UL 155

STANDARD FOR SAFETY

Tests for Fire Resistance of Vault and File Room Doors

UL Standard for Safety for Tests for Fire Resistance of Vault and File Room Doors, UL 155

Eighth Edition, Dated April 5, 2000

Summary of Topics

This revision of ANSI/UL 155 dated February 28, 2024 includes the following changes in requirement:

– Update to Classes and Double Doors; 5.1, 8.3.2A

– Update to Furnace Temperatures; 8.3.4 – 8.3.6, 8.3A

– Addition of Furnace Pressure Testing; 8.3B, 8.4 (title only)

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 requirements are substantially in accordance with Proposal(s) on this subject dated October 20, 2023 and January 26, 2024.

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UL 155

Standard for Tests for Fire Resistance of Vault and File Room Doors

The first, second, and third editions were titled Fire Resistance Classification of Vault and File Room Storage Doors.

First Edition – August, 1939
Second Edition – December, 1941
Third Edition – December, 1969
Fourth Edition – November, 1972
Fifth Edition – April, 1979
Sixth Edition – January, 1990
Seventh Edition – April, 1995

Eighth Edition

April 5, 2000

This ANSI/UL Standard for Safety consists of the Eighth Edition including revisions through February 28, 2024.

The most recent designation of ANSI/UL 155 as an American National Standard (ANSI) occurred on February 28, 2024. 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 ULSE at any time. Proposals should be submitted via a Proposal Request in ULSE's Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover the test procedure applicable to the fire-resistance classification of doors intended for the protection of openings of vaults and file rooms.

1.2 Recommendations for record protection equipment and techniques, including the use and installation of vault or file room door assemblies, are contained in the Standard for Protection of Records, NFPA 232.

1.3 The terms "vault doors" and "file room doors" refer to assemblies consisting of doors, single or in pairs, the frame into which doors are hung, and the necessary hardware. These assemblies are intended to provide fire resistance and protection to contents from heat for periods designated by the classifications to an extent described in these requirements.

1.4 Vault doors are recommended for use on enclosures of limited volume [not exceeding 5000 cubic feet (142 m^3)], constructed so that no point on the interior surface will reach a temperature exceeding 350°F (177°C) when separate vault members or the vault as a whole are exposed to a fire regulated according to the standard time-temperature curve. See Figure 8.2.

1.5 File room doors are recommended for enclosures of large volume [not exceeding 50,000 cubic feet (1420 m^3)] for the storage of records which are not of sufficient importance to economically justify the provision of vaults. It is anticipated that combustibles will not be stored nearer than 3 feet (0.91 m) from the unexposed face of the door nor 6 inches (152 mm) to the side from the door joints.

1.6 It is intended that classification shall register performance during the period of exposure and shall not be construed as having determined suitability for use after fire exposure.

1.7 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.

3 Practicability

3.1 Vault and file room doors shall be constructed so that, when installed:

a) The door, locking mechanism, and other movable parts are capable of repeated operation prior to tests and

b) Repairs of moving parts can be made without damage to the insulating and fire-resistive qualities.

Testing for such capability, however, is not within the scope of these requirements.

3.2 Heat-insulating materials used in vault and file room doors shall be free from sweating or swelling and shall be capable of retaining their heat-insulating properties under the intended conditions of use.

4 Instructions

4.1 Each door shall be accompanied by instructions for installation into walls of the types recommended for each classification.

5 Classifications and Ratings

5.1 Vault doors classified as to 1-, 1.5-, 2-, 4-, and 6-hour fire resistance are effective in withstanding:

a) Standardized fire exposures for the periods indicated without exceeding a temperature of 350°F (177°C) during or after the fire exposure, 2 inches (51 mm) from the unexposed face, when installed in accordance with instructions accompanying the door; and

b) Application of a standard hose stream and reheating for one-half of the classification period without destroying the usability of papers or record form papers stored in the vault. See 6.2 and 6.3 for specifications.

