

NFPA No.

252

# **FIRE TESTS DOOR ASSEMBLIES 1972**



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**NATIONAL FIRE PROTECTION ASSOCIATION**  
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Adopted Jan. 23, 1964: Revised Dec. 9, 1969. Where variances to these definitions are found, efforts to eliminate such conflicts are in process.

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## Standard Methods of Fire Tests of Door Assemblies

**NFPA No. 252 — 1972**

This 1972 edition of NFPA No. 252 was adopted by the Annual Meeting of the National Fire Protection Association on May 17, 1972. It supersedes the 1969 edition.

Changes in this edition from the previous editions are in Figure 1, 4(a), 4(b), 5(a), 5(b), 9(b), Tables 1 and 10. Mounting for Test Purposes, 6(a) through (e) is new and supersedes 6(a) and (b). The text of 11(a) through 11(f) was deleted and new 11(a) through (u) added.

### History

The Standard for Fire Tests of Door Assemblies was adopted as a tentative standard by the ASTM in 1940 and was finally adopted in 1941. In 1942 this standard was adopted by the NFPA and approved by the American Standards Association. It was reaffirmed by the Committee on Fire Tests of Building Construction and Materials and adopted in 1950. In 1953 a new NFPA Committee on Fire Tests was formed by action of the Board of Directors and recommendations for revision of the standard made from that Committee were adopted in 1958 and 1969.

The test procedure covered by this standard was developed by Underwriters' Laboratories, Inc.

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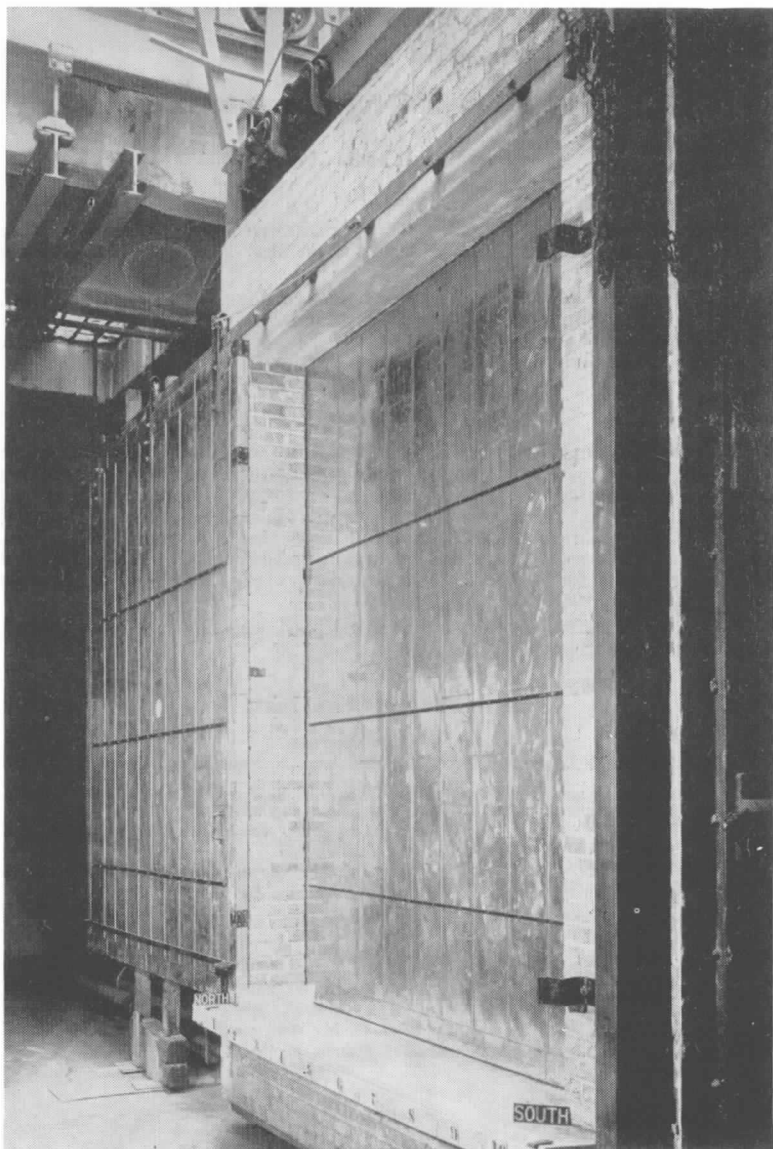
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### Alternate.

