



Underwriters Laboratories Inc.®

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February 15, 1996

Revision pages for

Standard for

Factory-Built Chimneys for Residential Type and Building Heating Appliances

UL 103, Ninth Edition

Attached to this transmittal notice is a revision of the Ninth edition of UL 103.

A CHANGE ON A PAGE DATED FEBRUARY 15, 1996 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THESE NEW REQUIREMENTS ARE NOW IN EFFECT.

The new requirements are substantially in accordance with UL's bulletin on this subject dated September 7, 1995. The bulletin is now obsolete and may be discarded.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 103-1995.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the Department of Defense approved text of UL 103.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the following checklist:

Page	Date
1	December 18, 1995 (Reprinted February 15, 1996)
2	—
3	February 15, 1996
4 – 10	December 18, 1995
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UL 103

Standard for

Factory-Built Chimneys For Residential Type and Building Heating Appliances

The First and Second editions were titled Chimneys, Factory-Built.

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Ninth Edition

December 18, 1995

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated December 18, 1995. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI/UL 103-1988, July 28, 1988
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The Department of Defense (DoD) has adopted UL 103 on September 16, 1991. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

9.2 When screws are employed to join assemblies during installation, the assemblies to be joined shall provide for use of screws without being punched or drilled, except as referenced in 6.1. When cement is employed for this purpose, the cement shall be a quick-setting type. Cement, screws, and instructions shall be furnished. A screw shall not extend into a flue-gas passage.

9.3 A joint shall not retain condensation nor permit condensation to flow from the interior to the exterior of the flue-gas conveying conduit.

9.4 A joint between sections of flue-gas conduit, fabricated in accordance with the manufacturer's instructions, shall not permit passage of a 1/32 inch (0.81 mm) diameter rod.

9.5 A joint shall not reduce the capacity of the chimney to the extent that it interferes with venting.

9.6 A chimney joint shall be constructed to resist the entrance of rain such that condensation does not flow from the exterior of a chimney section to the interior of a lower section.

9.7 A chimney intended for use in positive internal pressure applications shall be of a design such that the seal (resistance to leakage) is created at or between joints of the flue gas passageway. Supplemental sealing methods at the outer wall shall not be relied upon to comply with the Positive Pressure Applications Test, Section 22A.

9.7 added February 15, 1996

10 Radiation Shields

10.1 A radiation shield provided to comply with the maximum temperature limits of these requirements for floor or ceiling structures shall:

- a) Be an integral part of a firestop-spacer or support assembly; and
- b) Provide a continuous barrier for a vertical distance, referenced to the ceiling or floor level, of not less than 10 inches (254 mm).

10.2 The assembly described in 10.1 shall fit into a framed joist area not larger than the sum of:

- a) 1/2 inch (12.7 mm) greater on each side than the outside diameter of the chimney; and
- b) Twice the dimension specified in the installation instructions for clearance between chimney sections and combustible enclosures.

10.3 Parts of a firestop-spacer or support assembly that are not intended to provide shielding from radiation to combustible construction are not radiation shields.

10.4 A radiation shield provided to obtain compliance with the maximum temperature limits of these requirements for roof structures shall not be employed in a roof or other terminating assembly intended to be altered in the field when such alteration requires the shifting or relocation of the shield.

11 Roof Assemblies

11.1 The height of a roof assembly shall be such that the flue-gas exit is not less than 3 feet (0.9 m) above the highest point where the chimney passes through the roof.

11.2 A roof assembly installed in accordance with the installation instructions shall resist the entrance of excess water and debris into the building. See Rain Test, Section 28.

