

SECTION 07 81 00
APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Sprayed fire resistive materials.
 2. Patching and repair of existing applied fireproofing.

1.2 ACTION SUBMITTALS

- A. Product Data: Technical data indicating component materials and dimensions and include construction and application details.
- B. Shop Drawings: Structural framing plans and schedules indicating:
1. Extent of fireproofing for each construction and fire resistance rating.
 2. Applicable fire resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 3. Minimum fireproofing thicknesses needed to achieve required fire resistance rating of each structural component and assembly.
 4. For existing applied fireproofing, indicate locations and types of surface preparations required before repairing applied fireproofing.
 5. Extent of sprayed fireproofing for each construction and fire resistance rating, including the following:
 - a. Applicable fire resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Minimum thickness necessary to achieve required fire resistance ratings of structural components and assemblies.
 6. Treatment of fireproofing after application.
- C. Samples: Submit for each exposed product and for each color and texture specified, 4 inches (102 mm) square in size.
- D. UL Design Numbers: Submit UL Design Numbers and required thickness and location for work.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Submit data for Installer.
- B. Product Certificates: Submit data for each type of fireproofing.

- C. Evaluation Reports: Submit ICC-ES reports for each type of fireproofing.
- D. Preconstruction Test Reports: Submit test report for fireproofing.
- E. Field quality control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity or individual having minimum 5 years documented experience, who is certified, licensed, or qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
 - 1. A manufacturer's willingness to sell its sprayed fire resistive materials to Contractor or installer engaged by Contractor does not in itself confer qualification on the buyer.
- B. Technical Representation: Engage manufacturer's technical representative at the site to supervise patching and repair of sprayed resistive fireproofing materials.
- C. Testing Laboratory Qualifications: Independent laboratory complying with ASTM E 699 and having experience and capability to conduct satisfactorily the testing indicated without delaying progress of the work.
- D. Source Limitations: Obtain fireproofing from single source.
- E. Mockups: Build mockups to verify selections, to establish quality standards for materials and execution, and for preconstruction testing.
 - 1. Build mockup of each type of fireproofing and different substrate and each required finish as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
 - 1. Bond/Adhesion 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.
 - 2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire resistance design, but not less than minimum specified.
 - 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.

G. Preinstallation Conference: Conduct conference at site.

1. Review products, design ratings, restrained and unrestrained conditions, densities, thickness, bond strengths, and other performance requirements.

1.5 COORDINATION

A. Sequence and coordinate application of sprayed fireproofing with other related work specified elsewhere to comply with the following requirements:

1. Provide temporary enclosure if necessary to confine spraying operations and protect the environment.
2. Avoid unnecessary exposure of fire resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
3. Do not apply fire resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire resistive material.
4. Do not apply fire resistive material to metal floor deck substrates until concrete topping has been completed.
5. Do not install enclosing or concealing construction until after fire resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in original, unopened packages with intact and legible manufacturer labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire resistance ratings applicable to project.
- B. Use materials with limited shelf life within period indicated. Remove from site and discard materials whose shelf life has expired. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from project site and discard wet or deteriorated materials.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 degrees F (7 degrees C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or forced air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire resistance design and manufacturer's written instructions.
- B. Fire Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- 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*.

2.2 SPRAYED FIRE RESISTIVE MATERIALS

- A. Sprayed Fire Resistive Material (SFRM): Factory mixed, Portland cement based, lightweight, medium density, wet formulation, complying with indicated fire resistance design, mixed with water at Project site to form a slurry or mortar before conveyance and spraying. Products conveyed in a dry state and mixed with atomized water at the nozzle or place of application are not permitted.
 - 1. Products: Subject to compliance with requirements, provide one of the products indicated below, mixed with water at site to form a slurry or mortar before conveyance and in applications complying with indicated fire resistance design on the Drawings:
 - a. Monokote Z106/HY by GCP Applied Technologies; Typical UL Assembly utilized, UL D925.
 - b. Pyrocrete 239 by Carboline Company; RPM International; Typical UL Assembly utilized, UL D
 - c. Type 7GP by Southwest Fireproofing Products Co. Typical UL Assembly utilized, UL D
 - d. Cafco 400 by Isolatek International; Typical UL Assembly utilized, UL D902.
 - 2. Substitutions are Not Permitted.
 - a. All SFRM materials shall be Portland cement based only. No fibrous or gypsum based products shall be permitted.
 - b. All SFRM materials shall be wet formulation only. No dry formulation products mixed at the hose nozzle or place of application shall be permitted.
 - 3. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
 - 4. General Properties: SFRM shall have the following beneficial properties:

- a. Durability: Increased durability for exposed applications and in environments of high traffic and resistance to physical abuse by impact and abrasion without deformation, flaking or spalling.
 - b. Moisture Resistant: Resistance to high humidity and condensation.
 5. Bond Strength: Minimum 2,000 psf cohesive and adhesive strength based on field testing according to ASTM E 736.
 6. Density: Not less than 22 lb/cu. ft. (350 kg/cu. m) and as specified in the approved fire-resistance design, according to ASTM E 605. .
 7. Thickness: As required for fire resistance design indicated, measured according to requirements of fire resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
 8. Combustion Characteristics: ASTM E 136.
 9. Surface Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame Spread Index: 10 or less.
 - b. Smoke Developed Index: 10 or less.
 10. Compressive Strength: Minimum 16,000 psf according to ASTM E 761.
 11. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
 12. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
 13. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
 14. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E 859.
 15. Fungal Resistance: Treat products with antimicrobial formulation to result in no growth on specimens per ASTM G 21.
 16. Sound Absorption: NRC of no less than 0.85 per 1/2 inch thickness.
 17. Finish: Spray textured finish.
 - a. Where topcoat is indicated provide skip troweled finish. Apply separate, colored, smooth topcoat after finishing in areas indicated.
 - 1) Topcoat Color: Selected by Architect.
- B. Auxiliary Materials: Provide auxiliary materials compatible with fireproofing and substrates and approved by UL in fire resistance designs indicated.
1. Substrate Primers: Primers approved by fireproofing manufacturer and complying with requirements:
 - a. Primer and substrate are identical to those tested in required fire resistance design by UL.
 - b. Primer bond strength in required fire resistance design complies with specified bond strength for fireproofing and with requirements in UL Fire Resistance Directory based on a series of bond tests according to ASTM E 736.
 2. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL Fire Resistance Directory.

