



Designation: **E69–02 (Reapproved 2007) E69 – 15**

## Standard Test Method for Combustible Properties of Treated Wood by the Fire-Tube Apparatus<sup>1</sup>

This standard is issued under the fixed designation E69; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers fire-tube test procedures for fire tests for combustible properties of wood treated to reduce flammability. This test method relates to properties of treated wood, as such, rather than to the performance of a fabrication used as an element of construction. Performance under this test method shall be as prescribed in requirements applicable to materials intended for specific uses.

1.2 This test method is a fire-test-response standard.

1.3 The SI values given in parentheses are provided for information purposes only.

1.4 ~~This standard 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 test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use. This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products, or assemblies under actual fire conditions.~~

1.5 ~~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.~~

1.6 ~~Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.~~

### 2. Referenced Documents

- 2.1 *ASTM Standards*:<sup>2</sup>
- D9 Terminology Relating to Wood and Wood-Based Products
  - E176 Terminology of Fire Standards

### 3. Terminology

3.1 *Definitions*—For definitions of terms found in this test method, refer to Terminologies D9 and E176.

### 4. Significance and Use

4.1 The purpose of this test method is to provide a relative measurement of the combustibility of fire-retardant-treated wood specimens based on their percentage loss in weight under controlled fire exposure conditions (1).<sup>3</sup> In addition, other possible data include rate of weight loss, time of flaming and afterglowing, increase in temperature, and maximum vertical flame progress.

4.2 This test method is not sufficiently large scale to evaluate the suitability of a given treated product for building construction, but it is a convenient method to use for purposes of development or as a quality-control test during manufacture.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.07 on Fire Performance of Wood. Current edition approved April 1, 2007; Dec. 1, 2015. Published April 2007; February 2016. Originally approved in 1946. Last previous edition approved in 2002 as E69–02-E69–02 (2007). DOI: 10.1520/E0069-02R07.10.1520/E0069-15.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The boldface numbers in parentheses refer to the list of references at the end of this test method.

4.3 This test method gives a procedure for sampling and preparation of test specimens from a lot of treated material in which complete penetration is a requirement. A procedure is also given for the sampling of charges at a treating plant for purposes of quality control of the treatment process.

4.4 This test method has proven useful for evaluating comparative fire performance effectiveness of fire-retardant chemicals and treatment formulations for wood and wood products (2-5).

4.5 In this test method, the specimens are subjected to one or more specific sets of laboratory test conditions. If different test conditions are substituted or the anticipated end-use conditions are changed, it may not be possible by or from this test method to predict changes in the fire-test-response characteristics measured. Therefore, the results are valid only for the fire test exposure conditions described in this procedure.

**5. Apparatus**

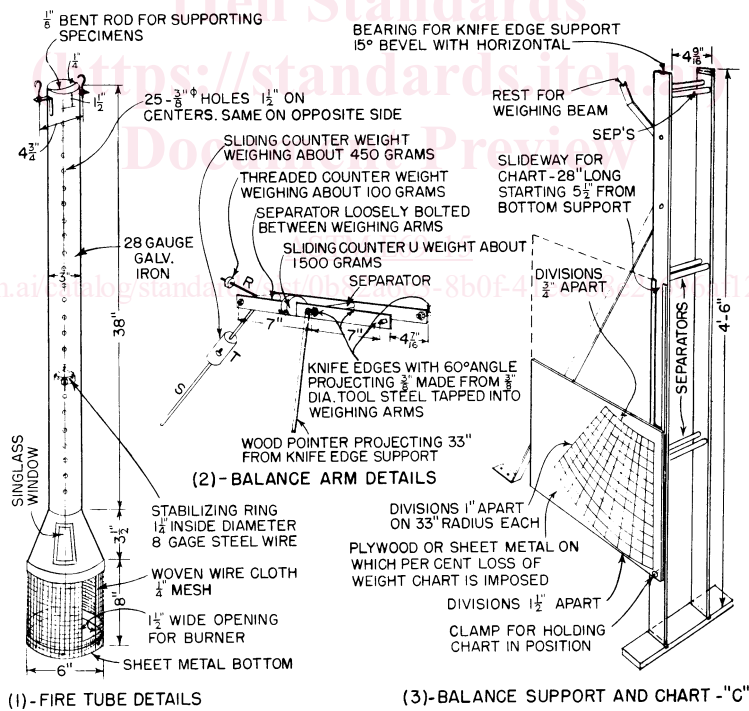
5.1 The apparatus for conducting the fire-tube test shall consist of the fire-tube assembly and accessory equipment as follows:

5.1.1 *Fire-Tube Assembly*—A specially constructed balance designed to indicate directly the percentage loss of weight suffered by the test specimen when exposed to a standardized flame for a given duration. Essential construction details of the apparatus assembly are shown in Fig. 1 and Fig. 2.

5.1.2 *Igniting Burner*—The igniting burner is to be of the low-form (curved-stem) bunsen type, having an inside tube diameter of 3/8 in. (9.5 mm) and attached to a ring-stand support. The igniting burner shall be provided with a device to maintain a constant gas flow, as described in 5.1.2.1 and the flame calibration, as required by 9.4.