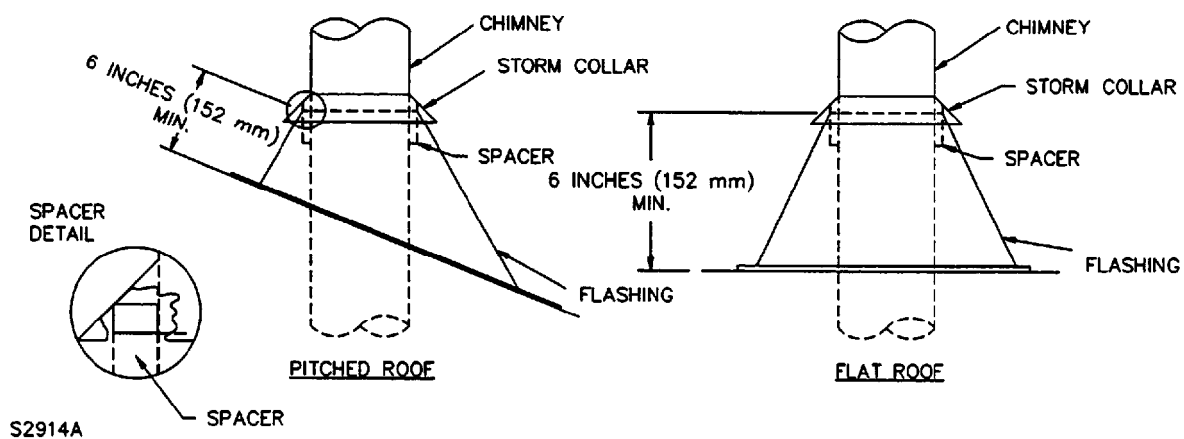
11.3 A roof assembly shall resist the accumulation of soot and debris therein when such accumulation obstructs flue-gas or cooling-air passages. See Sections 19 – 22.

11.4 A section of a roof assembly that gives access to the chimney flue shall be removable and replaceable by the use of simple hand tools (screwdriver, wrench, pliers, or similar tools) to allow for chimney cleaning in accordance with the maintenance instructions without bending or deforming of the chimney or roof assembly section.

11.5 A roof flashing assembly that provides for ventilation shall be constructed so that soot or debris does not accumulate on the assembly to the extent that ventilation openings intended to remain open are obstructed. (See also the requirements of 8.2 and 16.2.13, which apply to openings between the chimney and the flashing, and between the flashing and the test enclosure.) See Figure 11.1, which illustrates a typical roof flashing housing assembly. The ventilation shall be provided by one or more fixed openings surrounding the chimney and the assembly shall comply with all of the following:

- a) The openings shall not permit entrance of a 1/4 inch (6.4 mm) diameter rod.
- b) The lowest portion of the opening in the flashing shall not be less than 6 inches (152 mm) above the roof, measured perpendicular to the roof.
- c) The assembly shall incorporate a storm collar.
- d) The intended openings shall be maintained by means of:
 - 1) Spacers factory attached to the flashing; or
 - 2) Designed openings in the assembly.

Figure 11.1
Typical roof flashing housing assembly



12 Roof Jacks

12.1 A roof jack constructed for placement in contact with combustible roof, rafter, insulation, and ceiling material shall provide a continuous surface or barrier for a vertical distance, measured from the roof line, of at least 6 inches (150 mm).

22 Temperature Test – 2100°F (1149°C) Flue Gases

22.1 The maximum temperature attained on the test structure, such as ceilings, enclosures, floors, and joists, and on surfaces of the chimney assembly at points of zero clearance to the test structure, shall be not more than 175°F (97°C) above ambient temperature when tested as described in 22.3 – 22.6 or after the flue-gas generator is shut off.

22.2 A chimney shall comply with the requirements specified in 15.2 and 15.3 after being tested in accordance with 22.3 – 22.6.

22.3 The test is to be started with the test chimney and the test structure at room temperature.

22.4 The test conditions then are to be established at the inputs shown in Column 2 of Table 16.1, and maintained to produce flue gas at a temperature of 930°F (517°C) above room temperature as measured by means of a flue-gas thermocouple as shown in Figure 17.1 and located centrally in the generator. The operation is to be continued until equilibrium temperatures are attained on surfaces of chimney parts and the test structure.

