UL 94

STANDARD FOR SAFETY

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

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UL Standard for Safety for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94

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Summary of Topics

This revision of ANSI/UL 94 dated July 2, 2026 includes the addition of Flame Stabilization Time for the Flame Test Method described in 7.5.4, 9.5.3, and 12.5.4.

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

The revised requirements are substantially in accordance with Proposal(s) on this subject dated March 27, 2026 and May 29, 2026.

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1

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The most recent designation of ANSI/UL 94 as an American National Standard (ANSI) occurred on July 2, 2026. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE 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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CONTENTS

INTRODUCTION

1 Scope 5
2 References 5
2.1 General 5
2.2 Referenced standards in this text 5
2.3 Related standards 6
3 Definitions 7
4 Significance of Tests 7
5 Apparatus 7
6 Conditioning 9

TESTS

7 Horizontal Burning Test; HB 9
7.1 Test criteria 9
7.2 Test apparatus 10
7.3 Test specimens 10
7.4 Conditioning 10
7.5 Procedure 11
7.6 Calculations 13
7.7 Results 14
8 50 W (20 mm) Vertical Burning Test; V-0, V-1, or V-2 14
8.1 Test criteria 14
8.2 Test apparatus 15
8.3 Test specimens 15
8.4 Conditioning 16
8.5 Procedure 16
8.6 Results 17
9 500 W (125 mm) Vertical Burning Test; 5VA or 5VB 17
9.1 Test criteria 17
9.2 Test apparatus 18
9.3 Test specimens 18
9.4 Conditioning 19
9.5 Bar specimens test procedure 19
9.6 Plate specimens test procedure 21
10 Radiant Panel Index Test 22
10.1 Test criteria 22
10.2 Test specimens 23
11 Thin Material Vertical Burning Test; VTM-0, VTM-1, or VTM-2 23
11.1 Test criteria 24
11.2 Test apparatus 24
11.3 Test specimens 25
11.4 Conditioning 26
11.5 Procedure 26
11.6 Test results 27
12 Horizontal Burning Foamed Material Test; HBF, HF-1, or HF-2 27
12.1 Test criteria 27
12.2 Test apparatus 28
12.3 Test specimens 28
12.4 Conditioning 29
12.5 Procedure 29
12.6 Test results 31

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MARKING

13 General 32

ANNEX A (normative) – FOLLOW-UP INSPECTION INSTRUCTIONS

INTRODUCTION

A1 Scope 33
A2 Glossary 33
A3 Responsibility of the Manufacturer 34
A4 Responsibility of the Field Representative 34
A5 Selection of Samples for Follow-Up Testing 35
A6 Follow-Up Test Program 35

ANNEX B (normative) – GUIDANCE FOR ACCEPTING ALTERNATE MANUFACTURING LOCATIONS

INTRODUCTION

B1 Scope 36
B2 Guidelines 36

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INTRODUCTION

1 Scope

1.1 These requirements cover tests for flammability of polymeric materials used for parts in devices and appliances. They are intended to serve as a preliminary indication of their acceptability with respect to flammability for a particular application.

1.2 The methods described in this Standard involve standard size specimens and are intended to be used solely to measure and describe the flammability properties of materials, used in devices and appliances, in response to a small open flame or radiant heat source under controlled laboratory conditions.

1.3 The tests in the Standard for Tests for Flammability of Small Polymeric Component Materials, UL 1694, should be used to evaluate small components which contain materials that can not be fabricated into standardized specimens in the minimum use thickness and subjected to applicable preselection tests in UL 94. Test procedures in UL 1694 are applicable to small components with an overall volume of less than 2500 mm^3 (0.15 in^3). UL 1694 is generally not applicable to small components with an overall volume greater than 2500 mm^3 (0.15 in^3).

1.4 The final acceptance of the material is dependent upon its use in complete equipment that conforms with the standards applicable to such equipment. The flammability classification required of a material is dependent upon the equipment or device involved and the particular use of the material. The performance level of a material determined by these methods shall not be assumed to correlate with its performance in end-use application. The actual response to heat and flame of materials depends upon the size and form, and also on the end-use of the product using the material. Assessment of other important characteristics in the end-use application includes, but is not limited to, factors such as ease of ignition, burning rate, flame spread, fuel contribution, intensity of burning, and products of combustion.

