An Acceptable Standard

Two years in the making, iaWCC’s new standard for inspecting field applied sprayed fire protection materials makes consistency available

(Editor’s Note: Application is just as important as manufacture in the success of field applied sprayed fire protection materials. But until the iaWCC published its “Inspection Procedure For Field Applied Sprayed Fire Protection Materials,” there had been no acceptable industry standard on field inspection with consequent contradiction and confusion on requirements. The unheralded success of this standard—now in its third printing—dramatized the need for such a standard. In the interest of promoting a higher level of quality and performance in sprayed tire protection, CONSTRUCTION DIMENSIONS is reproducing the entire standard. Printed manuals, a necessity for any contractor seriously interested in high quality sprayed applications, are available from iaWCC, 1775 Church St., NW, Washington, D.C. 20036. Prices are: single copy, $2.75; 2-10 copies, $2.25; 11-24 copies, $1.75; 25-49 copies, $1.25; 50-over, $.75.)

1. SCOPE

1.1 The purpose of this inspection procedure shall be to provide methods by which field inspection of direct contact spray applied tire protection can be performed for physical characteristics.

1.2 The procedure provides means by which an inspector can determine whether the application of sprayed tire protection materials is being applied in accordance with the ASTM E 119 assemblies previously submitted for approval.

1.3 The procedure does not determine the acceptability of any particular sprayed material, but only describes procedures by which a particular field application can be field inspected.

2. APPLICATION

2.1 The field inspection procedure is applicable for inspection of applications of spray applied fire protection materials such as in ASTM Method E-119, ULC S-101, ULI 263 or NFPA 251 fire exposure test, submitted for the specific project approval. If adhesive, tamping, troweling, multiple coats, reinforcing, or other procedures were utilized in the fire test, the same procedures shall be followed on the job site.

2.2 The field inspection procedure shall be applicable to direct contact spray applied fire protection materials, classified as either “sprayed fiber” or “cementitious (cement and plaster) mixtures”.

2.3 Sprayed products shall be inspected and tested when applied to members such as beams, columns, floor systems and related components.

3. INSPECTION PROCEDURE

3.1 Types. Physical and visual test procedures are as follows:

A. Condition of substrates:

B. Thickness of application:

C. Density in pounds per cubic foot:

D. Bond strength — adhesion/cohesion:

E. Finished appearance:

F. Inspection of patching work:

3.2 Instructions. The authority named in paragraph 3.3 shall be guided by the instructions as specified in section 4, 5, and 6 in determining the acceptability of direct contact spray applied fire protection.

3.3 Inspection. The inspection of direct contact spray applied fire protection materials shall be made by an independent testing laboratory and/or inspection agency acceptable to the owner or his representative. Testing personnel shall be permitted to enter the premises to observe the progress and application of the sprayed material and review the records of the owner’s representatives, and perform their functions.

3.3.1 Qualifications. Personnel inspecting spray applied fire protection materials shall be trained in the application and capabilities of these products and be thoroughly familiar with the details of all procedures.

3.4 Material and Design. The following shall be performed:

A. The owner or his representative shall make available to the inspecting agency the accepted description of the ASTM E-119 tested design having sufficient fireproofing details for the purpose of inspection.

B. The testing and/or inspection agency shall determine that the fire protection material is identified and labeled by an accredited agency providing inspection and label service as the material used in the selected design.

3.4.1 Test Reports. The independent testing laboratory shall perform the specified tests and promptly report the findings simultaneously to the owner or his representative, the general contractor, and the fire protection contractor. The report shall be submitted no later than one week after each floor or 10,000 square feet is completed and at such time as the tested area is still available for ready correction of cited deficiencies.

4. METHOD OF TESTS

The following tests shall be based on random samplings and shall be initiated by the owner or his representative.
Substrate conditions shall be inspected before application. Other tests shall be performed as the application progresses.

4.1 Substrate Conditions Substrates to receive the sprayed fire protection material should be free of dirt, oil, grease, release agents, loose scale, loose paint and any extraneous material. Areas not in compliance shall be reported to the General Contractor for preparation, in accordance with material manufacturer’s specifications.

4.2 Thickness Determination Thickness of spray applied fire protection shall be determined by use of a thickness gauge as shown in Figure 1. The gauge consists of 1-1/8” (29 mm) diameter disc, a needle and a measuring rule.

The needle shall be extended beyond the disc and inserted into the material until the point reaches the substrate. The rule shall be moved so that the disc contacts the material surface. Enough pressure shall be exerted on the rule to compress the material surface to measure the average plane of the texture (average of crests and valleys). The gauge shall then be withdrawn to read the thickness in 1/16” increments as shown by the position of the sliding clip indicator.

Note: At the point of thickness location, if there is excessive irregularities in the surface texture, move the thickness gauge to the closest location representative of a more uniform surface. For materials not readily penetrated by the depth gauge, other approved acceptable measuring devices shall be used.

Fig. 1

4.2.1 Areas to be Measured for Thickness Areas or bays which comprise at least 25 per cent of each floor shall be selected from the contract drawings for testing as follows:

4.2.1.1 Thickness Measurement of Areas.

For the purpose of averaging measurements required in paragraphs 4.2.1.2 and 4.2.1.3, any measurement ¼” or more over the design thickness shall be recorded as the design thickness plus ¼”.

4.2.1.2 Floor Sections One out of every four bays or similar units shall be inspected, but in no case shall a bay or unit exceed 2500 square feet. Each bay or unit shall be divided into quarters. In each quarter a 12 inch square shall be laid out and a thickness measurement taken at each corner, averaged and reported as a single measurement. Where more than one thickness is required by design, a similar procedure shall be performed for each of the required thicknesses. The test report should clearly state the locations of thickness measurements and the values measured at each point.

