



NFCA 100 Standard Practice for the Application of Sprayed Fire-Resistive Material (SFRM)

1. Scope

This Standard Practice provides guidelines for the application of Sprayed Fire-Resistive Materials (SFRMs), both dry and wet types. The document covers the application procedures and safety issues relating to SFRMs, and the repair of areas after application. It also covers exclusions, qualifications and/or clarifications to be used by owners, construction managers, general contractors, architects and specifiers. Since product manufacturers may have code or regulatory approvals that have specific requirements relating to their product application, consultation with the manufacturer should occur regarding specific application procedures. The document is not intended to replace manufacturers application instructions.

2. Reference Documents

- 2.1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
- 2.2. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials
- 2.3. ASTM E605 Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
- 2.4. ASTM E736 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- 2.5. ASTM E759 Standard Test Method for Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members
- 2.6. ASTM E760 Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
- 2.7. ASTM E761 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- 2.8. ASTM E859 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
- 2.9. ASTM E937 Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
- 2.10. ASTM G21-96 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- 2.11. AWCI Technical Manual 12-A Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide
- 2.12. International Building Code Chapter 17

- 2.13. Legacy Building Codes that may be applicable to existing buildings:
 - 2.13.1. Southern Building Code – Section 1709
 - 2.13.2. BOCA National Building Code – Section 1705.12 and Table 602
 - 2.13.3. Uniform Building Code – Chapter 7 and Table 6A
- 2.14. NFCA 200 – Field Quality Assurance Procedure for Application of Sprayed Fire-Resistive Material (SFRM).

3. Terminology

- 3.1. Application: The act of applying Sprayed Fire-Resistive Material.
- 3.2. Sprayed Fire-Resistive Material (SFRM): Materials mixed with water that are sprayed onto structural members to provide passive fire-resistive protection of the members.

4. Summary of Practice

- 4.1. This document is for the purpose of aiding others to properly specify and apply SFRM.

5. Significance and Use

- 5.1. NFCA recommends this practice to be used by the material specifier, general contractor, construction manager, contractor, any individual, or group requiring information regarding the application of SFRM.
- 5.2. This practice is not intended to replace the manufacturers' specific application instructions.

6. Safety

- 6.1. Current Occupational Safety and Health Administration (OSHA), applicable local ordinances, or code regulations shall be followed at all times.
 - 6.1.1. Equipment shall have safety guards that meet applicable OSHA regulations in place. Grounded electrical connections shall be used.
 - 6.1.2. Protective Equipment: All persons in the application area shall wear protective equipment as required. Examples of equipment that may be needed are respirators, dust masks, coveralls, goggles or safety glasses and hard hats.
 - 6.1.3. Workmen shall not wear loose fitting clothing that could become caught in the machinery. Note, however, personnel actually spraying product may wear loose, long sleeve clothing for protection and comfort during application.
 - 6.1.4. Floors: The floors in the work area shall be kept free of obstructions, excessive moisture, waste materials, open penetrations or unprotected perimeters that would lead to unsafe conditions during application.

7. Materials

7.1. The SFRM shall be manufactured in accordance with the manufacturer's specifications and quality control procedures and/or specifications and procedures required by product approval agencies. The material shall be free of any contamination that could impair its application or performance.

8. Storage & Handling

8.1. All materials shall be delivered to the job site in clearly labeled, unopened bags. Labels shall include the manufacturer name, product name, production location, production date, approval agency product label, and quantity of product.

8.2. Materials with a shelf life shall be used within that period. Materials that have gone beyond their shelf life shall be removed from the job site, or manufacturer shall provide documentation and testing that the product is still usable for its original intended purpose.

8.3. Materials shall be kept dry and stored off the ground under cover until used.

9. Equipment

9.1. Equipment used for application shall be of a type recommended by the SFRM manufacturer. Equipment shall include, but is not limited to the following:

9.1.1. Pumping Equipment: Manufacturer's recommended pumping equipment shall be used for materials specified.

9.1.2. Metering Devices: Use only SFRM manufacturer recommended water-metering devices to ensure correct amounts of water use.

9.1.3. Booster Pumps: Use only SFRM manufacturer recommended water booster pumps to facilitate required flow rate.

9.1.4. Injection Pumps: Use only SFRM manufacturer recommended injection pumps to facilitate the correct amounts of setting materials required for the individual SFRM. Insulation glue pumps are not acceptable.

9.1.5. Accessories: Use only those types of hoses, nozzles, spray tips etc. recommended by product manufacturer.

10. Application Environment

- 10.1. A minimum ambient and substrate temperature of 40F (4 C) shall be maintained prior to, during, and a minimum of 24 hours after the application of the SFRM, unless otherwise recommended by the material manufacturer. If necessary for job progress, enclosures and heat shall be provided to maintain temperatures, and shall be the responsibility of the general contractor and/or construction manager.
- 10.2. In most instances, natural ventilation is sufficient. In enclosed areas, forced ventilation shall be introduced for curing and shall be the responsibility of the general contractor and/or the construction manager (section 13.2). A minimum of four complete air exchanges per hour is required.
- 10.3. Within the building, free and clear ingress/egress for movable scaffolds, from the floor line to the area to be fireproofed, is required. No installation that would restrict movement of scaffolds, personnel or equipment, or limit the uninterrupted application of fireproofing materials shall be permitted. Clutter, debris and/or items stored on the floor must be located where they will not interfere with application. Protection of these items is not the responsibility of the SFRM contractor.
- 10.4. Suitable room and space required for pump location, trailer setting, etc. shall be provided.
- 10.5. Sufficient egress for delivery of materials and proper spotting of delivery trailers shall be provided by the general contractor and/or construction manager, that will allow for an efficient drop-trailer condition at the project site.
- 10.6. Dedicated sources of sufficient electricity and water in close proximity to the staging area are required and are be the responsibility of the general contractor and/or the construction manager.
- 10.7. Protection and covering shall be limited to structural walls and floors. Other covering and protection shall be the responsibility of the designated trade or the general contractor and or construction manager.

