SECTION 07 81 00

CEMENTITIOUS FIREPROOFING

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\*\* NOTE TO SPECIFIER \*\* Carboline; Coatings, Linings, and Fireproofing.
This section is based on the products ofCarboline, which is located at:
2150 Schuetz Rd.
St. Louis, MO 63146
Toll Free: 800-848-4645
Email: \_\_\_\_\_\_\_\_.
Phone: 314-644-1000
Web: https://www.carboline.com
[Click Here] for additional information.
Operating from a position of global leadership, Carboline is considered the standard of quality high-performance coatings, linings, and fireproofing products. For 75 years, Carboline has combined innovative product development with technical knowledge and experience to provide superior protective coating solutions around the world.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Cementitious fire protection materials including, but is not limited to:
			1. Interior fireproofing, concealed from view and direct contact.
			2. Interior fireproofing, exposed to view and direct contact or abuse.
			3. Exterior fireproofing, exposed to the elements and contact and possible abuse.
		2. This specification covers labor, materials, equipment, and application necessary for, and incidental to, the complete and proper installation of cementitious fire protection for application to steel structures and supports in accordance with all applicable requirements of contract documents.
			1. This specification is supplemented by the applicable requirements of building codes, insurance rating organizations and other authorities having jurisdiction.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 01 73 29 - Cutting and Patching.
		2. Section 07 84 13 - Penetration Firestopping.
		3. Section 07 81 23 - Intumescent Fireproofing.
		4. Section 09 27 00 - Plaster Fabrications.
		5. Section 09 27 00 - Plaster Fabrications.
		6. Section 05 12 13 - Architecturally-Exposed Structural Steel Framing.
		7. Section 05 20 00 - Metal Joists.
		8. Section 05 36 00 - Composite Metal Decking.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. Association of the Wall and Ceiling Industry (AWCI):
			1. AWCI Technical Manual 12-A - Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials.
		2. ASTM International (ASTM):
			1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
			2. ASTM E119 - Standard Test Method for Fire Tests of Building Construction and Materials.
			3. ASTM E136 - Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
			4. ASTM E605 - Standard for Thickness and Density of Sprayed Fire Resistive Materials Applied to Structural Members.
			5. ASTM E736 - Standard for Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members (min 500 PCF).
			6. ASTM E759 - Standard for Effect of Deflection of Sprayed Fire Resistive Materials Applied to Structural Members.
			7. ASTM E760 - Standard for Effect of Impact on Bonding of Sprayed Fire Resistive Materials Applied to Structural Members.
			8. ASTM E761 - Standard for Compressive Strength of Sprayed Fire Resistive Materials Applied to Structural Members.
			9. ASTM E859 - Standard of Air Erosion of Sprayed Fire Resistive Materials Applied to Structural Members.
			10. ASTM E937 - Standard for Corrosion of Steel By Sprayed Fire Resistive Materials Applied to Structural Members.
			11. ASTM G21 - Standard for Determining Resistance of Synthetic Polymeric Materials to Fungi.
		3. International Building Code (IBC):
			1. IBC Standard - Thickness and Density Determination for Spray Applied Fire Protection.
	1. DEFINITIONS

\*\* NOTE TO SPECIFIER \*\* Add all required project-specific definitions. Delete as required.

* + 1. Approved Factory Finish: Product in compliance with the finish stated in the applicable Specification Section, or in Specification Section - .
		2. CSP: Concrete Surface Profiles.
		3. Definitions of Painting Terms: ASTM D16, unless otherwise specified.
		4. Dry Film Thickness (DFT): Thickness of a coat of cured paint measured in mils (1/1000 inch).

\*\* NOTE TO SPECIFIER \*\* Final determination on environmental exposure (mild vs. moderate vs. Severe shall be made by the owner or Architect on the project. The following definitions are intended to be used as guidelines.