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Scope: To develop standards for fire testing procedures when such standards are not available; review existing fire test standards and recommend appropriate action to NFPA; recommend the application of and advise on the interpretation of acceptable test standards for fire problems of concern to NFPA Technical Committees and members; act in a liaison capacity between NFPA and the committees of other organizations writing fire test standards.



Assembly of two tin-clad fire doors, one on each side of 12-inch fire wall (Class A situation), one door open and one closed, during operation test preceding fire exposure test.

## Standard Methods of Fire Tests of Door Assemblies

NFPA No. 252 — 1969

### Scope

1. (a) These methods of fire test are applicable to door assemblies of various materials and types of construction, for use in wall openings to retard the passage of fire.

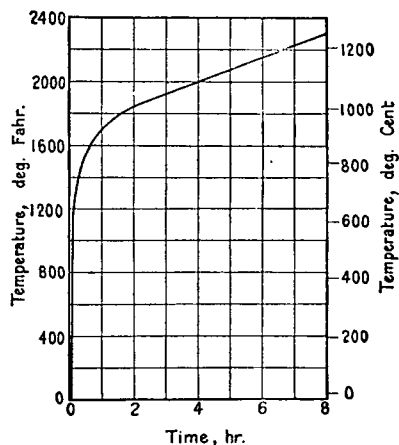
(b) Tests made in conformity with these test methods will register performance during the test exposure; but such tests shall not be construed as determining suitability for use after exposure to fire.

(c) It is the intent that tests made in conformity with these test methods will develop data to enable regulatory bodies to determine the suitability of door assemblies for use in locations where fire resistance of a specified duration is required.

