



Standard Test Method for Fire Tests of Marine Joiner Doors¹

This standard is issued under the fixed designation F 1384; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method for fire tests covers marine joiner door assemblies of various materials and types of construction for use in bulkhead openings to retard the passage of fire.

1.2 Tests made in conformity with this test method will register performance during the test exposure; but such tests shall not be construed as determining suitability for use after exposure to fire.

1.3 Tests made in conformity with this test method will develop a set of data to assist regulatory agencies to determine the suitability of joiner door assemblies for use in locations where fire resistance is required.

1.4 *This test method should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this practice may be used as elements of a fire risk assessment that takes into account all of the factors that are pertinent to an assessment of the fire hazard of a particular end use.*

1.5 The values stated in SI units are to be regarded as the standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 119 Method for Fire Tests of Building Construction and Materials²

E 152 Methods for Fire Test of Door Assemblies²

2.2 IMO Resolution:

A.517(13) Recommendation on Fire Test Procedures for “A,” “B” and “F” Class Divisions³

¹ This test method is under the jurisdiction of ASTM Committee F-25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.03 on Outfitting.

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² *Annual Book of ASTM Standards*, Vol 04.07.

³ Available from IMO Publications Section; 4 Albert Embankment; London SE1 7SR, England.

3. Significance and Use

3.1 This test method provides data to evaluate the ability of a door assembly to remain in an opening during a predetermined test exposure. This test method also provides data to evaluate the ability of a door assembly to limit the temperature rise on the unexposed face.

3.2 This test method exposes a door assembly to a standard fire exposure controlled to achieve specified temperatures throughout a specified time period followed by the application of a specified standard fire hose stream (see Methods E 119 and E 152). The exposure, however, may not be representative of all fire conditions, that may vary with changes in the amount, nature, and distribution of fire loading, ventilation, compartment size and configuration, and heat sink characteristics of the compartment. It does, however, provide a relative measure of fire performance of door assemblies under these specified fire exposure conditions.

3.3 Any variation from the construction or conditions that are tested may substantially change the performance characteristics of the assembly.

3.4 This test method does not provide the following:

3.4.1 Full information as to performance of all door assemblies in bulkheads constructed of materials other than that tested,

3.4.2 Evaluation of the extent to which the door assembly contributes to the fire hazard by generation of smoke, toxic gases, or other products of combustion,

3.4.3 A limit on the number of openings allowed in glazed areas or of the number and size of lateral openings between the door and frame, and

3.4.4 Measurement of the degree of control or limitation of the passage of smoke or products of combustion through the door assembly.

4. Time Temperature Curve

4.1 The furnace temperature rise shall be continuously controlled so as to follow the standard time-temperature curve within the limits specified in 4.2.

4.2 The standard time-temperature curve is defined by a smooth curve drawn through the following points measured above the initial furnace temperature:

At the end of the first

5 min
10 min

556°C
659°C

15 min	718°C
30 min	821°C
60 min	925°C
90 min	978°C
120 min	1010°C

4.3 The accuracy of the furnace control shall be as follows:

4.3.1 During the first 10 min of the test, the area under the curve of mean furnace temperature shall not vary by more than $\pm 15\%$ of the area under the standard curve.

4.3.2 During the first half hour of the test, the area under the curve of mean furnace temperature shall not vary by more than $\pm 10\%$ of the area under the standard curve.

4.3.3 For any period after the first half hour of the test, the area under the curve of mean furnace temperature shall not vary by more than $\pm 5\%$ of the area under the standard curve.

4.3.4 At any time after the first 10 min of the test, the mean furnace temperature shall not differ from the standard curve by more than $\pm 100^\circ\text{C}$.

5. Furnace Temperature

5.1 In the case of a specimen area size of 4.65 m^2 , the furnace temperature should be determined by means of four thermocouples of not less than 0.75-mm diameter and not more than 1.5-mm diameter. For specimens larger than 4.65 m^2 , thermocouples should be provided in the proportion one per 1.25 m^2 of the specimen area. Specimen area refers to the entire bulkhead construction with the door and frame fitted. Thermocouples should be uniformly disposed over the specimen area with a spacing between the thermocouples in the horizontal and vertical plane, within the range from 0.75 to 1.25 m.