* + 1. Environment: Final determination of environmental exposure category to be made by the Architect.
			1. Mild: Areas subject to a low level of external corrosion. Deemed by the owner or Architect to have a mild level of chemical exposure and low corrosion rates.
			2. Moderate: Areas subject to a moderate level of external corrosion. Deemed by the owner or Architect to have a moderate level of chemical exposure and moderate corrosion rates.
			3. Severe: Areas subject to a high level of external corrosion. Deemed by the owner or Architect to have a high level of chemical exposure and severe corrosion rates.
		2. Exposed Exterior Surface: Area which is exposed to exterior weathering, but not necessarily UV exposure.
		3. Finished Area: An area that is listed in or has finish called for on Room Finish Schedule or is indicated on Drawings to be painted.
		4. Installer or Applicator: Personnel performing product installation onsite.
		5. Mil: One thousandth of an inch.
		6. SSPC SP: Society for Protective Coatings - Surface Preparation Standard for Protective Coatings.
		7. VOC: Volatile Organic Compound.
		8. Wet Film Thickness (WFT): Thickness of a coat of uncured (wet) paint measured in mils (1/1000 inch).
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data:
			1. Manufacturer's data sheets on each product to be used, use and limitations for each material used, and applicable fire test designs, as listed by approved fire testing organization.
			2. Preparation instructions and recommendations.
			3. Typical installations instructions.
			4. Storage and handling requirements and recommendations.
		3. Performance Certification: Submit manufacturer's verification of performance criteria, fire performance and compliance with applicable standards.
		4. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.
		5. Applicable Standards and Test Methods:
	2. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
			1. Asbestos: Manufacturer shall provide Certification that products supplied are 100% asbestos free.
			2. Fire Resistance: Provide fireproofing materials that have been listed and classified by one or more of the following testing authorities: Underwriters Laboratories (UL), Underwriters Laboratories of Canada (ULC), ITS (formerly Warnock Hersey) or other testing and inspecting agency acceptable to the architect and authorities having jurisdiction.
		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 manufacturer's willingness to sell products to an installer engaged by contractor, does not in itself confer qualification on the buyer.
		3. Single Source: 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.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Before proceeding with the Work, the Applicator is to apply the fire protection material to a predetermined location as a mock-up in sufficient time, for the Architect's review and to not delay construction progress. This section shall be witnessed by the Architect or Owner's Representative and subject to their approval to be used as a guide for texture, and thickness of finish Work.
			1. Mock-Up Location: Determined by the Architect.
			2. Mock-Up Intent: Demonstrate quality of workmanship and visual appearance.
			3. If Mock-Up is Not Acceptable: Rebuild mock-up until satisfactory results are achieved.
			4. Retain mock-up during construction as a standard for comparison with completed work.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following paragraphs.

