

## SPECIFICATION SECTION 07810

(07810 before 2005) (07250 before 1995)

# INTERIOR CEMENTITIOUS SPRAY - APPLIED FIREPROOFING

### PART 1 - GENERAL

#### 1.00 SCOPE

A. 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 shall be supplemented by the applicable requirements of building codes, insurance rating organizations and all other authorities having jurisdiction.

#### B. SECTION INCLUDES

1. Cementitious fire protection material.

#### 1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract documents, including Conditions of Division 1 apply to the work of this section.

#### 1.02 DESCRIPTION OF WORK

A. The work of this section shall include, 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

#### 1.03 RELATED WORK

A. Examine all of the contract documents for requirements which affect the work of this section. Other specification sections, which directly relate to the work of this section include, but are not limited to the following:

- |                              |   |
|------------------------------|---|
| 1. Fire Stopping             | Division 07, Section 07 84 [ ___ ]            |
| 2. Thermal Insulation        | Division 07, Section 07 [2_][ ___ ]           |
| 3. Gypsum and Plaster        | Division 09, Section 09 [2_][ ___ ]           |
| 4. Structural Steel          | Division 05, Section 05 [1_][ ___ ]           |
| 5. Steel Joists              | Division 05, Section 05 [2_][ ___ ]           |
| 6. Metal Floor Decking       | Division 05, Section 05 [3_][ ___ ]           |
| 7. Metal Roof Decking        | Division 05, Section 05 [3_][ ___ ]           |
| 8. Mechanical – Re: Patching | Division 15 [or any new division designation] |
| 9. Electrical – Re: Patching | Division 16 [or any new division designation] |

#### 1.04 QUALITY ASSURANCE

A. 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.

- B. 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.
- C. Fire Resistance: Provide fireproofing materials that have been listed and classified by one or more of the following testing authorities: Underwriters Laboratories of Canada (ULC), Underwriters Laboratories (UL), ITS (formerly Warnock Hersey) or other testing and inspecting agency acceptable to the architect and authorities having jurisdiction.
- D. Packaging: All products must be packaged with proper identifications and approval indications acceptable to the testing and/or listing agency.
- E. Asbestos: Manufacturer shall provide Certification that products supplied are 100% asbestos-free.
- F. Steel Surfaces: **Structural steel and steel decking shall be unprimed.**
- G. Painted Steel Surfaces: Steel surfaces requiring fireproofing that are painted and/or primed, shall meet ULC/UL requirements for application and adhesion characteristics. Provide certifications from fireproofing manufacturer of compatibility of fireproofing and painted systems. Restrictions published by ULC/UL shall apply.
- H. Remedial Work: Steel surfaces with incompatible primers or paint shall have the existing coating removed, be lathed, or otherwise remedied within the requirements of ULC/UL, so that adequate and approved bonding can occur, acceptable to Authorities Having Jurisdiction.
- I. Field Quality Assurance - NFCA 200 – “Field Quality Assurance Procedures for Application of Spray-Applied Fire Resistive Materials”
- J. Special inspections: Shall be conducted by an owner engaged ICC Certified Special Inspector for SFRM to perform code mandated inspections following SFRM application.

#### 1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fireproofing material when ambient or substrate temperatures are 5°C (40°F) 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. It is recommended that the corresponding area immediately above the structure to be sprayed be heated as well in order to control the temperature of the concrete floor slab and the structural steel.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing at a rate of four (4) air changes per hour until fireproofing is dry. If natural ventilation is insufficient, employ mechanical means as necessary.
- C. Surfaces to be sprayed: Surfaces to be sprayed must be free of any substance that would impair proper adhesion.
- D. Dedicated Pumping Station Area: 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.

## 1.06 SEQUENCING

A. 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 (partitions or tarps) 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 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.