5.2 "Unexposed face" refers to the side which is on the inside of the vault or file room. "Exposed face" refers to the side which is on the outside of the vault or file room.

5.3 File room doors classified as to 1/2- or 1-hour fire resistance are effective in withstanding:

a) Standardized fire exposures for the periods indicated without exceeding a temperature of 350°F (177°C) during or after the fire exposure, 36 inches (0.91 m) from the unexposed face of the door or 6 inches (152 mm) to the side from the door joints, when installed in accordance with instructions accompanying the door; and

b) Application of a standard hose stream and reheating for one-half of the classification period without destroying the usability of papers or record form papers stored in the file room. See 6.2 and 6.3 for specifications.

TESTS

6 General

6.1 The vault or file room door assembly shall be constructed so that it will withstand the stresses occasioned by the Fire Endurance Test, Section 8, and the Fire-Hose Stream – Reheat Test, Section 9, without bending, distortion, displacement, rupture, or other developments which will affect the security of the locks and fastenings between the parts, or the strength of the parts or the assembly.

6.2 In reference to "usability" of contents of record protection equipment after tests, the paper contents used in tests are to be those considered common newsprint or coated and uncoated magazine, letter, file, and record form paper printed, typed, lead-penciled, or penned. Nonpaper records are not used for

contents for the tests described in these requirements since testing to determine the ability of various nonpaper records to withstand these conditions is not within the scope of this standard.

6.3 Contents to be used in the tests are considered to be usable after tests if capable of ordinary handling, without breaking, and if decipherable by ordinary means. Such contents requiring special preparation to permit handling, or decipherable only by resort to special photography or chemical processes, are not considered usable.

7 Size of Test Samples

7.1 The sample assembly for both the Fire Endurance Test, Section 8, and the Fire-Hose Stream – Reheat Test, Section 9, shall be of the largest size for which classification is desired.

7.2 When a type or pattern of an assembly has successfully withstood the tests, classification is warranted of subsequent factory output of assemblies of similar construction, design, and sizes varying in height and width within the lineal dimensions of the test sample.

8 Fire Endurance Test

8.1 General

8.1.1 The vault and file room door assemblies shall withstand the fire endurance test:

a) For the periods for which classification is desired;

b) Preventing the interior temperature from exceeding 350°F (177°C) during the fire exposure or after the furnace fires have been extinguished;

c) Without destroying the usability of the records stored in the vault chamber; and

d) Without developing conditions indicating disintegration of the parts or materials which will affect the tightness of closure or the heat insulation.

8.1.2 Door assemblies of all classes shall withstand the Fire Endurance Test, Section 8, and the Fire-Hose Stream – Reheat Test, Section 9:

a) Without destroying the usability of the records stored inside the vault chamber and

b) Without developing temperatures, separations, distortions, displacements, or ruptures that would indicate reductions in the tightness of the closure or the heat-insulating properties of the door assembly.

See 6.2 and 6.3.