## CONTROL OF FIRE TESTS

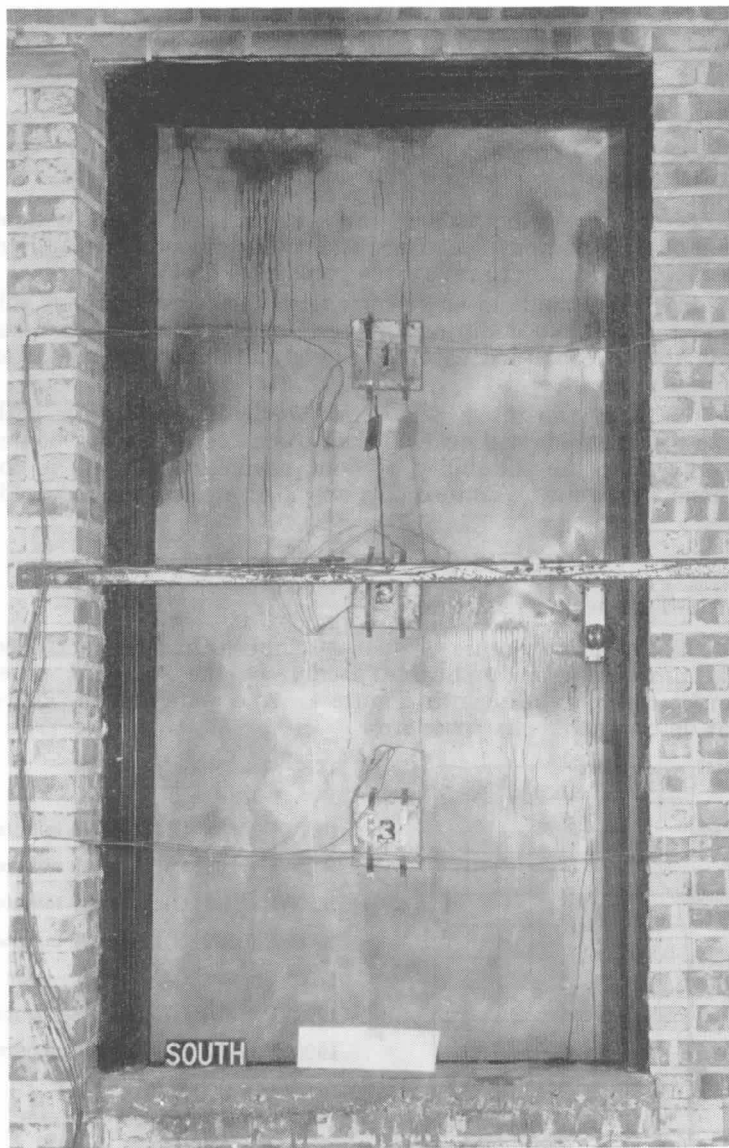
### Time-Temperature Curve

2. The fire exposure of door assemblies shall be controlled to conform to the applicable portion of the standard time-temperature curve shown in Figure 1. 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
1638° F ( 892° C)	... at 45 minutes
1700° F ( 927° C)	... at 1 hour
1792° F ( 978° C)	... at 1½ hours
1925° F (1052° C)	... at 3 hours

Figure 1. Time-Temperature Curve.



Unexposed face of flush-type metal-clad fire door, after standard fire exposure and application of hose stream. Note location of thermocouples on face of door.

For a closer definition of the time-temperature curve, see the Appendix.

### Furnace Temperatures

3. (a) The temperatures of the test exposure shall be deemed to be the average temperature obtained from the readings of not less than nine thermocouples symmetrically disposed and distributed to show the temperature near all parts of the test assembly. The thermocouples shall be protected by sealed porcelain tubes having  $\frac{3}{4}$ -inch outside diameter and  $\frac{1}{8}$ -inch wall thickness, or, as an alternate, in the case of base metal thermocouples, protected by  $\frac{1}{2}$ -inch wrought steel or wrought iron pipe of standard weight. The junction of the thermocouples shall be 6 inches from the exposed face of the test assembly or from the masonry in which the assembly is installed, during the entire test exposure.

(b) The temperatures shall be read at intervals not exceeding 5 minutes during the first 2 hours, and thereafter the intervals may be increased to not more than 10 minutes.

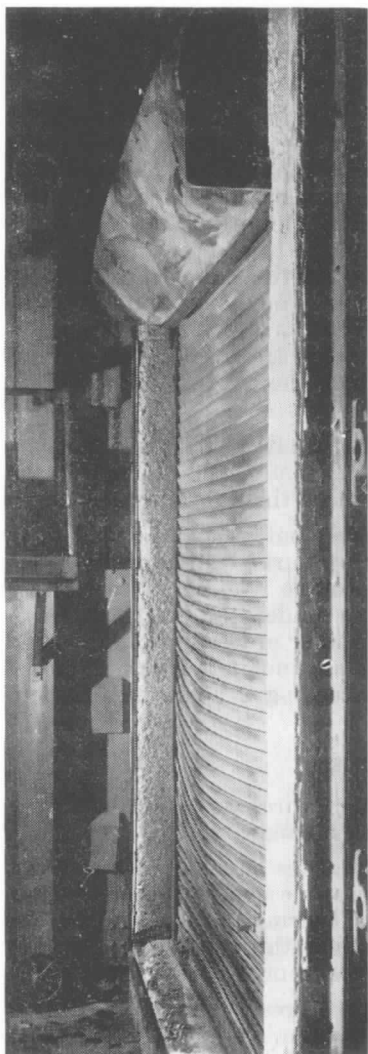
(c) The accuracy of the furnace control shall be such that the area under the time-temperature curve, obtained by averaging the results from the thermocouple readings, is within 10 per cent of the corresponding area under the standard time-temperature curve for fire tests of 1 hour or less duration, within 7.5 per cent for those over 1 hour and not more than 2 hours, and within 5 per cent for tests exceeding 2 hours in duration.