1.5 If found to be appropriate, the requirements are applied to other nonmetallic materials.

1.6 These tests, with the exception of the Radiant Panel Index Test, Section 10, are not applicable to the evaluation of parts where the thickness exceeds 13.0 mm or where the surface area exceeds 1 m^2. These requirements do not cover polymeric materials when used for building construction, finishing, or contents such as wall and floor coverings, furnishings, decorative objects and so forth. In addition, the fire resistance (in terms of an hourly rating), flame spread, smoke characterization, and heat release rate is not evaluated. Other fire tests exist and shall be used to evaluate the flammability of materials in the intended end-use-product configuration.

2 References

2.1 General

2.1.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

2.2 Referenced standards in this text

2.2.1 If a designation for a test method is followed by an alternate or equivalent designation, in parenthesis, the latter method is considered technically equivalent, though not necessarily identical, and might yield somewhat different numerical test results than those obtained with the original test method.

ISO 13943, Fire Safety – Vocabulary (ASTM E176, Standard Terminology of Fire Standards)

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ISO 291, Standard Atmospheres for Conditioning and Testing (ASTM D618, Practice for Conditioning Plastics for Testing)

ASTM D789, Test Method for Determination of Relative Viscosity of Polyamide

ASTM E162-08, Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

ASTM D3195, Practice of Rotameter Calibration

IEC TS60695-11-4, Test Flames 50 W Flames – Apparatus and Confirmational Test Methods; Method A and IEC TS60695-11-3, Test Flames 500 W Flames – Apparatus and Confirmational Test Methods; Method A (ASTM D5025, Specification for a Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials; ASTM D5207, Practice for Confirmation of 20 mm (50 W) Test Flames for Small-Scale Burning Tests on Plastic Materials)

ASTM 2016, Standard Specification for Industrial Woven Wire Cloth, Appendix X3

HB: ASTM D635, Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position (IEC 60695-11-10 , Fire hazard testing Part 11-10; Test flames 50 W horizontal and vertical flame test methods)

V: ASTM D3801, Test Method for Measuring the Comparative Burning Characteristics of Solid Plastics in a Vertical Position (IEC 60695-11-10, Fire hazard testing Part 11-10: Test flames 50 W horizontal and vertical flame test methods)

VTM: ASTM D4804, Test Method for Determining the Flammability Characteristics of Nonrigid Solid Plastics (ISO 9773, Plastics – Determination of Burning Behavior of Flexible Vertical Specimens in Contact with a Small Flame Ignition Source)

5V: ASTM D5048, Test Method for Measuring the Comparative Burning Characteristics and Resistance to Burn-Through of Solid Plastics Using a 125 mm Flame (IEC 60695-11-20, Fire hazard testing Part 11-20: Test flames 500 W flame test methods)

HBF: ASTM D4986, Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials (ISO 9772, Cellular Plastics – Determination of Horizontal Burning Characteristics of Small Specimens Subjected to a Small Flame)

2.3 Related standards

2.3.1 The Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A, contains short-term test procedures to be used for the evaluation of materials used for parts intended for specific applications in electrical end products. The Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, contains long-term test procedures to be used for the evaluation of materials used for parts intended for specific applications in end products. Test procedures are provided in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, for the evaluation of polymeric materials in specific applications in end products. The test procedures include reference to the data obtained from the standard property tests in UL 746A, as well as other practical means of evaluation. The Standard for Polymeric Materials – Fabricated Parts, UL 746D, contains requirements for traceability and performance of parts molded and fabricated from polymeric materials.

2.3.2 Requirements for materials that have been modified to match the requirements of a specific application, including - but not limited to - the use of recycled and regrind materials, the use of additives and colorants, and the blending of two or more materials, are described in the Standard for Polymeric Materials – Fabricated Parts, UL 746D.

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3 Definitions

3.1 For the purpose of this Standard, the following definitions apply (See ISO 13943):

3.2 AFTERFLAME – Flame which persists after the ignition source has been removed.

3.3 AFTERFLAME TIME – The length of time during which an afterflame persists under specified conditions.

3.4 AFTERGLOW – Persistence of glowing combustion after both removal of the ignition source and the cessation of any flaming.

3.5 AFTERGLOW TIME – The length of time during which an afterglow persists under specified conditions.

3.6 FLAME – To undergo combustion in the gaseous phase with emission of light.

3.7 GLOWING COMBUSTION – Combustion of a material in the solid phase without flame but with emission of light from the combustion zone.

4 Significance of Tests

4.1 Tests conducted on a material under the conditions specified are intended to provide information when: comparing the relative burning characteristics of different materials, or assessing any change in burning characteristics prior to, or during, use. This method is not intended to provide correlation with performance under actual service conditions.