8.2 Test structure

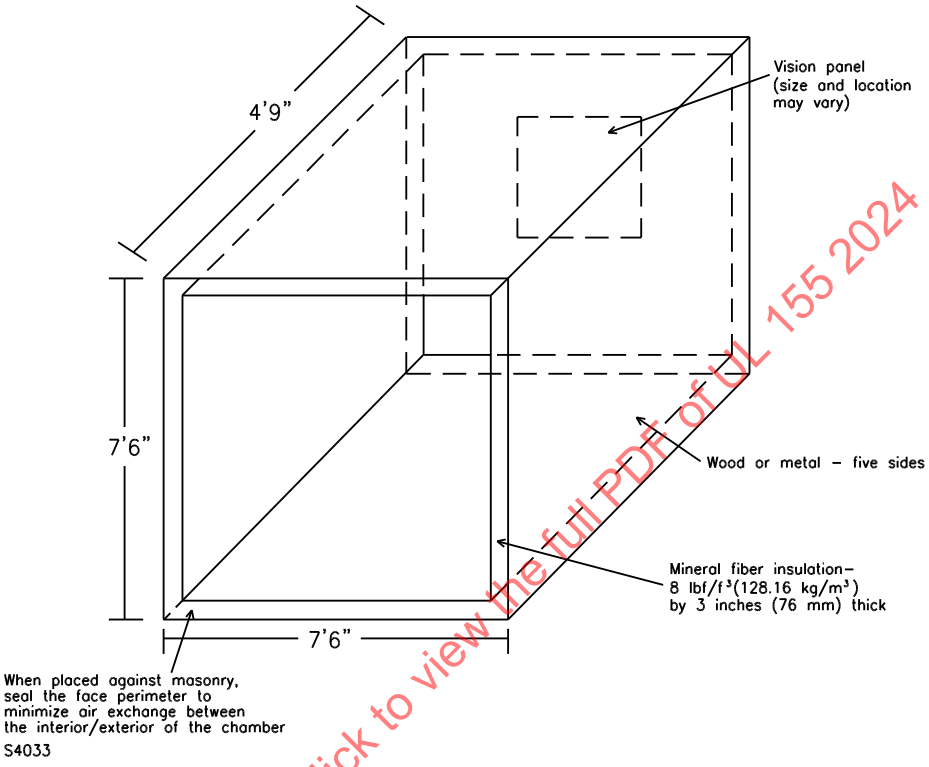
8.2.1 The door under test is to be mounted into a wall of the kind and thickness recommended for the classification for which the test is to be conducted, in accordance with the installation instructions furnished by the manufacturer. This wall is to be placed in front of a furnace in such a manner that the exposed face of the door will be subject to the furnace fire.

8.2.2 The unexposed side of the wall and the unexposed face of the door assembly are to be enclosed by an insulated chamber consisting of a box 57 inches (1.45 m) deep, open at one side, as illustrated in Figure 8.1. The open side is to fit over a projected area 90 inches (2.3 m) square, built out in the masonry

of the test wall into which the test sample has been installed. The joints between the masonry and the radiation chamber are to be sealed with insulating materials.

Figure 8.1

Insulated radiation chamber



8.2.3 Single sheets of paper are to be placed in the interior of the chamber, arranged on shelves on each side of the door opening, and on a stand 36 inches (0.91 m) from the unexposed face of the wall.

8.3 Unexposed surface temperature measurement

8.3.1 The temperatures determining the classification of the doors are to be measured by thermocouples mounted with regard to the unexposed face of the door as described in 8.3.2 and 8.3.3.

8.3.2 For vault doors, the thermocouples are to be located 2 inches (51 mm) from the unexposed face of the door. A thermocouple is to be placed in the plane of each side door joint and another in the plane of the top door joint at its middle.

8.3.2A When testing double doors, an additional thermocouple is to be located at one-half the vertical height of the meeting edge, spaced 2 inches (51 mm) from the unexposed door faces.

8.3.3 For file room doors, the thermocouples are to be located as follows:

a) One in a plane which is 36 inches (0.91 m) from the unexposed face of the door and 6 inches (152 mm) down from the top door joint at its middle.

b) One in a plane which is 1 inch (25 mm) from the unexposed surface of the wall in which the door is mounted and 6 inches above the top door joint at its middle.

c) Two in planes which are 6 inches from each side door joint, 1 inch from the unexposed surface of the wall, and 6 inches down from the top door joint.