### Unexposed Surface Temperatures

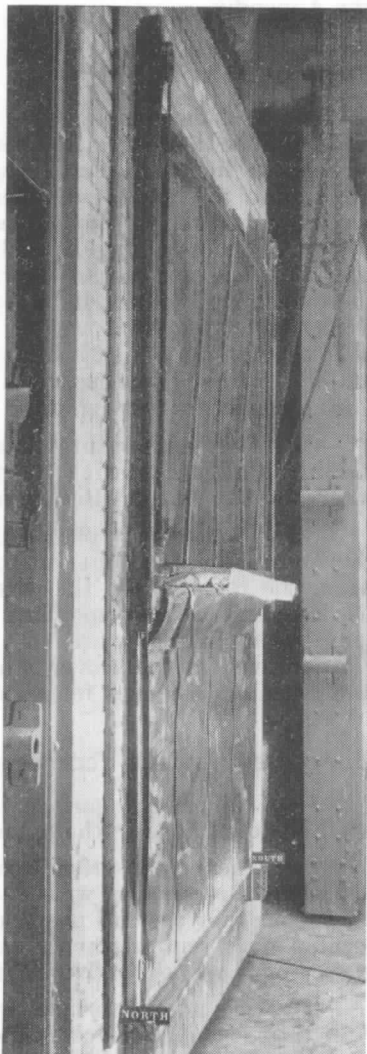
4. If unexposed surface temperatures are recorded, they shall be determined in the following manner:

(a) Unexposed surface temperatures shall be taken at not less than three points with at least one thermocouple in each 16 square foot area of the door. Thermocouples shall not be located over reinforcements extending through the door, over glass panels, or nearer than 12 inches from the edge of the door.

(b) Unexposed surface temperatures shall be measured with thermocouples placed under flexible, oven-dry, felted amosite asbestos pads  $6 \pm \frac{1}{8}$  inches square,  $0.40 \pm 0.05$  inch in thickness, and weighing  $0.26 \pm 0.026$  pound. The pads shall be held firmly against the surface of the door and shall fit closely about the thermocouples. The thermocouple leads shall be positioned under the pad for a distance of not less than  $3\frac{1}{2}$  inches with the hot junction under the center of the pad. The



Exposed face of automatic rolling steel fire door, after fire exposure and hose stream tests.



Exposed face of counterbalanced freight elevator fire door, after standard fire exposure and application of hose stream.



thermocouple leads under the pads shall be not heavier than No. 18 B & S gage (0.04 inch) and shall be electrically insulated with heat-resistant and moisture-resistant coatings.

(c) Unexposed surface temperatures shall be read at the same intervals as used for the furnace temperatures in Section 3(b).

## TEST ASSEMBLIES

### Construction and Size

5. (a) The construction and size of the test door assembly, consisting of single doors, doors in pairs, special-purpose doors (such as Dutch doors, double-egress doors, etc.), or multisection doors, shall be representative of that for which classification or rating is desired.

(b) A floor structure shall be provided as part of the opening to be protected, except where such floor interferes with the operation of the door. The floor segment shall be of noncombustible material and shall project into the furnace approximately twice the thickness of the test door.

### Mounting

6. (a) Swinging doors shall be mounted so as to open into the furnace chamber.

(b) Sliding and rolling doors, except passenger-elevator shaft doors, shall be mounted on the exposed side of the opening in the wall closing the furnace chamber.

(c) Passenger-elevator shaft doors shall be mounted on the unexposed side of the opening in the wall closing the furnace chamber.

(d) Access-type doors and chute-type doors and frame assemblies shall be mounted so as to have one assembly open into the furnace chamber and another assembly open away from the furnace chamber.

(e) Dumbwaiter and service-counter doors and frame assemblies shall be mounted on the exposed side of the opening in the wall.

(f) Door frames shall be evaluated when mounted so as to have the doors open either away from or into the furnace chamber, at the discretion of the testing authority, to obtain representative information on the performance of the construction under test.

(g) Surface-mounted hardware (fire-exit devices) for use on

fire doors shall be evaluated by being installed on one door assembly swinging into the furnace chamber and another door assembly swinging away from the furnace chamber.

(h) The mountings of all doors shall be such that they fit snugly within the frame, against the wall surfaces, or in guides, but such mounting shall not prevent free and easy operation of the test door.

(i) Clearances for swinging doors shall be as follows: With a minus  $\frac{1}{16}$ -inch tolerance —  $\frac{1}{8}$  inch along the top,  $\frac{1}{8}$  inch along the hinge and latch jambs,  $\frac{1}{8}$  inch along the meeting edge of doors in pairs, and  $\frac{3}{8}$  inch at the bottom edge of a single swing door, and  $\frac{1}{4}$  inch at the bottom of a pair of doors.