4.2.1.3 Beams and Columns Measurements for thickness on beams and columns shall be done on those adjoining the bays, or similar units, as tested for floor thickness. Four sets of random measurements shall be taken for each bay or unit. Tests for beam thickness shall be made at nine locations around the member at the locations shown in Figure 2, or at comparable locations. For each beam or column tested, a 12” length shall be laid out at each location and thickness measurements taken at each end. The measurements shall be averaged and reported as a single measurement. For column measurements, there shall be three additional measurements taken on the unnumbered flange on Figure 2, and the average calculated on the 24 measurements. A sample data sheet is shown as Appendix A for beams.

Fig. 2

4.2.2 Criteria. The average thicknesses shall be equal to or be greater than the approved thickness.

4.3 Density Determination.

4.3.1 Sample for density determination shall be one for each 10,000 square feet of preselected floor area, but shall be no less than two per floor. The average of all individual densities per floor shall not be less than the design criteria.

4.3.2 Density Test Method

A. Mark off the size of specimen using a suitable template of known length and width.

B. Test area for thickness before removal following procedure described in paragraph 4.2. Area size shall be not less than 144 square inches (6” x 24” if possible). The average thickness shall be determined from 20 measurements symetrically taken.

C. Cut perimeter of test area to substrate for removal of sample.

D. Remove specimen from substrate without loss of materials.

4.3.2.1 Upon removal from the substrate, the density specimen shall be dried at 120° F. maximum to constant weight, usually 24 - 48 hours, but for a minimum of 24 hours. A scale with an accuracy of 1 gram shall be used.

(Continued on Page 54)
INSPECTION STANDARDS:

(Continued from Page 23)

4.3.2.2 Density Calculation. Density will be calculated in accordance with the following formula:

\[
\text{Density in lbs./cu. ft.} = \frac{W \times 1728}{l \times w \times t}
\]

A. Where \( W \) = weight of dry material in pounds.
\( l \) = length of specimen in inches.
\( w \) = width of specimen in inches.
\( t \) = average specimen thickness in inches.

B. Or: lbs./cu. ft. = \( \frac{W \times 12}{t} \) Provided a 144 square inch area is used.

Note: For conversion of grams to pounds, divide gram weight of sample by 453.6 to obtain pounds.

4.4 Bond Strength Criteria (Adhesion and Cohesion).

4.4.1 The horizontally in place applied sprayed tire protection material shall support not less than a 2 lb. weight for a duration of not less than 2 minutes in accordance with the following test procedure, unless a greater requirement is established by the manufacturer.

4.4.2 The test shall be conducted on thoroughly dried material from areas adjoining test section as used for thickness and density determinations and shall be one test for beams and one test for decks for each 10,000 square feet of floor area, but a minimum of two tests per floor. If the material is not thoroughly cured, artificial means of drying the material acceptable to the material manufacturer, shall be provided.

4.4.3 Method

A. Apparatus (see Fig. 3)

(1) A metal or plastic bottle cap, 3¼" in diameter and approximately ½" deep, weighing one ounce. A hook shall be attached at the centre by predrilling a 1/8" centre hole.

(2) A two-component adhesive system of urethane resin to form a rigid foam.

(3) A necessary weight.

(4) A 12" square template.

B. Method

(1) Place a 12 inch square template at the predetermined location and carefully cut through to the substrate.

(2) A sufficient quantity of two component urethane resin system shall be intimately mixed in the cap (with hook attached).

(3) The cap shall be immediately placed against the sprayed tire protection material being tested in the center of the square.

(4) The cap shall be held in place until the resin has completely foamed and has set sufficiently to become self supporting.

(5) After the foam becomes hard the weight shall be carefully engaged on the hook.

NOTES:

A. After a test, the adhered cap can be removed by carefully cutting the foam away from the fire protection material with a sharp knife or hacksaw blade.

B. Caps are available from laboratory supply houses or bottle suppliers.

C. The two-component urethane resin system is available from Insta-Foam Products Co., 2050 North Broadway, Joliet, Illinois 60435. Telephone: 815-726-6241.

Bond Strength Testing Apparatus

5. FINISHED APPEARANCE

5.1 Sprayed fire protection materials shall not, upon complete drying or cure, show any deep or wide cracks, voids, spalls, or any exposure of the substrate.

6. PATCHING

6.1 The owner or his representative shall insure that corrective measures have been applied to areas requiring respraying or patching where sprayed fire protection materials have been deliberately removed for testing, been damaged, or removed by other trades.

The inspection procedures described for applied sprayed fire protection materials are provided solely as guides for field inspection. The described procedures do not in any way determine the suitability or appropriateness of any application, and the procedures themselves, or the application of the procedures or compliance with the procedures shall not constitute any warranty, expressed or implied, of the performance characteristics of any sprayed fire protection materials for any purpose. The standards, guidelines, and assemblies referred to in the procedures are for reference only, and shall not constitute a recommendation for the use of any such standard, guideline, or assembly.
to be multiplied by the number of days of delay.

6. Corporate overhead computed as a daily rate is as follows: (A) Corporate billing divided by the total corporate billing (for entire period of subcontract including delay) times corporate overhead equals (B) corporate overhead attributable to contract divided by the total time of performance equals (C) daily rate times number of days of delay then equals corporate overhead attributable to delay.

These costs are recoverable for delays which occur without the fault or negligence of the subcontractor and beyond his control. If the delay results from a change, the subcontractor is also entitled to profit on his costs. These costs may also be recoverable against the payment bond furnished by the contractor if expressed as out-of-pocket costs and expenses for labor and material furnished and used by Wallter Ceiling, subcontractor, in performing his contractual obligations.