22.5 After equilibrium temperatures are attained under the test conditions described in 22.4, the input to the flue-gas generator is to be increased to that specified in Column 4 of Table 16.1 and regulated to produce a temperature of 2030°F (1128°C) above room temperature at the location designated in Figures 16.10 and 16.13. The test period shall be 10 minutes, exclusive of the time taken to reach the 2030°F temperature rise above room temperature (which shall not exceed 15 minutes). At the end of the test period the flue-gas generator is to be shut off.

22.6 The test specified in 22.5 is to be conducted three times. The first test is to be conducted with the entire connector pipe uninsulated. The two remaining tests are to be conducted with the full length of the connector pipe insulated with a 3 inch (75 mm) thick layer of ceramic blanket insulation or equivalent insulation having a K factor of 1.7 at 2000°F (1079°C). The insulation is to be applied to the chimney connector after equilibrium temperatures are attained as described in 22.5 and prior to increasing the input to the flue-gas generator to produce the flue-gas temperature rise of 2030°F (1128°C) above room temperature.

22A Positive Pressure Applications Test

22A.1 A chimney system intended for installation in positive pressure applications where the chimney is subject to positive rather than negative or neutral pressure in the chimney flue shall be evaluated as described in 22A.2 – 22A.7.

22A.1 added February 15, 1996

22A.2 Individual chimney sections with joints are to be assembled in a manner that creates a straight assembly incorporating a minimum ratio of 50 inches (1270 mm) of seal per cubic foot of sealed sample. The diameter of the chimney system tested shall be at least 40 percent of the maximum diameter of the series of chimney diameters being evaluated.

22A.2 added February 15, 1996

22A.3 The chimney assembly is to have its ends capped (sealed), then be pressurized to a 60 inch water column (14934 Pa) or the manufacturer's rated pressure, whichever is greater. If any leakage occurs, the leakage rate is to be noted.

22A.3 added February 15, 1996

22A.4 The end caps are to be removed and the chimney assembly is to be subjected to an exposure as described in Section 18, Thermal Shock Test. The chimney assembly is not required to be enclosed during these exposures. Following the Thermal Shock Test, the chimney assembly is to be subjected to flue gas temperatures consistent with the Temperature Test, Section 19. This test is to be conducted for a period of 4 hours at which time the gas is to be shut off.

22A.4 added February 15, 1996

22A.5 Following the exposure described in 22A.4, the chimney assembly is again to be pressurized to a 60 inch water column (14934 Pa) or the manufacturer's rated pressure, whichever is greater. The length of time for the pressure to drop 10 inches water column (2489 Pa) is to be noted.

22A.5 added February 15, 1996

22A.6 If leakage occurs following the temperature testing, the acceptance criteria is to be determined based on the following equation.

$$426.7 (L/V) < 50 \text{ ppm}$$

In which:

L = Leakage rate determined lb/hr

V = Volume of test sample, ft³

(If leakage is quantified in ft³/hr, it is to be converted to lb/hr by multiplying by 0.075 lb/ft³ air, before using the above equation.)

22A.6 added February 15, 1996

22A.7 The manufacturer's rated pressure or 60 inch water column (14934 Pa) shall not be shown on the marking and installation instructions unless the calculated test results comply with the equation shown in 22A.6.

22A.7 added February 15, 1996

23 Draft Test

23.1 A chimney shall produce a draft of not less than 0.006 inch (0.15 mm) water column per foot (300 mm) of vertical chimney when tested as described in 23.2 and 23.3.

23.2 The test is to be conducted with the chimney erected and prepared for test as described in the Temperature Test – 1000°F (538°C) Flue Gases, Section 19. Starting with the chimney at room temperature, the flue-gas generator is to be fired to at least an input indicated in Column 2 of Table 16.1, and the secondary air regulated to produce flue gases at a temperature of 930°F (517°C) above room temperature, measured at the location in the flue pipe designated in Figure 16.11. The draft at the inlet to the chimney is to be measured within 15 minutes of the start of firing.