* + - 1. Mock-Up may remain as part of the finished Work.
			2. Do not alter or remove mock-up until work is completed or removal is authorized.
		1. NFCA 200 - Field Quality Assurance Procedures for Application of Spray-Applied Fire Resistive Materials.
			1. Must be followed to help ensure material application meets design requirements for substrate surface conditions, water control, wet density, and thickness.
		2. Special inspections shall be conducted by an owner engaged ICC Certified Special Inspector for SFRM to perform code mandated inspections following SFRM application.
	1. PRE-INSTALLATION CONFERENCE
		1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda to include schedule, responsibilities, critical path items and approvals.
			1. Establish a procedure to maintain optimum working conditions and to coordinate this work with related an/or adjacent work.
	2. COORDINATION
		1. Sequence and coordinate application of sprayed fireproofing with other related work specified in other Sections to comply with the following requirements:
			1. Provide temporary enclosure for interior applications to prevent deterioration of applied materials exposed to unfavorable environmental conditions.
			2. Avoid exposure of fireproofing to unnecessary damage or abrasion.
			3. Do not apply fireproofing to metal roof decking until roofing is complete including installation of all air handling systems. Prohibit all roof traffic until application of fireproofing is completed and dry.
			4. Do not apply fireproofing until all hangers, clips and other necessary supports are in place, requiring penetration of fireproofing if installed after the application of fireproofing.
			5. Ducts, piping, and other items that would interfere with the application of fireproofing shall not be installed, until application is completed.
	3. DELIVERY, STORAGE, AND HANDLING
		1. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type, and other identifying data.
			1. Packaging: To bear the ULI or ITS labels and seals for fire resistance ratings.
				1. Products must be packaged with proper identifications and approval indications acceptable to the testing and/or listing agency.
		2. Store materials at a temperature above 40 degrees F (4 degrees C) in a dry location, protected from the weather.
		3. Damaged packages found unsuitable for use and any materials which have come into contact with contaminants prior to use shall be rejected and removed from the project.
	4. PROJECT CONDITIONS
		1. Environmental Limitations: Do not apply sprayed fireproofing material when ambient or substrate temperatures are 40 degrees F (4 degrees C) or lower, unless temporary heat and protection is provided to maintain temperatures at or above this level for 24 hours before, during and 24 hours after application of fireproofing.
		2. Ventilation: Ventilate building spaces during and after application of fireproofing at a rate of four air changes per hour until fireproofing is dry. If natural ventilation is insufficient, employ mechanical means, as necessary.
		3. Surfaces to be sprayed: Surfaces to be sprayed must be free of any substance that would impair proper adhesion.
		4. Dedicated Pumping Station Area: The contractor shall make available to the fireproofing contractor suitable areas 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.
	5. WARRANTY
		1. 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 reasonably foreseeable under conditions of normal use.
		2. Warranty Period: 1 year, from date of substantial completion.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Carboline, which is located at: 2150 Schuetz Rd.; St. Louis, MO 63146; Toll Free Tel: 800-848-4645; Tel: 314-644-1000; Fax: 314-644-4617; Email: [request info (rfrye@carboline.com)](https://admin.arcat.com/users.pl?action=UserEmail&company=Carboline&coid=31234&rep=&fax=314-644-4617&message=RE:%20Spec%20Question%20(07810cbl):%20%20&mf=); Web: <https://www.carboline.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. PERFORMANCE AND DESIGN REQUIREMENTS
		1. Products to be cementitious fireproofing materials. A mixture of gypsum and/or cement-based materials, with lightweight aggregates mixed with water to form a slurry for conveyance and application.
			1. Mineral (dry spray) fiber-based products not permitted.
		2. Physical properties must be in accordance with listed properties.

\*\* NOTE TO SPECIFIER \*\* Delete article not required.

* 1. STANDARD DENSITY CEMENTITIOUS FIREPROOFING
		1. Standard Density Cementitious Fireproofing: Must meet the below listed minimum physical properties. For use in concealed areas.
		2. Basis of Design: Southwest Fireproofing Products, Type 5 GP as manufactured by Carboline.
			1. Physical Properties: Minimum values unless otherwise indicated or higher values required to attain designated fire resistance ratings. Measured per ASTM standard test methods as listed in the "Reference" Article of this specification.
				1. ASTM E84: Flame Spread: 0. Smoke Developed: 0.
				2. ASTM E136: Passes. Determined to be non-combustible.
				3. ASTM E605: Density: 15 pcf (240 kg per sq m).
				4. ASTM E736: Cohesion/Adhesion: 430 psf (9.5 kPa); acceptable level. If primed steel is used, comply with requirements published by ULI / ULC over 75 ft from grade.
				5. ASTM E759: No cracking, spalling or delamination.
				6. ASTM E760: Impact: No delamination, cracking, or spalling.
				7. ASTM E761: Compression: 16.25 psi (112 kPa).
				8. ASTM E859: Erosion shall be 0.00 grams per sq ft maximum.
				9. ASTM E937: Corrosion: No evidence of corrosion allowed.
				10. ASTM G21: Mold Resistance: No evidence of growth.
			2. Structural members not meeting minimum size requirements specified in a design must receive a thickness of fireproofing consistent with the member's W/D ratio.

\*\* NOTE TO SPECIFIER \*\* Delete article not required.

