

## SECTION 07 8120

### CEMENTITIOUS FIREPROOFING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Work of this Section consists of spray applied fireproofing (SFRM), and includes but is not limited to the following:
  - 1. Application of SFRM to new steel framing and decking.
- B. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to the following:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and General Requirements, Division 01 Specification Sections.
  - 2. Section 07 9200 - JOINT SEALANTS.

##### 1.2 SYSTEM DESCRIPTION

- A. General System Description: Spray-applied fireproofing products shall be a mixture of gypsum and/or cement based materials, with lightweight aggregates to be mixed with water to form a slurry for conveyance and application.
  - 1. Compatibility Requirement: Cementitious fireproofing furnished in this Section shall be determined to be compatible with existing cementitious fireproofing.
  - 2. Fire Rating Requirement: Newly applied cementitious fireproofing shall be installed to match the fire ratings of existing cementitious fireproofing unless indicated otherwise.
- B. Fire-Resistance Ratings for New Construction:
  - 1. Floor structure above and below 1 hour rated Assembly spaces (floor assembly, supporting trusses, beams and columns): 1 hour rated
  - 2. Structure supporting stairs, elevator shafts, and mechanical shafts connecting more than 3 floors: 2 hour rated.
  - 3. Structure supporting mechanical shafts connecting 3 floors and less: 1 hour rated.

##### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use and limitations for each material used, and applicable fire test designs, as listed by approved fire testing organization.
- B. Shop Drawings: Structural framing plans indicating the following:
  - 1. Locations and types of surface preparations required before applying SFRM.
  - 2. Extent of SFRM for each construction and fire-resistance rating, including the following:
    - a. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
      - 1). For steel joist assemblies, include applicable fire-resistance design designations, with each steel joist tested with the same maximum tensile stress as each steel joist indicated on Drawings or as scheduled. Design designations with steel joists tested at lower maximum tensile stress than those indicated are not permitted.

- b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
- 3. Treatment of SFRM after application.
- C. Samples for Initial Selection: For each type of colored, exposed SFRM indicated.
- D. Samples for Verification: For each type of colored, exposed SFRM, two Samples, each 4 inches square, of each color, texture, and material formulation to be applied. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- E. Product Certificates: For each type of SFRM, signed by product manufacturer.
- F. Qualification Data: For Installer, manufacturer and professional engineer.
- G. Compatibility and Adhesion Test Reports: From SFRM manufacturer indicating the following:
  - 1. Materials have been tested for bond with substrates.
  - 2. Materials have been verified by SFRM manufacturer to be compatible with substrate primers and coatings.
  - 3. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for proposed SFRM.
- I. Research/Evaluation Reports: For SFRM.
- J. Warranties: Special warranties specified in this Section.

#### 1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer Qualifications: A firm experienced a minimum five (5) years in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
  - 2. Installer: Contractor shall be approved by manufacturer, and be experienced in installing specified products, and is approved by the manufacturer of the fireproofing products.
    - a. A manufacturer's willingness to sell products to an installer engaged by Contractor, does not in itself confer qualification on the buyer.
- B. Fire-Test-Response Characteristics: Provide SFRM with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify bags containing SFRM with appropriate markings of applicable testing and inspecting agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency acceptable to authorities having jurisdiction, for SFRM serving as direct-applied protection tested per ASTM E119.
  - 2. Surface-Burning Characteristics: ASTM E84.
- C. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy.

- D. Mockups: Apply mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Extent of Mockups: Approximately 100 sq. ft. of surface for each product indicated.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Source Limitations: Obtain spray applied fireproofing products from a single source for each product required. Provide secondary materials, which are acceptable to the fireproofing manufacturer which, are included in the tested and/or listed designs.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Manufactured materials shall be mill-mixed and shall be delivered in original, unopened packages bearing the name of the product, manufacturer's name, and the Underwriters' Laboratories, Inc. label.
- B. Materials shall be kept dry until ready for use, and shall be kept off the ground, under cover and away from sweating walls and other damp surfaces. Materials that have been exposed to water before actual use shall be discarded.