5.1.2.1 *Gas Flow Device*—Typical devices utilized to control gas flow are manometers, pressure regulators or gas flowmeters with a rating of 0 to 5 SCFH (0 to 142 L/h). A gas flowmeter is desirable since they are readily available, very accurate, and inexpensive.

5.1.3 *Temperature-Indicating Apparatus*—A thermometer or thermocouple equipment that will indicate temperatures up to 1000°F (538°C).



**FIG. 1 Construction Details of Fire-Tube Apparatus**

Inch-Pound Units	SI Units
1/8 in.	3 mm
1/4 in.	6 mm
3/8 in.	9.5 mm
1/2 in.	19 mm
1 in.	25 mm
1 1/4 in.	31.7 mm
1 1/2 in.	38 mm
3 in.	76 mm
3 1/2 in.	89 mm
4 1/8 in.	113 mm

Inch-Pound Units	SI Units
4 1/16 in.	116 mm
4 1/4 in.	121 mm
5 1/2 in.	140 mm
6 in.	152 mm
8 in.	203 mm
28 in.	711 mm
33 in.	838 mm
38 in.	965 mm
4 ft 6 in.	1.35 m

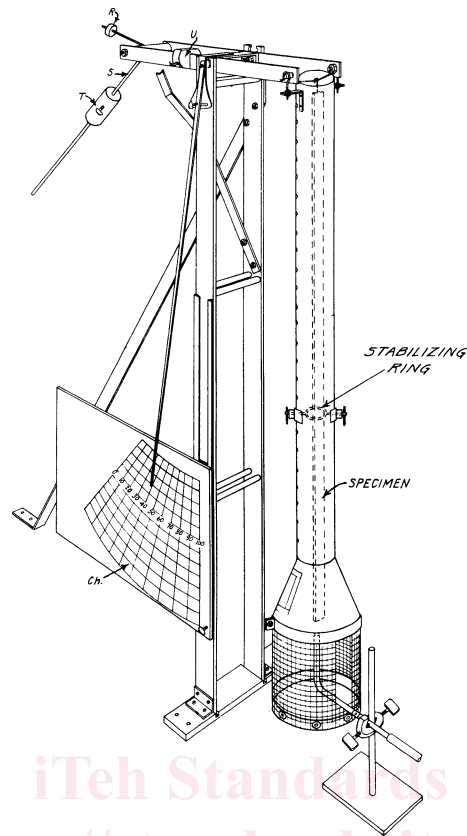


FIG. 2 Assembly of Fire-Tube Apparatus for Procedure A

5.1.4 *Timer*—A timing device capable of being read to minutes and seconds.

5.1.5 *Balance*—A balance with readability of 0.1 g and suitable for weighing test specimens and moisture-content samples.

5.1.6 *Oven*—A suitable thermostatically controlled oven for moisture-content determinations.

## 6. Sampling and Test Specimens for Wood Impregnated Throughout Entire Section

6.1 For interior trim or other lumber requiring penetration of treating solution throughout the section (but not for wood given incomplete penetration), the test specimens shall be prepared as follows:

6.1.1 At least one sample shall be taken from the lot for each 5000 bd ft or fraction thereof. Different species, and pieces of the same species with widely different thicknesses, shall be considered as separate lots and sampled accordingly. The samples shall be selected so as to include material from different sections of a finished unit or different lengths of finished trim, or to include variations such as heartwood or sapwood, rate of growth, density, and other visible nonuniformities. Samples shall be cut not closer than 2 ft (0.6 m) from the ends of treated boards.

6.1.2 Not less than five tests shall be made from each sample, except that where the quantity is less than 2000 bd ft the number of tests shall be left to the discretion of the testing authority but shall be not less than two.

6.1.3 The standard specimens cut from the selected samples shall be  $\frac{3}{8}$  by  $\frac{3}{4}$  in. (9.5 by 19 mm) in cross section by 40 in. (1016 mm) in length, with surfaces smooth-sawed to dimensions within  $\pm \frac{1}{32}$  in. (0.8 mm). Each test specimen shall consist of one piece sawed the full 40-in. length or shall be made up of several shorter pieces joined at squared ends with six small wire staples at each joint to give a combined length of 40 in.

6.1.4 From samples taken from boards having thicknesses of  $\frac{3}{4}$  in. (19 mm) or more, the specimen shall be prepared by cutting  $\frac{3}{8}$  by  $\frac{3}{4}$ -in. (9.5 by 19-mm) pieces longitudinally, not nearer than  $\frac{3}{8}$  in. from the edge of the sample, and so that the face of the sample appears as one, or both, of the  $\frac{3}{8}$ -in. edges of the specimen; provided, however, that if the thickness of the sample exceeds 1½ in. (38 mm) an additional test specimen shall be cut from the center of the piece with the  $\frac{3}{8}$ -in. edge parallel to the edge of the sample.

6.1.5 From samples taken from boards having thicknesses of  $\frac{3}{8}$  in. (9.5 mm) or more but less than  $\frac{3}{4}$  in. (19 mm), the specimen shall be prepared by cutting  $\frac{3}{8}$  by  $\frac{3}{4}$ -in. pieces longitudinally not nearer than  $\frac{3}{8}$  in. from the edge of the same and so that the face of the sample appears as one, or both, of the  $\frac{3}{4}$ -in. faces of the specimen.