23.3 Draft is to be measured by a draft gauge that reads directly to 0.005 inch (0.10 mm) water column and that has an accuracy of ±0.0025 inch (0.050 mm). The gauge is to be checked for zero reading at the beginning and at the end of each test.

24 Vertical Support Test

24.1 An assembly intended to support the chimney shall not be damaged nor shall the security of its attachment to the building structure be impaired when tested as described in 24.2.

24.2 The support assembly is to be installed as described in the manufacturer's installation instructions and in a framework simulating a typical installation. A section of the chimney is to be placed on the support, and the assembly is to be loaded by means of weights or by a machine. The maximum static load applied is to be equal to four times the load imposed by the heaviest chimney that the support is required to sustain in service. The load is to be applied for a minimum of 60 minutes.

25 Strength Test

25.1 General

25.1.1 A chimney or its parts shall not break, disassemble, or become damaged to the extent that they are not capable of being further used as a result of three impacts of a sand bag applied as described in 25.2.1 – 25.2.4.

25.1.2 Chimney parts shall not break, disassemble, or become damaged to the extent that they are not capable of being further used when subjected to a longitudinal force of 100 pounds (445 N) applied as described in 25.3.1 and 25.3.2.

25.1.3 A support for an elbow shall sustain a load equivalent to four times the weight of the longest chimney section between adjacent supports. See 25.4.1.

25.1.4 A chimney joint of an offset chimney shall sustain a load equivalent to four times the weight of the vertical portion of the chimney length between the supports applied as described in 25.5.1.

25.1.5 Chimney parts shall not separate or disengage when subjected to torsional forces exerted by chimney cleaning brushes as described in 25.6.1.

25.2 Impact test

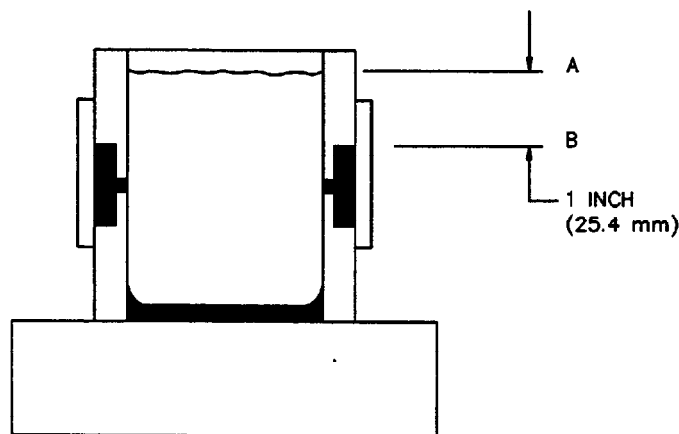
25.2.1 With reference to the requirements in 25.1.1, the impact is to be applied to an unenclosed chimney installed as shown in Figure 25.1. Tests shall be conducted on samples of each chimney size. Each section is to be joined together as specified by the manufacturer. When cemented joints are included in an assembly, the cement is to be allowed to dry before the test is conducted.

25.2.2 The impact is to be produced by a pendulum consisting of a rope suspending a cloth bag filled with sand and having the weight as shown in Figure 25.1. The bag is to be formed by tightly drawing up all sides and corners of a flat section of canvas around the sand and tying the excess canvas. The bag is to have an at-rest position with not more than 1 inch (25.4 mm) distance between the edge of the bag and the surface of the chimney. The point of impact is to be on the same horizontal plane as the center of gravity of the bag at rest. The distance of swing is to be that required to raise the center of gravity of the bag to the elevation specified in Figure 25.1 above the center of gravity of the bag at its at-rest position.

32.2 Four samples are to be prepared of each style of joint used between two sections of the flue-gas conduit. The length of the test assembly is required to include the complete joint.

32.3 The samples are to be dried to constant weight in a ventilated oven at a temperature between 105 and 110°C (221 and 230°F). Each sample then is to be placed in an ambient temperature between 21 and 32°C (70 and 90°F), and mounted with the axis of the assembly in a vertical position. The bottom of the assembly is to be sealed to retain liquid, and the assembly is to be filled with a 1/50 normal sulfuric acid solution to a level 1 inch (25.4 mm) above any cemented portion of the joint. The solution is to be maintained at that level for 72 hours. The solution then is to be removed and the test repeated, except that water is to be used in place of the sulfuric acid solution. See Figure 32.1.