#### 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups of fireproofing.
- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
  - 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
  - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

#### 1.7 EXISTING CONDITIONS

- A. Ensure structure and surfaces to which sprayed fireproofing is applied is not enclosed and is open to view until application is reviewed.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply spray fireproofing when temperature of substrate materials and surrounding air is below 40 deg F. Maintain temperature 24 hours before and 24 hours after application of fireproofing.

#### 1.9 PROTECTION

- A. Provide ventilation in areas to receive fireproofing during and 24 hours after application, to properly dry material and maintain nontoxic, unpolluted safe working area.

- B. Protect adjacent surfaces and equipment from damage by overspray fall-out, and dusting. Mask adjacent work as required.
- C. Provide temporary enclosures to prevent spray from contaminating air.
- D. Close off and seal ductwork in areas where fireproofing is being applied.
- E. Protect applied sprayed fireproofing from damage.

#### 1.10 WARRANTY

- A. General Warranty: Submit a written warranty, executed by the Contractor and cosigned by the installer, agreeing to repair or replace sprayed fireproofing materials that fall within the specified warranty period.
  - 1. Failures include, but are not limited to cracking, flaking, eroding in excess of specified requirements, peeling and delaminating of sprayed fireproofing from substrates due to defective materials or installation.
  - 2. Not covered in this warranty are failures due to damage by others, such as occupants and Owner maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, excessive flexing of floor systems, and Work on said roof systems, and other causes not reasonable foreseeable under conditions of normal use.
- B. Warranty Period: Two (2) years, from date of Substantial Completion.

### PART 2 PRODUCTS

#### 2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS

- A. Sprayed-On Fireproofing, Concealed, Basis-of-Design: Provide Monokote MK-6 by Grace Construction Products Division, or approved equivalent by one of the following:
  - 1. Carboline Co.
  - 2. Isolatek International
  - 3. Architect acceptable equivalent

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Sprayed-On Fireproofing, Concealed: Provide cementitious spray applied fireproofing that is a mill-mixed cementitious blend of minerals and gypsum, Portland, or magnesium oxychloride cements, with the following properties:
  - 1. Compressive Strength: 35.2 lb./sq.in., minimum, when tested according to ASTM E761
  - 2. Bond Strength over Uncoated or Galvanized Steel: 200 lb./sq.ft., minimum, when tested according to ASTM E736
  - 3. Air Erosion: 0.025 gms/sq.ft., maximum, when tested according to ASTM E 859
  - 4. Deflection: No evidence of cracking or delamination, when tested according to ASTM E759
  - 5. Bond Impact: No evidence of cracking or delamination, when tested according to ASTM E760
  - 6. Dry Density: 14 lb./ft. minimum (applied), when tested according to ASTM E605
  - 7. Abrasion Resistance Methods: 22cm<sup>3</sup> abraded, maximum, when tested according to SFBBI Test
  - 8. Impact Penetration Methods: 6 cm<sup>3</sup> loss, maximum, when tested according to SFBBI Test
  - 9. Fireproofing material shall not be subject to losses from finished application by sifting, flaking, or dusting.
  - 10. Fireproofing shall not deform more than 10% under 500 lb./sq. ft. compressive forces in

accordance with ASTM E761.

11. Bare, shop-coated, and galvanized steel sheets with the fireproofing applied shall be kept at 90 + 3 deg F and 70 + 3% relative humidity for 240 hours without evidence of corrosion of steel, tested in accordance with ASTM E937.
  12. Fireproofing shall contain a mold inhibitor.
  13. Fireproofing shall contain a green-blue tint to distinguish new material from existing as approved by the Owner.
- B. Material shall be UL-listed.
- C. Manufactured materials shall be mill-mixed requiring only the addition of water at the job site.
- D. Water shall be clean, fresh, potable, from public mains, free of deleterious amounts of mineral or organic substances.
- E. Materials, procedures for application, dry densities, and thicknesses necessary to provide the required protection shall be approved by UL for the uses indicated. Submit certification by an independent Testing Laboratory acceptable to the Owner that materials, dry densities, thicknesses, and application procedures satisfy the requirements of the governing laws and building code, and UL requirements, with respect to the minimum protection requirements below when tested in accordance with ASTM E119.
- F. Fireproofing Performance: Structural steel members throughout the Project to receive fireproofing shall be protected under this Section with adequate fireproofing thicknesses and densities in accordance with UL Designs indicated.
- G. Thickness and Density: Thickness of fire protection material for each condition for the required fire resistance rating shall be according to manufacturer's data and UL requirements. Where required thickness is given as an average thickness the minimum thickness permitted shall be that given as average thickness. Acceptable minimum thickness of applied material shall be that measured at specified dry density.
- H. Fire ratings interpolated or extrapolated from actual test data will not be acceptable. Provide evidence prior to application that proposed materials, and installation methods and materials have been approved by all authorities having jurisdiction.