11. Application

- 11.1. SFRM shall be applied by an experienced, manufacturer-approved or licensed, and preferably a NFCA Accredited Contractor.
- 11.2. Equipment, mixing, and applications shall be in accordance with SFRM manufacturers written specifications and application instructions.
- 11.3. Application shall not start until SFRM applicator inspects the substrates to receive protection and find them acceptable.

- 11.3.1 The substrates to receive application of fireproofing shall be satisfactory for direct spray application. Structural steel shall be free of primers/paint (other than those tested and found acceptable), oils, grease, loose mill scale, dirt, or other foreign substances that may impair proper adhesion. Steel decks shall be free of rolling compounds, lubricants or other foreign substances that may impair proper adhesion.
- 11.3.2 Prior to the application of fireproofing, clips, hangers, support sleeves, and other attachments required to penetrate the fireproofing shall be in place.
- 11.3.3 Ducts, piping, equipment, metal stud framing, non-load bearing concrete masonry unit (CMU) or other suspended material shall not be positioned until the fireproofing work is complete.
- 11.3.4 The application of the fireproofing to the underside of metal roof decks shall not commence until roofing is completely installed and tight, all penthouses are complete, all mechanical units have been placed, and after construction roof traffic has ceased.
- 11.3.5 When roof traffic is anticipated, as in the case of periodic maintenance, roofing pavers must be installed as a walkway to distribute loads.

11.4. An adhesive shall be used when required and as recommended by SFRM manufacturer.

12. Proper Spraying Techniques

- 12.1 Trained Sprayers: Sprayers shall follow the manufacturers recommended installation procedures, and follow the field quality assurance procedures stated in NFCA 200 – Field Quality Assurance Procedure for Application of SFRMs, to ensure the following:
 - 12.1.1. All required flutes, both long bay and short bay flutes, are filled to meet UL design listing;
 - 12.1.2. All minimum required densities are met during installation of the SFRM;
 - 12.1.3. All products are sprayed to obtain complete and consistent texture;
 - 12.1.4. Surface enhancing applications are installed as required by the SFRM manufacturer;
 - 12.1.5. Correct tolerances and thickness control are obtained through spot checks during installation and confirmed by a third-party independent inspection agency. (Note: Thickness gauges must be used during application);
 - 12.1.6. Correct thickness control is maintained for full and half-flange thickness applications.

13. Protection During Curing

- 13.1. SFRMs are susceptible to damage while they are curing. Precautions shall be taken to allow the materials to cure without physical abuse or damage during the cure period. Precautions shall be the sole responsibility of the contractor who caused the damage, the general contractor, or the construction manager.
- 13.2. Heating and ventilation shall be provided when needed for curing and shall be the responsibility of the general contractor and/or construction manager.
- 13.3. No construction roof traffic shall be allowed. Refer to sections 11.3.4. and 11.3.5. Any damage due to roof traffic shall be the responsibility of the general contractor and/or construction manager.

***Caution** – Roof traffic at any time after the SFRM is fully cured shall be avoided. Traffic, loading or impact can cause SFRM delamination from the roof deck underside. In cases of periodic roof maintenance traffic, roofing pavers may be utilized.*

- 13.4. Care shall be taken so that deflection or impact greater than the SFRM manufacturer's recommended limits do not occur. The maximum allowable steel deck deflection shall be determined in accordance with test method ASTM E759, and the effects of impact shall be determined in accordance with test method ASTM E760.

14. Patching

- 14.1. Patching: In areas where the SFRM has been removed, it shall be resprayed or patched with the same material, or with compatible material which maintains the projects approved UL designs and fire-resistance ratings.
- 14.2. The responsible party for damage shall be determined before the patching takes place.
- 14.3. All patching and repairing of fireproofing due to damage (intentional or unintentional) by others shall be completed by the manufacturer approved or licensed contractor, preferably a NFCA Accredited Contractor.

15. Specific Exclusions, Qualifications and Clarifications

The building owner, general contractor and/or construction manager shall provide the following conditions for application of the SFRM:

- 15.1. Power and water to the staging area;
- 15.2. Heat and weather protection as applicable for areas during application and during curing of SFRM;

- 15.3. Protection of surfaces other than structural walls and floors;
- 15.4. Method of payment for performing patching services prior to the commencement of patching;
- 15.5. Showing SFRM on the construction progress schedule (this is mandatory);
- 15.6. Clear and unobstructed access to areas and steel to receive SFRM is mandatory;
- 15.7. Proper construction site space to facilitate the delivery of materials and when necessary proper drop-trailer conditions, as well as the ability to remove empty trailers during the construction progress;
- 15.8. SFRM Inspection shall be continuous as SFRM is applied to each floor and prior to installation of rough mechanical, electrical, plumbing and ceiling construction. Communication of test results from inspection of applied materials to fireproofing contractor at the completion of each floor;

NOTE: According to the 2018 International Building Code, 1704.2.4, and prior versions, discrepancies are to be immediately communicated to the SFRM Application Contractor.

- 15.9. Removal of equipment and all exposed floor areas shall be left in a scraped-clean condition.



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