Figure 32.1
Test of cemented joints



A - Liquid Level

B - Highest Level of Cement

S2265

33 Sulfuric Acid Extraction Test for Porcelain-Coated Steel Used for Flue-Gas Conduit

33.1 The loss in weight of porcelain-coated steel used for flue-gas conduit shall be not greater than 0.30 percent following the tests described in 33.2 and 33.3.

33.2 Two samples are to be tested, each 2- by 2-inches (50- by 50-mm) in face area. When seams are incorporated in the product, each sample is to include the conduit seam. The samples are to be weighed and the thickness of the base metal determined. The sample weights are to be adjusted to a base metal thickness of 0.026 inch (0.66 mm). The edges of the samples are to be coated with wax.

33.3 The samples are to be suspended completely immersed in a solution containing 20 percent by weight sulfuric acid, and at a temperature between 21 and 32°C (70 and 90°F), for a period of 44 hours. After removal from the solution, the samples are to be cleaned, dried, and weighed; and the loss of weight is to be calculated and recorded as a percent of the original adjusted dry weight.

MARKING AND INSTRUCTIONS

34 Marking

34.1 Each individual chimney assembly or part, such as a chimney section, firestop, support, or roof assembly shall be permanently marked with the following:

- a) Manufacturer's or private labeler's name or identifying symbol;
- b) Distinctive part or model designation; and
- c) "Install and Use Only in Accordance With ^(a) Installation and Maintenance Instructions," or equivalent.

^a Manufacturer's or private labeler's name.

34.2 The exterior surface of each chimney pipe section shall be permanently marked with the statement "MINIMUM CLEARANCE – ^(a) INCH AIR SPACE TO COMBUSTIBLE MATERIALS AND BUILDING INSULATION", or equivalent. This and other required marking information shall appear at least once on each chimney section and shall be repeated at 5 foot (1.5 m) intervals on sections longer than 5 feet.

^a Manufacturer's specified minimum clearance.

34.3 The exterior surface of an attic insulation shield tested in accordance with the exception to 16.2.9 shall be permanently marked with the word "CAUTION" and the following or equivalent statement: "Risk of fire. Do not enclose this shield. Remove this insulation shield before enclosing chimney in attic space." The marking shall be in letters at least 1/4 inch (6.4 mm) high:

- a) On a contrasting background; and
- b) Shall be located at least 10 inches (254 mm) above the attic construction material (see 8.3). The marking shall indicate how to remove the shield.

34.4 A chimney assembly complying with the requirements of Section 22, Temperature Test – 2100°F (1149°C) Flue Gases, shall be permanently marked "Type HT". This marking shall be affixed to each chimney pipe section, ceiling support and wall penetration assembly (such as a thimble). When attached to a part, such as a ceiling support or wall penetration assembly, the marking shall be placed so as to be identifiable from the room in which the heating appliance is installed after installation of the assembly.

34.5 Each chimney pipe section shall be marked with an arrow, with the word "up" next to an arrow pointing upward.

34.5.1 A chimney assembly shall not be marked with the following statement or the equivalent, "This chimney system is rated for use at maximum _____ inch water column internal pressure when used in Positive Pressure Applications," unless it has been tested in accordance with Section 22A, Positive Pressure Applications Test. The blank shall employ the manufacturer's tested rated pressure.

34.5.1 added February 15, 1996

34.6 In addition, each chimney section tested unenclosed in accordance with the method described in 16.3.1 – 16.3.6 shall be marked with the word "CAUTION" and the following or equivalent statement: "Risk of fire. Do not enclose with combustible materials. Building heating appliance chimney for installation as required for single wall metal chimneys (smokestacks). See manufacturer's installation instructions."

