



# Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members<sup>1</sup>

This standard is issued under the fixed designation E760; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers a procedure for determining the effect of impact loading on the bonding of sprayed fire-resistive material (SFRM) applied to the underside of steel floor deck. These materials include sprayed fibrous and cementitious materials applied directly in contact with the structural members. The test method is applicable only to laboratory procedures.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.3 *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:<sup>2</sup>

[E84 Test Method for Surface Burning Characteristics of Building Materials](#)

[E119 Test Methods for Fire Tests of Building Construction and Materials](#)

[E605 Test Methods for Thickness and Density of Sprayed Fire-Resistive Material \(SFRM\) Applied to Structural Members](#)

[E695 Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.21 on Serviceability.

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

## 3. Summary of Test Method

3.1 In this test method, a cellular steel deck with a concrete topping sprayed with fire-resistive material is subjected to a leather bag drop impact while supported horizontally at its ends.

## 4. Significance and Use

4.1 The intent of this test method is to determine a property of SFRM that may be used to provide an indication of its in-place serviceability. Satisfactory performance of SFRM applied to structural members and assemblies depends upon its ability to withstand the various influences that may occur during construction and during the life of the structure, as well as upon its satisfactory performance under fire conditions.

4.2 The test method measures the behavior of SFRM when the floor construction to which it is applied is subjected to shock loading and evaluates adhesion and resistance to spalling, cracking, and delamination. It is an indication of the ability of SFRM to remain in place and resist removal during anticipated service conditions.

## 5. Apparatus

5.1 *Supports*—Rigid base to provide at least 50 mm (2 in.) bearing and a clear span between supports of at least 3 m (10 ft).

5.2 *Impact Instrument*—A lead shot- or steel shot-filled leather bag weighing 27.2 kg (60 lb) and equipped with a leather hoisting strap, both as described in Method E695.

5.3 *Rule*—To measure the height of drop (1.2 m (4 ft)) with an accuracy of 12.8 mm ( $\frac{1}{2}$  in.).

## 6. Materials

6.1 The test specimen shall be a deck assembly consisting of cellular steel deck and a concrete topping. The cellular steel deck shall be of the noncomposite type, nominal 40 mm ( $1\frac{1}{2}$  in.) deep, 600 mm (24 in.) wide, by 3600 mm (12 ft) long, consisting of a 1.5-mm (0.060-in.) thick galvanized or painted

steel fluted top section and 1.2-mm (0.048-in.) galvanized steel flat bottom section welded together to form four cells 150 mm (6 in.) on center.

6.2 The concrete shall be nominal 20 MPa (3000 psi), and 64 mm (2½ in.) deep as measured from the top plane to the steel decking.

6.3 This test method requires the application of SFRM in accordance with manufacturers' published instructions. The apparatus, materials, and procedures used to apply the SFRM for this test shall be representative of application in the field.

6.4 The density of the prepared sample shall be similar to the density tested and reported during the Test Methods **E119** and Test Method **E84** fire exposure tests or as required by the sponsor of the test.

6.5 Determine the density and thickness of each of the laboratory-prepared specimens. Report in accordance with Test Methods **E605**.

## 7. Test Specimen

### 7.1 Laboratory Tests:

7.1.1 Apply the SFRM to the underside of the steel deck no sooner than seven days after the concrete has been placed. Do not apply the SFRM to the area 330 mm (13 in.) in from each end of the specimen, in order to permit the steel deck to bear directly on the supports.

7.1.2 Condition the prepared specimen for a period of not less than one week at ambient temperature and humidity conditions (not less than 4.4°C (40°F)).

7.1.3 Condition the specimen for a period sufficient to be considered dry in accordance with the manufacturers' recommendation.

## 8. Procedure

8.1 Place the specimen on the test supports with the SFRM as the lower surface and the concrete as the upper surface.

8.2 Hoist the bag to a height of 1.2 m (4 ft) as measured from the upper face of the specimen to the bottom of the bag.

8.3 Apply an impact load once to the middle of the upper face of the specimen by dropping the leather bag.

## 9. Report

9.1 Report the following information:

9.1.1 A complete description of the overall specimen, including the final physical condition and appearance of the SFRM after impact,

9.1.2 Any spalling, delamination, cracking, and

9.1.3 Thickness in millimetres (or inches) and the density of the SFRM in kilograms per cubic metre (or pounds per cubic foot).

## 10. Precision and Bias

10.1 No statement is made about either precision or bias of this test method since the results merely describe qualitatively the physical condition of the test specimen after exposure to the specified procedure.

## 11. Keywords

11.1 impact loading; sprayed fire-resistive material; steel floor deck

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