* 1. MEDIUM DENSITY CEMENTITIOUS FIREPROOFING
		1. Medium Density Cementitious Fireproofing: Must meet the below listed minimum physical properties. For use in exposed regular conditioned areas.
			1. Exposed fire protection includes, but is not limited to the following areas:
				1. Stairwell columns and beams.
				2. Elevator shafts structural steel.
				3. Mechanical room columns.
				4. Areas where physical abuse may be encountered.
		2. Basis of Design: Sprayed fire-resistive materials.
			1. Southwest Fireproofing Products, Type 5 MD as manufactured by Carboline.
			2. Southwest Fireproofing Products, Type 7 GP as manufactured by Carboline for humidity conditions.
			3. Carboline P-239 for fire protection and acoustical value.
		3. Physical Properties: Minimum values unless otherwise indicated or higher values required to attain designated fire resistance ratings. Measured per ASTM standard test methods as listed in the "Reference" Article of this specification
			1. ASTM E84: Flame Spread: 0. Smoke Developed: 0.
			2. ASTM E136: Passes. Determined to be non-combustible.
			3. ASTM E605: Density: 22 pcf (352 kg per sq m).
			4. ASTM E736: Cohesion/Adhesion: Greater than 1268 psf (60.7 KPa).
			5. ASTM E759: No cracking, spalling or delamination.
			6. ASTM E760: Impact: No delamination, cracking, or spalling.
			7. ASTM E761: Compression: 118 psi (813 kPa).
			8. ASTM E937: Corrosion: No evidence of corrosion allowed.
			9. ASTM G21: Mold Resistance: No evidence of growth.

\*\* NOTE TO SPECIFIER \*\* Delete article not required.

* 1. HIGH DENSITY CEMENTITIOUS FIREPROOFING
		1. High Density Cementitious Fireproofing: Permanently exposed to weather, manufactured of cement-based products, with light weight aggregate; minimum density of 40 pcf. Must meet the below listed minimum physical properties. For use in concealed areas.
		2. Basis of Design:
			1. Pyrocrete P40 as manufactured by Carboline.
			2. Type 7 HD high density.
		3. Physical Properties: Minimum values unless otherwise indicated or higher values required to attain designated fire resistance ratings. Measured per ASTM standard test methods as listed in the "Reference" Article of this specification.
			1. ASTM E84: Flame Spread: 0. Smoke Developed: 0.
			2. ASTM E136: Passes. Determined to be non-combustible.
			3. ASTM E605: Density: 40 pcf (640 kg per sq m).
			4. ASTM E736: Cohesion/Adhesion: Greater than 6000 psf (287 KPa).
			5. ASTM E759: No cracking, spalling or delamination.
			6. ASTM E760: Impact: No delamination, cracking, or spalling.
			7. ASTM E761: Compression: 350 psi (23411 kPa).
			8. ASTM E859: Erosion shall be 0.00 grams per sq ft.
			9. ASTM E937: Corrosion: No evidence of corrosion allowed.
			10. ASTM G21: Mold Resistance: No evidence of growth.
	2. MISCELLANEOUS MATERlALS
		1. Miscellaneous Materials: Provide the following materials as standard with each of the fireproofing systems, as recommended by manufacturer for each condition and substrate.
			1. Primers: It is not recommended that any structural steel primers are used on any steel surfaces, unless tested and listed by ULI in designs proposed to be used. Compatible primers may be used, providing the fireproofing manufacturer can verify such compatibility in accordance with UL requirements.
			2. Adhesives: Provide adhesives as necessary, to comply with manufacturer requirements for adhesion of fireproofing. Acceptable adhesives are:
				1. TC-55 water based acrylic adhesive.
				2. Type DK Spatter Coat.
			3. Reinforcements: Provide fiberglass mesh or wire lath for areas where adhesion is not compatible and for application of fireproofing to steel joists.
			4. Mold Inhibitor: Provide factory added mold inhibitor tested in accordance with ASTM G 21 for areas such as hospitals, testing laboratories, health facilities and other areas of hygienic requirements.
			5. Top Coats: Use as required and recommended by fireproofing manufacturer or compatible products.
1. EXECUTION
	1. PRE-INSTALLATION EXAMINATION
		1. The Applicator and Contractor must examine surfaces to be fire protected and determined if the surfaces are satisfactory. Substrate conditions must comply with the following:
			1. Substrates: Must be free of grease, oil, rolling compounds, incompatible primers, loose mill scale, dirt or any other foreign matter which would prevent proper bonding of fireproofing.
			2. Structural Steel: Must be unprimed. Steel roof and floor decking shall be galvanized only.
			3. Any objects such as hangers, piping attachments, and other suspended retainer devices shall be properly secured.
			4. Ducts, piping, and other equipment shall not be placed or suspended until the fire protection materials are in place.
		2. Do not begin installation until substrates have been properly constructed and prepared.
			1. Steel Surfaces: Structural steel and steel decking shall be unprimed.