34.7 A marking required to be permanent shall be molded; die-stamped; paint-stenciled, stamped, or etched metal that is permanently secured to the chimney assembly; or indelibly stamped on a pressure-sensitive label. Usage, handling and storage of the product are factors in determining the permanence of the marking. Adhesive attached marking and labeling systems shall comply with the requirements in the Standard for Marking and Labeling Systems, UL 969.

- q) The specified method of chimney cleaning, and the necessity that access be provided for the inspection and cleaning of all sections of the chimney;
- r) A statement as follows: "Contact Local Building or Fire Officials About Restrictions and Installation Inspection in Your Area";
- s) Installation of the clean-out tee and clearances to combustible construction;
- t) Proper installation of the attic insulation shield and firestop spacers. Distinction shall be clearly made between the conditions under which:
 - 1) An attic insulation shield is to be used; and
 - 2) An attic chimney section is to be enclosed;
- u) Installation of any parts that contain openings that provide for air flow between air in the chimney chase and air located between the chimney walls; and
- v) Installation and maintenance of a flashing/storm collar assembly. For a chimney assembly that incorporates a ventilated flashing, the instructions shall include specific details, in written and diagrammatic form:
 - 1) Illustrating the openings in their intended location and orientation as installed, and
 - 2) Specifying precautions to be taken such as instructing the installer to not caulk or seal the ventilating openings.

35.6 A chimney assembly shall not include the following statement or the equivalent, "This chimney system is rated for use at maximum _____ inch water column internal pressure when used in Positive Pressure Applications," unless it has been tested in accordance with Section 22A, Positive Pressure Applications Test. The blank shall employ the manufacturer's tested rated pressure.

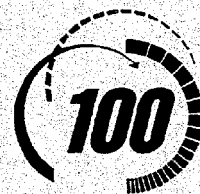
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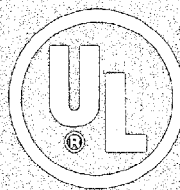
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Factory-Built Chimneys for Residential Type and Building Heating Appliances



a century of
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est. 1894



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Standard

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Attention is directed to the note on the title page of this standard identifying that the Department of Defense has adopted the text of UL 103.

Revised and/or additional pages may be issued from time to time.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements cover factory-built chimneys intended for venting gas, liquid, and solid-fuel fired residential-type appliances and building heating appliances in which the maximum continuous flue-gas outlet temperatures do not exceed 1000°F (538°C). Factory-built chimneys are intended for installation in accordance with the Standard for Chimneys, Fireplaces, Vents, and Solid-Fuel Burning Appliances, NFPA 211, and in accordance with codes such as the BOCA National Mechanical Code, the Standard Mechanical Code, and the Uniform Mechanical Code. They are intended for installation inside or outside of buildings or both, in a manner that provides a vertical (30 degree maximum offset) conduit or passageway to transport flue gases to the outside.

1.2 The chimneys covered by these requirements comply with either a 1700°F (927°C) flue-gas temperature test or a 2100°F (1149°C) flue-gas temperature test, at the manufacturer's option.

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

2 Units of Measurement

2.1 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component.

3.2 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.

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

3.4 Specific components are recognized as being 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 for which they have been recognized.

4 Glossary

4.1 For the purpose of this standard, the following definitions apply.

4.2 **COMBUSTIBLE MATERIAL, NONCOMBUSTIBLE MATERIAL** – As used in these requirements, these terms are defined in the Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances, NFPA 97M-1988.

CONSTRUCTION

5 Materials

5.1 A chimney part shall be made of noncombustible corrosion-resistant materials. Metals shall not be used in combinations at any location within the assembly that causes galvanic action.

5.2 The minimum thickness of sheet metal including any coatings and of other materials shall comply with Table 5.1.

5.3 A flue-gas conveying conduit of a chimney shall be of stainless steel, porcelain-coated steel or cast or fired refractory of the minimum thickness specified in Table 5.1. Porcelain-coated steel and cast or fired refractory shall comply with the requirements of the applicable tests described in Sections 29 – 33.