(j) Clearances for horizontal sliding doors not mounted within guides shall be as follows: with a minus  $\frac{1}{8}$ -inch tolerance —  $\frac{1}{2}$  inch between door and wall surfaces,  $\frac{3}{8}$  inch between door and floor structure, and  $\frac{1}{4}$  inch between the meeting edges of center-parting doors. A maximum lap of four inches of the door over the wall opening at sides and top shall be provided.

(k) Clearances for vertical sliding doors moving within guides shall be as follows: With a minus  $\frac{1}{8}$ -inch tolerance —  $\frac{1}{2}$  inch between door and wall surfaces along top and/or bottom door edges with guides mounted directly to the wall surface and  $\frac{3}{16}$  inch between meeting edges of bi-parting doors or  $\frac{3}{16}$  inch between door and floor structure or sill.

(l) Clearances for passenger elevator sliding doors shall be as follows: With a minus  $\frac{1}{8}$ -inch tolerance,  $\frac{3}{8}$  inch between the door and wall surface or jambs,  $\frac{3}{8}$  inch between the bottom edge of the door and the sill,  $\frac{3}{8}$  inch between multisection door panels. Multisection door panels shall overlap  $\frac{3}{4}$  inch. Door panels shall lap the wall opening  $\frac{3}{4}$  inch at sides and top.

## CONDUCT OF TESTS

### Time of Testing

7. Masonry settings shall be allowed to dry at least 3 days before tests are made.

### Fire Endurance Test

8. (a) The pressure in the furnace chamber shall be maintained as nearly equal to the atmospheric pressure as possible.

(b) The test shall be continued until the exposure period of the desired classification or rating is reached unless the con-

ditions of acceptance set forth in Section 11 are exceeded in a shorter period.

### Hose Stream Test

9. (a) Immediately following the fire endurance test, the test assembly shall be subjected to the impact, erosion, and cooling effects of a hose stream directed first at the middle and then at all parts of the exposed surface, changes in direction being made slowly.

(b) The hose stream shall be delivered through a 2½-inch hose discharging through a National Standard Playpipe of corresponding size equipped with a 1⅛-inch discharge tip of the standard-taper smooth-bore pattern without shoulder at the orifice. The water pressure at the base of the nozzle and duration of application in seconds per square foot of exposed area shall be as prescribed in Table I.

(c) The tip of the nozzle shall be located 20 feet from and on a line normal to the center of the test door. If impossible to be so located, the nozzle may be on a line deviating not to exceed 30 degrees from the line normal to the center of the test

**TABLE I. — WATER PRESSURE AT BASE OF NOZZLE  
AND DURATION OF APPLICATION.**

<i>Desired Rating</i>	<i>Water Pressure at Base of Nozzle, pounds per square inch</i>	<i>Duration of Application, Seconds per Square Foot of Exposed Area</i>
3 hour . . . . .	45	3.0
1½ hour and over, if less than 3 hour . . . . .	30	1.5
1 hour and over, if less than 1½ hour . . . . .	30	0.9
Less than 1 hour . . . . .	30	0.6

door. When so located the distance from the center shall be less than 20 feet by an amount equal to 1 foot for each 10 degrees of deviation from the normal.

### Report

10. Results shall be reported in accordance with the performance in the tests prescribed in these test methods. The report shall show the performance under the desired exposure period chosen from the following: 20 minute, 30 minute, ¾ hour, 1 hour, 1½ hour, or 3 hour. The report shall include the tem-

perature measurements of the furnace and, if determined, of the unexposed side of the test assembly. It shall also contain a record of all observations having a bearing on the performance of the test assembly. The materials and construction of the door and frame, and the details of the installation, hardware, hangers, guides, trim, finish, and clearance or lap shall also be recorded in the report.

## CONDITIONS OF ACCEPTANCE

### General

11. (a) The test assembly shall have withstood the fire endurance test and the hose stream test without developing openings anywhere through the assembly; except that dislodging of small fragments from the central area of the glass light shall be disregarded. The edges of the individual glass light shall remain in place.

