



UL 1040

STANDARD FOR SAFETY

Fire Test of Insulated Wall Construction

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UL Standard for Safety for Fire Test of Insulated Wall Construction, UL 1040

First Edition, Dated August 9, 1996

Summary of Topics

This revision to ANSI/UL 1040 dated January 4, 2022 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

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

The requirements are substantially in accordance with Proposal(s) on this subject dated November 12, 2021.

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UL 1040

Standard for Fire Test of Insulated Wall Construction

Prior to the first edition, the requirements for the products covered by this standard were included in the Outline of Investigation for Insulated Wall Construction, Subject 1040.

First Edition

August 9, 1996

This ANSI/UL Standard for Safety consists of the First Edition including revisions through January 4, 2022.

The most recent designation of ANSI/UL 1040 as a Reaffirmed American National Standard (ANS) occurred on January 4, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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

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INTRODUCTION

1 Scope

1.1 This test method describes the testing procedures and requirements applicable to insulated wall constructions by use of a standardized large-scale corner test.

1.2 The purpose of this test method is to determine the ability of field or prefabricated insulated wall panels to resist the spread-of-flame over a simulated interior wall surface of a building and the ability of the insulating material to resist damage as a result of the fire exposure. This test method is not intended to evaluate the fire resistance afforded by the structural members of the test structure such as columns, beams, girders, bar joists, tie bars, and the like.

1.3 These requirements do not cover the evaluation of panels intended for various uses other than as specified in [1.1](#) for which there are other established test standards as follows:

- a) Surface Burning Characteristics Classification – Establishes the comparative burning characteristics of building materials and assemblies by measurement of flame spread over exposed surfaces and the density of the smoke developed during the fire exposure period. This test method is described in the Standard for Test for Surface Burning Characteristics of Building Materials, UL 723.
- b) Fire-Resistance (hourly rating) – Establishes hourly fire resistance ratings of building assemblies through large-scale fire exposures under specific loading conditions. This test method is described in the Standard for Fire Tests of Building Construction and Materials, UL 263.
- c) Roof-Covering Materials – Establishes performance measurements for coverings relative to resistance to exterior fire spread and penetration. This test method is described in the Standard for Test Methods for Fire Resistance of Roof-Covering Materials, UL 790.
- d) Roof-Deck Construction Materials – Establishes performance measurements for roofing systems with respect to resistance to the spread-of-flame and damage from underdeck interior fire exposure. This test method is described in the Standard for Fire Test of Roof Deck Constructions, UL 1256.

1.4 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements 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 does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 General

2.1 Units of measurement

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

2.2 Undated references

2.2.1 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.

PERFORMANCE

LARGE SCALE CORNER TEST

3 General

3.1 A nominal 764 $\pm$ 10 pound (347 $\pm$ 4.54 kg) wood crib is to be used to produce a uniform flame for direct impingement on the walls and ceiling of a 20 by 20 by 30 foot (6.10 by 6.10 by 9.14 m) high open corner configuration. The contribution of the wall assembly to fire growth is to be defined in terms of:

- a) The time history of temperature development within the corner configuration;
- b) The maximum observed flame progression;
- c) Post-test damage of the sample.

3.2 A report of the test results shall be prepared as specified in Report, Section 10.

4 Ignition Source

4.1 The ignition source for the test is to be a wood crib weighing 764 $\pm$ 10 pounds (347 $\pm$ 4.54 kg) having dimensions of 4 by 4 by a minimum of 3-1/2 ft high (1.22 by 1.22 by 1.07 m), and constructed of 12 tiers of kiln dried spruce, pine, fir, or other soft woods having densities similar to those named, and are to be dried to a moisture content of 9 to 11 percent as determined by the procedures described in paragraph 4.3. Each strip is to be 4 ft. long, and is to have a cross section of trade size 2- by 4-inch [nominal 1-1/2 by 3-1/2 inches (38.1 by 89 mm)]. Within the crib, the strips in each tier are to be evenly spaced and lie at right angles to the strips in the tier below.