## 2.3 ACCESSORIES

- A. General: Provide the following materials as standard with each of the fireproofing systems, as recommended by the manufacturer for each condition and substrate.
- B. Primers: It is not recommended that structural steel primers are used on steel surfaces, unless tested and listed by UL in designs proposed to be used. Compatible primers may be used, providing the fireproofing manufacturer can verify such compatibility in accordance with UL requirements.
1. Adhesives: Provide adhesives as necessary, to comply with manufacturer requirements for adhesion of fireproofing.
- C. Reinforcements: Provide fiberglass mesh or wire lath for areas where adhesion is not compatible and for application of fireproofing to steel joists.
- D. Mold Inhibitor: Provide factory added mold inhibitor tested in accordance with ASTM G21 for areas such as hospitals, testing laboratories, health facilities and other areas of hygienic requirements.
- E. Top Coats: Use as required and recommended by fireproofing manufacturer or compatible

products.

- F. Water: Potable water shall be used for the application of spray-applied fire resistive materials.

## 2.4 SOURCE QUALITY CONTROL

- A. Factory Testing: Submit evidence that cementitious fireproofing has been tested per ASTM E119 by Underwriters Laboratories Inc. Include evidence that fire testing was sponsored by the manufacturer and that the material tested was produced at the manufacturer's facility under the supervision of Underwriters Laboratories Inc. personnel. Letters documenting classification status are not acceptable evidence of compliance with this Section.

## PART 3 EXECUTION

### 3.1 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fireproofing material when ambient or substrate temperatures are 40 deg F or lower, unless temporary heat and protection is provided to maintain temperatures at or above this level for twenty four (24) hours before, during and twenty four (24) hours after application of fireproofing.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing.
  - 1. Ventilation shall not be less than four (4) complete air exchanges per hour until spray-applied fireproofing is fully cured. When spraying in enclosed areas such as basements, stairwells, shafts and small rooms, additional air exchanges may be necessary.
- C. The Contractor shall make available to the fireproofing contractor suitable area(s) for permanent locations for mixing and pumping fireproofing. This site must be:
  - 1. Convenient to the structure
  - 2. Be able to accommodate delivery of product
  - 3. Allow for space for truck storage and trailer parking, and for materials and equipment
  - 4. Be well drained
  - 5. Be near a suitable source of potable water of quantity required
  - 6. Have a proper source of electrical power, if required.
  - 7. Provide temporary heat and ventilation to comply with manufacturers recommendations.
- D. Environmental Requirements
  - 1. Provide temporary weatherproof enclosure(s), with temporary heat, and ventilation to maintain favorable application conditions, as necessary to meet Construction Schedule.
- E. Sequencing: Sequence and coordinate application of sprayed fireproofing with other related Work specified in other Sections to comply with the following requirements:

### 3.2 EXAMINATION

- A. Carefully examine installation areas with Installer present, for compliance with requirements affecting Work performance.
  - 1. Verification of Conditions: Verify that field measurements, surfaces, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are as required by the manufacturer, and ready to receive Work.
  - 2. Test substrates to receive fireproofing as required by fireproofing manufacturer

3. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 SURFACE PREPARATION

- A. Examine all surfaces to which the sprayed-on fireproofing is to be applied, and notify Architect in writing of conditions detrimental to the proper and expeditious installation of fireproofing which cannot be corrected by normal cleaning of surfaces. Starting of work within an area shall be construed as acceptance of the conditions of that area.
- B. Thoroughly clean all surfaces to receive sprayed-on fireproofing, just prior to the application of the fireproofing, with hand tools, power tools, or solvent cleaning methods to eliminate mill scale, dirt, grim, oil, grease, dust, loose rust or paint, and all other foreign material which would prevent satisfactory bonding of fireproofing to steel.
- C. Application of fireproofing shall constitute acceptance of the suitability of the surface to receive this work by the fireproofing applicator.