(b) No flaming shall occur on the unexposed surface of a door assembly during the first 30 minutes of the classification period.

(c) After 30 minutes, some intermittent light flames (approximately six inches long), for periods not exceeding five-minute intervals, may occur along the edges of doors.

(d) Light flaming may occur during the last 15 minutes of the classification period on the unexposed surface area of the door, provided it is contained within a distance of  $1\frac{1}{2}$  inches from a vertical door edge and within three inches from the top edge of the door and within three inches from the top edge of the frame of a vision panel.

(e) When hardware is to be evaluated for use on fire doors, it shall hold the door closed in accordance with the conditions of acceptance for an exposure period of three hours and, in addition, the latch bolt shall remain projected and shall be intact after the test. The hardware need not be operable after test.

### Swinging Doors

(f) The movement of swinging doors shall not result in any portion of the edges adjacent to the door frame moving from the original position in a direction perpendicular to the plane of the door more than the thickness of the door during the first half of the classification period, nor more than  $2\frac{7}{8}$  inches during the entire classification period or as a result of the hose stream test.

(g) The movement of swinging doors mounted in pairs shall not result in any portion of the meeting edges moving more than the thickness of the door away from the adjacent door edge in a direction perpendicular to the plane of the doors during the entire classification period or as a result of the hose stream test.

(h) An assembly consisting of a pair of swinging doors incorporating an astragal shall not separate in a direction parallel to the plane of the doors more than  $\frac{3}{4}$  inch nor a distance equal to the throw of the latch bolt along the meeting edges.

(i) An assembly consisting of a pair of swinging doors, without an overlapping astragal, for a fire and hose stream exposure of  $1\frac{1}{2}$  hours or less, shall not separate along the meeting edges more than  $\frac{3}{8}$  inch, including the initial clearance between doors.

(j) An assembly consisting of a single swinging door shall not separate more than  $\frac{1}{2}$  inch at the latch location.

(k) Door frames to be evaluated with doors shall remain securely fastened to the wall on all sides and shall not permit through openings between frame and doors or between frame and adjacent wall.

## Sliding Doors

(l) Doors mounted on the face of the wall shall not move from the wall sufficiently to develop a separation of more than  $2\frac{7}{8}$  inches during the entire classification period or as a result of the hose stream test.

(m) Doors mounted in guides shall not release from the guides, and the guides shall not loosen from fastenings.

(n) The bottom bar of rolling steel doors shall not separate from the floor structure more than  $\frac{3}{4}$  inch during the entire classification period or as a result of the hose stream test.

(o) The meeting edge of center-parting horizontal sliding doors and bi-parting vertical sliding doors shall not separate more than the door thickness in a direction perpendicular to the plane of the doors.

(p) The meeting edges of center-parting horizontal sliding doors and bi-parting vertical sliding doors without an overlapping astragal, for a fire and hose stream exposure of  $1\frac{1}{2}$  hours or less, shall not separate in a direction parallel to the plane of the doors

more than  $\frac{3}{8}$  inch along the meeting edges, including the initial clearance between doors.

(q) The meeting edges of center-parting horizontal sliding doors incorporating an astragal shall not separate in a direction parallel to the plane of the doors more than  $\frac{3}{4}$  inch nor a distance equal to the throw of the latch bolt along the meeting edges.

(r) The bottom edge of service-counter doors or single-slide dumbwaiter doors shall not separate from the sill more than  $\frac{3}{8}$  inch.

(s) A resilient astragal, if provided, shall not deteriorate sufficiently to result in through openings during the fire endurance test, but small portions may be dislodged during the hose stream test.

(t) The lap edges of passenger-elevator doors, including the lap edges of multisection doors, shall not move from the wall or adjacent panel surfaces sufficiently to develop a separation of more than  $2\frac{7}{8}$  inches during the entire classification period or as a result of the hose stream test.

(u) The meeting edges of center-parting passenger-elevator door assemblies, for a fire and hose stream exposure of  $1\frac{1}{2}$  hours or less, shall not move apart more than  $1\frac{1}{4}$  inches as measured in any horizontal plane during the entire classification period or as a result of the hose stream test.