5.2 The thermocouples shall be arranged with each hot junction at such a position that an arc of 100-mm radius described from that junction meets the exposed face of the specimen or any projection. The hot junctions of the thermocouples shall not be located at positions within the furnace where they are subject to direct flame impingement.

5.3 The hot junction of the thermocouples may be formed by welding or crimping the ends of the wires. The crimping should be done by using a crimping tip as shown in Fig. 1.

5.4 Other types of thermocouples may also be used to control the furnace temperature. In all cases the response time characteristics of the thermocouples should not be inferior to that provided by a crimped tip thermocouple having a mass of 0.38 g.

5.5 The wires shall be insulated from each other by ceramic insulators or similar material of not more than 10-mm diameter, and the hot junction shall project 25 mm from the end of the insulators. The insulated wires shall be housed and supported in suitable heat resisting steel tubes (for example, "Inconel" or chromite) and arranged so that the ceramic or similar insulated portion projects 75 mm. The steel tubes shall be sealed and packed with a high temperature insulant or fire clay. A sketch of a thermocouple is shown in Fig. 2.

5.6 Provision should be made for the steel tubes to be movable in order that the 100-mm spacing may be maintained between the hot junctions of the thermocouples and the test specimen where distortion of the specimen occurs.

5.7 The thermocouple wire should be either continuous to

DIAMETER OF THERMOCOUPLE WIRE (MM)	DIMENSIONS OF CRIMPING TIP (MM)			MASS OF CRIMPING TIP (G)
	LENGTH	WIDTH "A"	WIDTH "B"	
0.75 TO 0.8	2	3	2	0.15
1.3	3	6	4	0.38

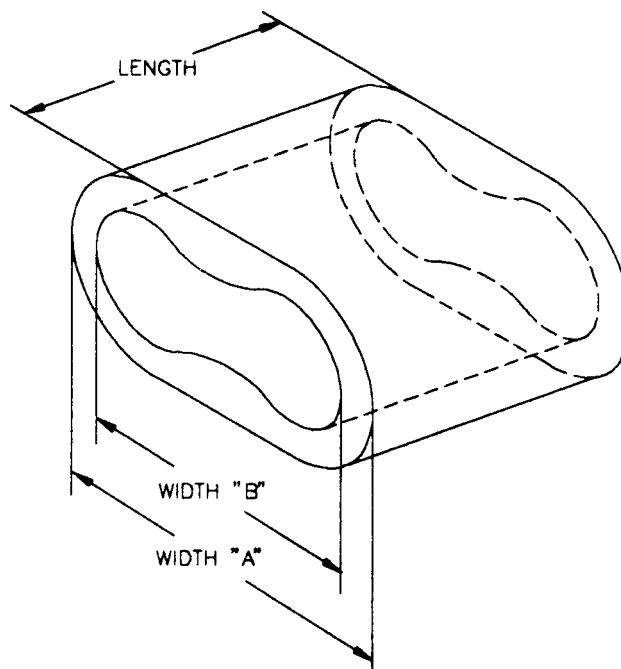


FIG. 1 Detail of Crimping Tip to be Used for Fabricating Thermocouple Hot Junctions

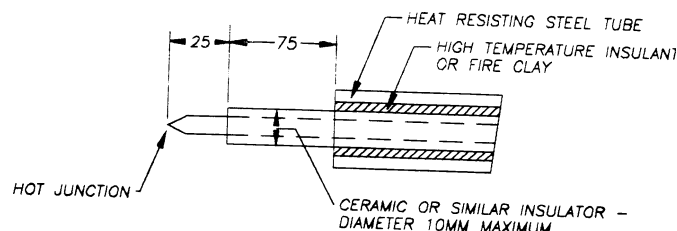


FIG. 2 Details of Thermocouples for Measuring Furnace Temperatures

the recording instrument or suitable compensating wire should be used with all junctions maintained as near as possible at ambient temperature conditions.

6. Furnace Pressure

6.1 An overpressure shall exist in the furnace during the duration of the test, except during the first 5 min of the test when the pressure may not be within the limit set by 6.2.

6.2 The overpressure shall be $10 \pm 2\text{ Pa}$ at a height equal to three-fourths the height of the door (see IMO A.517(13)). A positive pressure shall exist over two thirds of the door height. See Fig. 3.

7. Unexposed Surface Temperature

7.1 Construction of Thermocouples (see Fig. 4):

7.1.1 Each thermocouple shall be of 0.5-mm diameter wires.