3. Metal Lath: For applications requiring lath reinforcement, provide expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire resistance designs indicated and fireproofing manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.
 4. Reinforcing Fabric: For applications requiring fabric reinforcement, provide Glass fiber or carbon fiber fabric of type, weight, and form required to comply with fire resistance designs indicated; approved and provided by fireproofing manufacturer.
 5. Reinforcing Mesh: For applications requiring reinforcing mesh, provide metallic mesh reinforcement of type, weight, and form required to comply with fire resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
- C. Sealer: Transparent drying, tinted protective coating recommended in writing by fireproofing manufacturer for each fire resistance design.
- D. Topcoat: For applications requiring topcoat, provide products suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire resistance design.
1. Cement Based Topcoat: Factory mixed, cementitious hard coat formulation for trowel or spray application over SFRM.
 - a. Manufacturers: Subject to compliance with requirements, provide products by the SFRM manufacturer or one of the following recommended by the SFRM manufacturer:
 - 1) Carboline Company; a subsidiary of RPM International.
 - b. Water based topcoats not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for substrates and other conditions affecting performance of the work and according to each fire resistance design.
1. Verify substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 2. Verify objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 3. Verify substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or suspended construction that interferes with fireproofing application.
 4. Verify concrete work on steel deck is complete before beginning fireproofing work.
 5. Verify roof construction, installation of rooftop HVAC equipment, and related work are complete before beginning fireproofing work.

- B. Conduct bonding/adhesion, compatibility, and strength tests according to fireproofing manufacturer's written instructions to verify substrates are free of substances capable of interfering with bond.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the work.
- D. Proceed with installation after correcting unsatisfactory conditions

3.2 PREPARATION

- A. Cover adjacent work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Prime substrates where included in fire resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- D. For applications visible on completion, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that telegraph through fire resistive products after application.

3.3 APPLICATION

- A. Construct fireproofing assemblies identical to fire resistance design indicated and products specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and related materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; applicable to particular conditions of installation and as required to achieve fire resistance ratings indicated.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and related items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and similar items that interfere with the application of fireproofing until application is completed.
- D. Metal Decks:
 - 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, is completed.
 - 2. Do not apply fireproofing to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fireproofing.

- E. Install auxiliary materials as required, as detailed, and in accordance with fire resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- F. Spray apply fireproofing to maximum extent possible. After spraying operation in each area, complete coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- G. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- I. For applications over encapsulant materials, including lockdown (post removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.
- J. Where sealers are used, apply products tinted to differentiate new application from fireproofing over which they are applied.
- K. Provide uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- L. Cure fireproofing according to fireproofing manufacturer's written instructions.
- M. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- N. Finishes: Where indicated, apply fireproofing to produce finish:
 - 1. Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
 - 2. Spray Textured Finish: Finish left as spray applied with no further treatment.
 - 3. Rolled, Spray Textured Finish: Level finish produced by rolling spray applied finish with a damp paint roller to remove drippings and excessive roughness.
 - 4. Skip Troweled Finish: Even leveled surface produced by troweling spray applied finish to smooth out the texture and neaten edges.
 - 5. Skip Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray applied finish to smooth out the texture, eliminate surface markings, and square off edges.

3.4 APPLICATION

- A. Concealed Sprayed Fireproofing: Apply concealed sprayed fireproofing in thickness and densities not less than those required to achieve fire resistance ratings designated for each condition.
 - 1. Apply water overspray to concealed sprayed fiber fire resistive material if necessary to obtain designated fire resistance rating.

2. Cure concealed sprayed fireproofing according to product manufacturer's written recommendations.
 3. Apply topcoat to concealed sprayed fireproofing where required.
- B. Exposed Fireproofing: Apply exposed sprayed fireproofing in thickness and densities not less than those required to achieve fire resistance ratings designated for each condition but apply in greater thickness and densities if indicated.
1. Provide uniform finish complying with description indicated for each type of material and matching finish approved for field erected mockup.
 2. Apply exposed cementitious sprayed fireproofing to produce even, spray textured finish, produced by rolling flat surfaces of fire protected members with a damp paint roller to remove drippings and excessive roughness.
 3. Cure exposed sprayed fireproofing according to product manufacturer's written recommendations.
 4. Apply topcoat to exposed sprayed fireproofing where required.
- C. Repaired Fireproofing: Tint topcoat with dye of a different color to indicate areas patched or repaired.

3.5 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 Subsection 1705.15 Sprayed Fire Resistant Materials., as indicated on Schedule of Special Inspections..
- B. Perform tests and inspections of completed work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.6 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

- B. Protect fireproofing, according to advice and requirements of manufacturer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades. Do not fully conceal fireproofing without inspection to confirm conditions.
- D. Repair or replace work that has not successfully protected steel.
- E. Repair fireproofing damaged by other work before concealing with other construction. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel applied product.

END OF SECTION