Designation: E 759 – 92 (Reapproved 2000)

Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members[1]

This standard is issued under the fixed designation E 759; 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.

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 deflection on sprayed fire-resistive material (SFRM) applied to steel 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 *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 84 Test Method for Surface Burning Characteristics of Building Materials[2]

E 119 Test Methods for Fire Tests of Building Construction and Materials[2]

E 605 Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members[2]

3. Summary of Test Method

3.1 In this test method a cellular steel deck panel sprayed with fire-resistive material is subjected to bending by a vertical center load while supported horizontally at its ends.

4. Significance and Use

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

4.2 This test method measures the behavior of SFRM when subjected to deflection and evaluates such phenomena as spalling and delamination under bending stress. 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 3 m (10 ft).

5.2 *Bearing Block*— Approximately 50 mm (2 in.) wide, minimum 600 mm (24 in.) long bearing surface designed to distribute the load across the width of the specimen.

5.3 *Load*—Any form of weights or testing machine capable of applying a load normal to the test surface and of developing a deflection of $\frac{1}{120}$ of the clear span of the specimen.

5.4 *Deflection Gage*— A dial or digital micrometer graduated to 0.01 mm (0.001 in.).

6. Materials and Manufacture

6.1 The specimen shall consist of cellular steel deck nominal 40 mm (1½ in.) deep, 600 mm (24 in.) wide, by 3600 mm (12 ft) long, consisting of a 1.5-mm (0.060-in. (18 ga.)) thick galvanized steel fluted top section and a 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 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.

6.3 The density of the prepared sample shall be similar to the density tested and reported during the Test Methods E 84 and E 119 fire exposures or as required by the sponsor of the test.

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[1] 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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[2] *Annual Book of ASTM Standards*, Vol 04.07.

6.4 Determine the density and thickness of each of the laboratory-prepared specimens. Report in accordance with Test Methods E 605.

7. Test Specimen

7.1 Apply the SFRM to the underside of the steel deck at a minimum 19 mm (¾ in.) thickness. Do not apply the SFRM to the area 330 mm (13 in.) from each end of the specimen, in order to permit the steel deck to bear directly on the supports.

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

7.3 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.

8.2 To measure the deflection of the specimen, record the initial reading of the dial micrometer prior to the application of the load and record the deformation as the load is applied.

8.3 Apply a vertical center load to the upper face of the specimen by means of a bearing block to develop a deflection of 1⁄120 of the clear span, that is, 25 mm (1.0 in.).

9. Report

9.1 Report the following information:

9.1.1 Condition of the test specimen when it has deflected the required 1⁄120 the clear span,

9.1.2 Any spalling or delamination, and

9.1.3 Thickness of the SFRM in millimetres (or inches) and the density 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 deflection; sprayed cementitious; sprayed-fire-resistive materials (SFRM)