### 3.4 TEMPERATURE AND VENTILATION

- A. Exterior openings in areas to be sprayed shall be covered during application with tarpaulins or similar closures to confine the overspray and dusting to within the Contract-Limit Lines.
- B. The surfaces to which fire protection material is to be applied as well as the ambient temperature during application for at least one week following application shall be at least 55oF. Relative humidity shall be low enough to assure proper drying of the applied material.
- C. Provide natural ventilation to properly dry all sprayed-on fireproofing during and after its application. In enclosed areas lacking openings for natural ventilation, circulate exterior air and exhaust it to the outside by use of temporary circulators and exhaust fans.

### 3.5 SAMPLE AREA

- A. Exposed To View, Sprayed-On Fireproofing: A sample area, not less than 200 sq.ft. of each type of exposed to view sprayed on fireproofing, comprising a typical fire protection installation, including steel deck, beams, columns, and other critical areas, shall be installed in location of the building selected by the Architect, for joint approval by the representative of the fireproofing material manufacturer and the Architect. Fireproofing in other areas shall not proceed until sample installation is approved. Approved sample installation shall remain in place and open to observation as a standard for all work under the Contract.

### 3.6 MIXING AND APPLICATION

- A. Mixing shall conform to manufacturer's published instructions.
- B. Materials and equipment shall be as approved by the materials manufacturer. Application shall be by licensed manufacturer's applicators. Procedures shall be in strict accordance with said manufacturer's directions and specifications. Only experienced, skilled mechanics approved by the materials manufacturer shall be allowed to place the materials. A qualified manufacturer's representative shall be present for initial application to guide and assist applicator's personnel.
- C. Work shall comply with applicable UL standards in addition to the requirements imposed by the applicable laws and codes, for the indicated ratings, including local pollution control regulations.
- D. Sprayed-on fireproofing shall be applied in the exact manner described in the certificates submitted to prove compliance with specified protection requirements. The fireproofing applicator shall be responsible for providing a controlled application of fireproofing material so that uniform

quality and thickness is maintained.

- E. After completion of fireproofing work, equipment shall be removed and all surrounding wall and floor areas cleaned of deposits of sprayed-on fireproofing materials. Where hangers and other surfaces not requiring fireproofing have been sprayed unavoidably, the sprayed material shall be removed and the surfaces made clean.

### 3.7 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Test and inspect as required by the IBC, 1704.10 and most recent supplements.
  - 2. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
  - 1. Thickness: Per ASTM E605.
  - 2. Density: Per ASTM E605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
  - 3. Bond: Per ASTM E736.
    - a. If surfaces of structural steel receiving SFRM are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. (7.2 kPa) minimum per ASTM E 736.
- C. Where sample fails to meet thickness, quality, or dry density requirements, further sampling and testing will be required in the area of the deficient sample. If such further testing indicates an area deficient in thickness, quality, or dry density, correction shall be made by application of additional material or removal of deficient material and replacement with satisfactory material.
- D. Patching: Areas from which samples have been removed shall be patched by applicator to provide the specified fire ratings.

### 3.8 CLEAN-UP

- A. Upon completion of each day's work, sweep clean the working area, placing waste material in suitable bags or containers, and remove from site.
- B. Upon completion of fireproofing work, clean walls, floors, and surrounding surfaces of overspray, drippings, etc.

### 3.9 SCHEDULES

- A. Provide fireproofing schedule listing construction locations, protection rating (in hours) and UL design references.

**END OF SECTION**