			2. Painted Steel Surfaces: Steel surfaces requiring fireproofing that are painted and/or primed, shall meet UL requirements for application and adhesion characteristics.
			3. Provide certifications from fireproofing manufacturer of compatibility of fireproofing and painted systems. Restrictions published by UL shall apply.
			4. Remedial Work: Steel surfaces with incompatible primers or paint shall be remedied by removal of the primer or paint, be lathed, or otherwise remedied within the requirements of UL, so that adequate and approved bonding can occur, acceptable to authorities having jurisdiction.
		3. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean any substrate not ready to receive fireproofing. Consult with manufacturer if conditions exist that are not easily remedied.
		2. Apply adhesives, as necessary.
		3. Cover all work subject to over sprays during application. Provide temporary enclosure when necessary to temporarily confine fireproofing and protect the environment.
		4. Assure maintenance of ambient temperatures, and/or heat and ventilation when required.
	3. APPLICATION PARAMETERS
		1. The fireproofing contractor must be allowed to move freely to apply products, as necessary. Materials stored on the floor, are to be protected by the contractor, or relocated if these materials prevent the proper application of fireproofing.
		2. Patching, repairing, and cleaning of fireproofing, due to damage done by others, is to be performed by the fireproofing applicator.
		3. After completion of fireproofing, the fireproofing applicator will remove all equipment, and broom sweep all floor areas of overspray materials.
		4. Application of fireproofing is not to commence until the project is at a stage to allow the applicator to apply product continuously and efficiently, without undue interference and delay by other trades.
		5. Conference: Convene a pre-installation conference to establish a procedure to maintain optimum working conditions and to coordinate this work with related an/or adjacent work.
	4. INSTALLATION
		1. Spray Applied Fire Resistive Materials (SFRM) shall be installed in accordance with NFCA 100, "Standard Practice For The Application of Spray-Applied Fire Resistive Materials."
		2. Comply with manufacturers written application instructions and procedures for mixing, conveying, and applying products, in accordance with the types of recommended equipment, admixtures and specific procedures regarding special conditions.
		3. Coat substrates with adhesives if necessary.
		4. Extend fireproofing materials in full thickness per approved design, to be protected. Unless otherwise recommended, install fireproofing complete in each area, prior to another.
		5. Provide a uniform surface matching UL requirement for designs approved. Apply products at the minimum densities required, or greater.
		6. Cure fireproofing to prevent premature drying; protect from freezing as listed in Section 1.05 of this specification.
		7. Exposed to View Applications: Where exposed to view, provide appearance of fire protection as follows:
			1. Provide a troweled surface of appearance previously determined prior to installation.
			2. Surfaces shall be within tolerances of 1/16 inch.
			3. Mask edges of termination's to achieve neat and sharp edges.
	5. FIELD QUALITY CONTROL
		1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

\*\* NOTE TO SPECIFIER \*\* Include if manufacturer provides field quality control with onsite personnel for instruction or supervision of product installation, application, erection, or construction. Delete if not required.

* + 1. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.
		2. Testing Agency: The owner shall engage, and the Contractor and Applicator shall approve a qualified independent testing agency to perform field quality inspections of applied fireproofing and prepare reports.
			1. Testing shall be done in accordance with AWCI "Technical Manual 12 - A, Standard Practice for the Testing and Inspecting of Field Applied Sprayed Fire - Resistive Materials" and ASTM E 605.
			2. Tests shall be done to determine thickness, density, and adhesion.
			3. Variances shall be corrected with the testing agency present and when the applicator is performing work in the same area to allow for expedient corrections.
			4. A schedule of tests to be performed shall be agreed upon by applicator, contractor, and testing agency.
	1. CLEANING AND REPAIR
		1. After completion of each day's work, the applicator shall broom clean the area fireproofed. Areas not to receive fireproofing and that are finished surfaces shall be masked.
		2. Touch-up, repair or replace damaged fireproofing before Substantial Completion.
			1. All Touch-up, repair or replacing of damaged fireproofing must be completed by the Applicator.

END OF SECTION