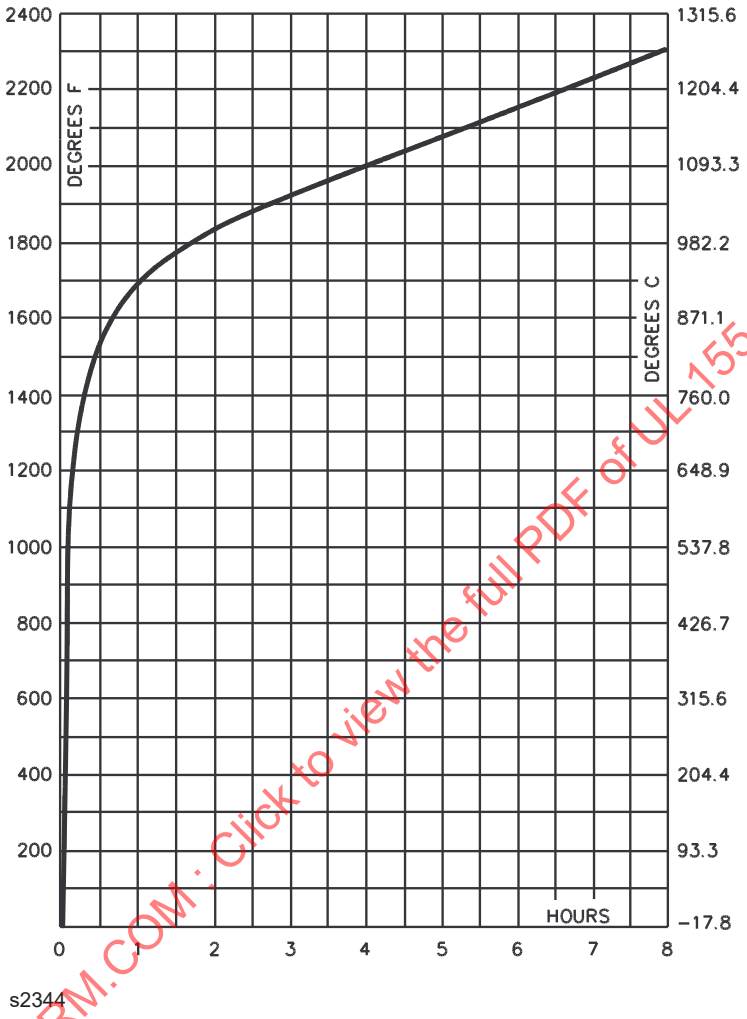
8.3.4 *Deleted*

8.3.5 *Deleted*

8.3.6 *Deleted*

Figure 8.2

Standard time-temperature curve



The points on the curve that determine its character are:

1000°F (538°C) at 5 minutes

1300°F (704°C) at 10 minutes

1550°F (843°C) at 30 minutes

1700°F (927°C) at 1 hour

1850°F (1010°C) at 2 hours

2000°F (1093°C) at 4 hours

2300°F (1260°C) at 8 hours

For a closer definition of the time-temperature curve see Annex A.

8.3A Furnace temperatures

8.3A.1 The temperatures of the test exposure shall be the average temperature obtained by a minimum of three thermocouples and no fewer one thermocouple per 15 square feet of test assembly exposed to the furnace symmetrically disposed and distributed to show the temperature near all parts of the test assembly. The thermocouple assembly is to consist of a thermocouple protected by a sealed porcelain tube having a 3/4 inch (19.1 mm) outside diameter and 1/8 inch (3.2 mm) wall thickness or, a base-metal thermocouple, protected by:

a) Sealed 1/2-inch (12.7-mm) wrought-steel or wrought-iron pipe of standard weight; or

b) Inconel 600 series schedule 40 pipe (0.8 inch OD / 0.6 inch ID, 20 mm OD / 15 mm ID).

The end of the thermocouple assembly is to be initially located 2 inches (152 mm) from the exposed face of the test assembly or from the construction in which the door assembly is installed. During the fire exposure, if the movement of the test sample causes the sample's distance to the end of the thermocouple assembly to vary, the end of the thermocouple assembly is to be reset to 2 inches (152 mm) at intervals not exceeding 10 minutes during the first 30 minutes of the test. Thereafter, the intervals are to be increased to not more than 30 minutes.

8.3A.2 The temperatures are to be recorded at intervals not exceeding 1 minute.

