

2) The exterior surfaces of the fireplace insert or hearth-mounted stove and the interior surfaces of the masonry chimney; and

3) The exterior surfaces of the chimney liner and the interior surfaces of the masonry chimney; and

NOTE: This requirement is intended to reduce degradation of system elements due to humid air.