4.2 The wood crib is to be positioned 1 foot (305 mm) from each wall and is to be ignited by two torches formed from 3-1/2 inch (88.90 mm) diameter by 6 inch (152.40 mm) long rolls of cotton waste, each saturated with 8 ounces (0.23 kg) of n-heptane. The torches are to be ignited simultaneously, inserted immediately into the bottom tier and positioned at the center of one of four quadrants (based on plan view cross-sectional area) for 15 s (30 s elapsed time) and then removed. Ignition time is considered to be the instant the torches are inserted into the wood crib.

4.3 Moisture content of the wood is to be monitored by using either a conductance or dielectric-type meter (calibrated as described in the Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters, ASTM D-4444) until the desired level is reached. Final determination of moisture content shall be based on the secondary oven-drying method (Method B) described in the Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials, ASTM D-4442.

5 Fire Test Room and Geometry

5.1 The test structure is to be constructed from the insulated wall construction materials under investigation. These materials are to be installed in the required framework so as to form two vertical walls intersecting to describe a 90-degree angle to form a 20 by 20 by 30 feet (6.10 by 6.10 by 9.14 m) high structure. The construction is to be representative of field construction. The two open sides of the test structure are considered to represent the greater open volume of a building.

5.2 An uninsulated flat-metal roof, nominally 20 by 20 feet (6.10 by 6.10 m), is to be placed over the test structure. The walls are to be joined to the roof in a manner representative of field-joining methods. (Since the presence of combustible material on the underside of the ceiling can influence the performance of walls, the results of this test are applicable only to constructions with noncombustible material on the interior ceiling surface.)

6 Protection and Conditioning of Test Assembly

6.1 Prior to mounting, specimens are to be conditioned at a temperature of $73 \pm 4^{\circ}\text{F}$ ($22.8 \pm 2.2^{\circ}\text{C}$) and a relative humidity of 50 ± 5 percent until constant weight is achieved.

6.2 The test assembly is to be mechanically protected during and after mounting to provide for its integrity at the time of test. Assemblies are not to be tested until final material conditioning has been attained. Materials containing moisture or solvents are to achieve constant weight condition prior to test.

6.3 In addition, 2-foot (0.61 m) high draft curtains are to be suspended from the underside of the flat roof along the open sides of the test structure. The draft curtains are to be composed of noncombustible material.

6.4 *Deleted*

7 Fire Test Room Environment

7.1 Ventilation

7.1.1 The fire test room is to be located within a building vented to discharge combustion products and intake fresh air.

7.2 Ambient conditions in test room

7.2.1 The ambient conditions in the test room, measured at the center of the test room, at the time of test are to be a minimum of 60°F (15.6°C) and a maximum of 70 percent relative humidity.

8 Instrumentation

8.1 Ignition source monitoring thermocouples

8.1.1 The ignition source monitoring thermocouples are to be constructed of No. 14 gauge (5.03 mm^2) bare chromel-alumel wire mounted in ceramic insulation and placed within a 1/2 inch, Schedule 40 pipe (see the Standard for Welded and Seamless Wrought Steel Pipe, ANSI/ASME B36.10M). The bare thermocouple junction is to protrude 1 inch (25.4 mm) beyond the end of the ceramic insulation and 3 inches (76 mm) beyond the end of the pipe.

8.1.2 Thermocouples are to be placed over the exposed fire crib, as shown in [Figure 8.1](#), to determine and record the character and temperature of the fire.

8.2 Test measurement thermocouples

8.2.1 Test measurement thermocouples are to be constructed of No. 24 gauge (1.60 mm^2) bare chromel-alumel wire. The thermocouple wire within 0.5 inch (13 mm) of the thermocouple junction is to be positioned along projected isotherms to minimize conduction errors. The insulation between the chromel and alumel wires is to be stable at a temperature of no less than 2000°F (1100°C), otherwise the thermocouple wires are to be separated.

8.2.2 The thermocouples shall be placed at the following locations:

- a) Centered every 5 feet (1.52 m) on the exposed face of each wall to determine surface temperature obtained.

b) Beneath the roof, as shown in [Figure 8.2](#), to provide data pertaining to the heat-flow pattern under the roof.

8.2.3 All thermocouples are to be monitored at maximum 30-second intervals.

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Figure 8.1
Location of thermocouples over crib