5.4 An unreinforced outer casing of a chimney shall be of galvanized steel, aluminum-coated steel, Series 300 or 400 stainless steel, or equivalent material. Minimum thickness of these materials shall be as specified in Table 5.1.

5.5 An outer casing reinforced by solid refractory not less than 2 inches (50.8 mm) thick shall be of galvanized steel, aluminum-coated steel, stainless steel or equivalent material. Minimum thickness of these materials shall be as specified in Table 5.1.

5.6 Parts of a chimney subject to contact by flue gases or flue-gas air mixtures at or beyond the terminus of the flue-gas conveying conduit shall be of a material equivalent to the flue-gas conveying conduit. See 5.3.

5.7 An outer casing or other structural part shall be of stainless steel, galvanized steel, or aluminum-coated steel when the part:

- a) Is such that deterioration or corrosion of the part causes the chimney system to collapse or otherwise increase the risk of injury to persons;
- b) Adjoins firestopping material; or
- c) Is subject to condensation.

Galvanized steel or aluminum-coated steel shall comply with the requirements of 5.8. Stainless steel shall comply with Table 5.1.

Exception No. 1: This requirement does not apply to the flue-gas conveying conduit. See 5.3.

Exception No. 2: This requirement does not apply to parts subject to contact by flue-gas or flue-gas air mixtures at or beyond the terminus of the flue-gas conveying conduit. See 5.6.

Table 5.1
Minimum thickness of chimney material

Type of material	Use of material	Paragraph reference	Equivalent nominal inside diameter of chimney					
			12 or less inches (305 or less mm)		Over 12 to 24 inches (over 305 to 610 mm)		Over 24 to 36 inches (over 610 to 914 mm)	
			Minimum material thickness					
			Inch	(mm)	Inch	(mm)	Inch	(mm)
Stainless steel – Series 300 or 400 or equivalent	Flue-gas conduit of chimneys evaluated to 1700°F; other parts exposed to flue gases or subject to condensation	5.3, 5.6	0.012 ^a	(0.30)	0.016	(0.41)	0.020	(0.51)
Stainless steel – Series 300 or 400 or equivalent	Flue-gas conduit of chimneys evaluated to 2100°F	5.3	0.015	(0.33)	0.016	(0.41)	0.020	(0.51)
Stainless steel – Series 300 or 400 or equivalent	Outer casing, unreinforced	5.4	0.012	(0.30)	0.016	(0.41)	0.026	(0.66)
	Outer casing, reinforced	5.5	0.012	(0.30)	0.012	(0.30)	0.012	(0.30)
	Component or subassembly	5.9	0.012	(0.30)	0.012	(0.30)	0.012	(0.30)
Galvanized steel, G-90 coating designation or aluminum-coated steel – Type T1-40	Outer casing, unreinforced	5.4, 5.7	0.018	(0.46)	0.023	(0.58)	0.034	(0.86)
	Outer casing, reinforced	5.5	0.018	(0.46)	0.018	(0.46)	0.018	(0.46)
	Component or subassembly	5.9	0.018	(0.46)	0.023	(0.58)	0.034	(0.86)
Aluminum alloys or painted steel	Component or subassembly	5.9	0.016	(0.41)	0.016	(0.41)	0.016	(0.41)
Steel, painted	Outer casings or structural part	5.10	0.053	(1.35)	0.053	(1.35)	0.053	(1.35)
Porcelain-coated steel-base metal	Flue-gas conduit of chimneys evaluated to 1700°F	5.3	0.026	(0.66)	0.032	(0.81)	0.032	(0.81)
Cast iron	Outer casing or structural part	5.10	0.125	(3.18)	0.125	(3.18)	0.125	(3.18)
Cast or fired refractory, clay tile	Flue-gas conduit	5.3	0.40	(10.2)	0.65	(16.5)	1.00	(25.4)
^a Flue-gas conduit employed for tee sections shall be of 0.015 inch (0.38 mm) minimum thickness.								