4.2 Assessment for risk of fire shall take into account such factors as fuel contribution, intensity of burning (rate of heat release), products of combustion and environmental factors such as the intensity of source, orientation of exposed material and ventilation conditions.

4.3 Burning characteristics, as measured by these test procedures, are affected by such factors as: density, color, any anisotropy of the material molding conditions and the thickness of the specimen.

4.4 When a specimen of a thin material shrinks from the flame without igniting, the test results shall be deemed invalid and additional specimens shall be tested. If all test specimens shrink from the applied flame without igniting, these materials cannot be evaluated by the test procedure and an alternate test procedure in this Standard shall be conducted.

5 Apparatus

5.1 Laboratory Fume Hood – The laboratory fume hood chamber shall have an inside volume of at least 0.5 m^3. The chamber shall permit observation of tests in progress and shall be draft free, while allowing a normal thermal circulation of air past the test specimen during burning. The inside surfaces of the chamber shall be of a dark color. When a light meter, facing towards the rear of the chamber, is positioned in place of the test specimen, the recorded light level shall be less than 20 lx. For safety and convenience, it is desirable that the enclosure (which can be completely closed) be fitted with an extraction device, such as an exhaust fan, to remove products of combustion which may be toxic. The extraction device shall be turned off during the test and turned on immediately after the test to remove the fire effluents. A positive closing damper may be needed.

Note 1: The amount of oxygen available to support combustion is important for the conduct of these flame tests. For tests conducted by this method when burning times are prolonged, chamber sizes less than 1 m^3 do not consistently provide accurate results.

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Note 2: Placing a mirror in the chamber, which provides a rear view of the test specimen, has been found useful.

5.2 Laboratory Burner – A laboratory type burner having a tube with a length of 100 ±10 mm and an inside diameter of 9.5 ±0.3 mm. The barrel is not to be equipped with an end attachment, such as a stabilizer. The burner shall be in compliance with ASTM D5025.

Note: Method A of IEC TS60695-11-4 and Ignition Source P/PF2 of ISO 10093 are technically equivalent to ASTM D5025

5.3 Burner Wing Tip – A wing tip with dimensions of slit 48 ±1 mm in length by 1.3 ±0.05 mm in width, for the burner. (Used for the test procedure in Horizontal Burning Foamed Material Test; HBF, HF-1, or HF-2..., Section 12 only.)

5.4 Burner Mounting Fixture – Capable of positioning the burner at an angle of 20° from the vertical axis. (Used for the test procedure in 500w Vertical Burning Test; 5VA or 5VB, Section 9 only.)

5.5 Ring Stands – Laboratory ring stands with clamps or the equivalent, for horizontal or vertical positioning of the specimen and/or the wire gauze. Laboratory ring stands with clamps adjustable to the desired angles and heights, or a support gauze holder constructed from aluminum or steel, or equivalent equipment.

5.6 Timing Devices – Accurate to 0.1 second.

5.7 Measuring Scale – Graduated in mm.

5.8 Gas Supply – A supply of technical grade methane gas (min. 98 % pure) with regulator and meter for uniform gas flow.

5.9 Wire Gauze – Having approximately 20 openings per 25 mm, made with 0.43 ±0.03 mm diameter iron or steel wire and cut to approximately 125 mm squares. (Used for the test procedure in Horizontal Burning Test; HB, Section 6.2 only.)

5.10 Conditioning Room or Chamber – Capable of being maintained at 23 ±2 °C and a relative humidity of 50 ±10 %.

5.11 HB Support Fixture – A metal support fixture for testing specimens that are not self-supporting. See Figure 7.2 (Used for the test procedure in Horizontal Burning Test; HB, Section 7 only.)

5.12 Micrometer – Capable of being read to 0.01 mm.

5.13 Cotton – A supply of absorbent 100 % cotton.

5.14 Desiccator – A desiccator containing anhydrous calcium chloride, or other drying agent, maintained at a relative humidity not exceeding 20 % at 23 ±2 °C.

5.15 Conditioning Oven – A full draft air-circulating oven, minimum of 5 air changes per hour, capable of being maintained at 70±2 °C.

5.16 Specimen Mandrel Form – Made from 12.7 ±0.5 mm diameter rod with a minimum 250 mm length. (Used for the test procedure in Thin Material Burning Test; VTM-0, VTM-1, VTM-2..., Section 11 only.)

5.17 Tape – Pressure-Sensitive Adhesive. (Used for the test procedure in Thin Material Burning Test; VTM-0, VTM-1, VTM-2..., Section 11 only.)

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