8.3A.3 The accuracy of the furnace control is to be such that the area under the time-temperature curve shown in Figure 8.2, obtained by averaging the results from the thermocouple readings, is within 10 % of the corresponding area under the standard time-temperature curve for fire tests of 1 hour or less duration, 7.5 % for those over 1 hour and not more than 2 hours, and within 5 % for tests exceeding 2 hours in duration.

8.3B Furnace pressure

8.3B.1 Furnace pressures are to be read at intervals not exceeding 1 minute.

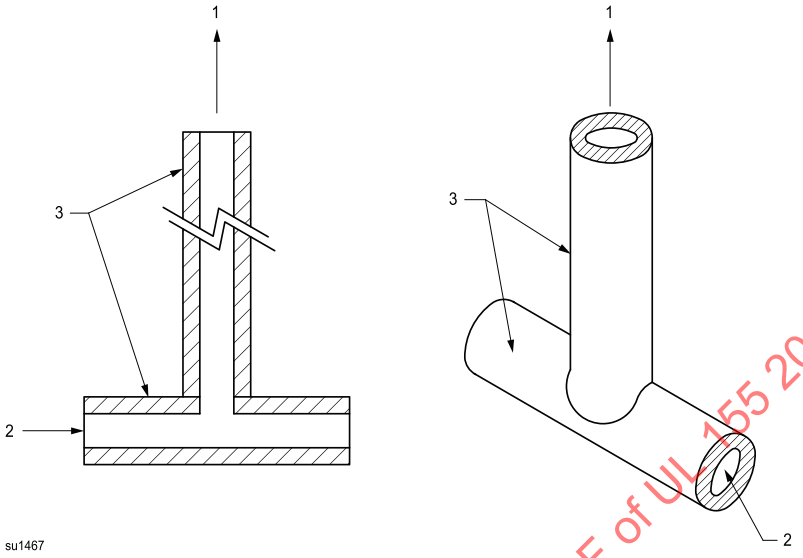
8.3B.2 The neutral plane within the test furnace shall be established prior to the initiation of the fire test. Such pressure shall remain constant or increase to maintain the neutral plane upon initiation of the fire test. Control of the furnace pressure is to be established beginning no later than 5 minutes after the start of the test and is to be maintained throughout the remainder of the fire test.

8.3B.3 The vertical pressure distribution within the furnace is to be measured by at least two pressure-sensing probes separated by a minimum vertical distance of 6 feet (1.8 m) inside the furnace for furnaces with a minimum vertical dimension of 10 feet (3.05 m). Minimum vertical separation between pressure probes is to be reduced proportionally for furnaces with an internal dimension less than 10 feet (3.05 m).

8.3B.4 The pressure-sensing probes are to be as shown in either Figure 8.3 or Figure 8.4. The probes are to be located so that the center line of the sensing holes are positioned 6 ±1 inch (152 ±2.5 mm) from the surface of the exposed face of the test assembly and a minimum of 18 inch (457 mm) from the edges of the furnace. The probes are to be positioned horizontally in the furnace without a change in vertical elevation of the probes or tubing within the furnace.

Figure 8.3

"T" Shaped Pressure-Sensing Probe



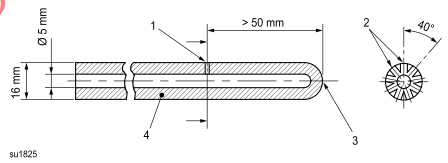
1 – Open to transducer

2 – Open

3 – "T" shaped pressure-sensing probe. Inside diameter 0.2 inch to 0.4 in (5 mm to 10 mm)

Figure 8.4

Tube Shaped Pressure-Sensing Probe



1 – Holes, 3.0 mm diameter

2 – Holes, 3.0 mm diameter, spaced 40° apart around the pipe

3 – Welded end

4 – Tube shaped pressure-sensing probe

Note: 1 inch = 25.4 mm

8.3B.5 The pressure-sensing probes are to be located at a minimum of 18 inches from the edges of the furnace chamber.