## 1.07 APPLICATION PARAMETERS

A. The fireproofing contractor shall be allowed to move freely to apply products as necessary. Materials stored on the floor, shall be protected by the contractor, or relocated if these materials prevent the proper application of fireproofing.

B. Patching, repairing and cleaning of fireproofing, due to damage done by others, shall be performed by the fireproofing applicator.

C. After completion of fireproofing, the fireproofing applicator shall remove all equipment, and broom sweep all floor areas of overspray materials.

D. Application of fireproofing shall not 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.

E. 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.

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.”

## 1.08 REFERENCED STANDARDS

A. ULC Fire Tests: Sprayed Fireproofing products must be tested and listed in compliance with the following National Standards of Canada:

1. CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building construction and Materials.
2. CAN/ULC-S102, Test for Surface Burning Characteristics.

B. ASTM Fire Tests: Sprayed Fireproofing Products may be tested and listed in compliance with the following ASTM Testing Standards:

1. ASTM E 119, Fire Test of Building Construction and Materials (also known as UL 263).
2. ASTM E 84, Test for Surface Burning Characteristics of Building Materials.

C. ASTM Physical Characteristics Standards:

1. **Noncombustibility:** ASTM E-136 Standard (Behavior of Materials in a Vertical Tube Furnace at 750° C). CAN/ULC-S114 is acceptable as well.
2. **Density:** ASTM E-605 Standard for Thickness and Density of Sprayed Fire Resistive Materials Applied to Structural Members.
3. **Adhesion/Cohesion:** ASTM E-736, Standard for Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members
4. **Deflection:** ASTM E-759, Standard for Effect of Deflection of Sprayed Fire Resistive Materials Applied to Structural Members.
5. **Impact:** ASTM E-760, Standard for Effect of Impact on Bonding of Sprayed Fire Resistive Materials Applied to Structural Members
6. **Compression:** ASTM E-761, Standard for Compressive Strength of Sprayed Fire Resistive Materials Applied to Structural Members
7. **Air Erosion:** ASTM E-859, Standard of Air Erosion on of Sprayed Fire Resistive Materials Applied to Structural Members.
8. **Steel Substrate Corrosion:** ASTM E-937, Standard for Corrosion of Steel By Sprayed Fire Resistive Materials Applied to Structural Members.
9. **Mold & Mildew Growth:** ASTM G-21, Standard for Determining Resistance of Materials to Fungi.

D. AWCI Inspection Standards: On-Site inspection of the sprayed fireproofing installation shall be conducted in accordance with: Technical Manual 12-A, Third Edition, "Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide".

E. NFCA 100 Standard Practice For The Application of Spray-Applied Fire Resistive Materials  
NFCA 200 Quality Assurance Procedures for Application of Spray-Applied Fire Resistive Materials

1.09 DOCUMENT 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. Fire Test Design Selection: Submit tested designs which apply to the project construction assemblies or details. The selected designs must have been tested in accordance with CAN/ULC-S101. The design selection priority must be respected, as follows:

1. Direct reference: Use ULC tested designs which come from the ULC Fire Resistance Directory, or any UL design taken from the UL Fire Resistance Directory that is certified for Canada (cUL).
2. If no designs are available from the CAN/ULC-S101 Canadian Test Standard, refer to any design tested upon the ASTM E-119 Testing Standard.
3. If the project assembly or detail cannot be supported by any ULC, UL or ASTM tested design source, submit a technical proposal that best matches the project situations.
4. Any alternate proposal must come from or be assisted by the Fireproofing manufacturer.
5. Any structure system or element which does not meet the dimension requirements stated in the tested design must be protected by a thickness based upon its particular M/D Ratio.

## 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: [1] year, from date of substantial completion.

## 1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type, and other identifying data. Packaging shall bear the ULI or ITS labels and seals for fire resistance ratings.
- B. Store materials at a temperature above 40 degrees F (4 degrees C) in a dry location, protected from the weather.
- C. 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.

## PART 2 - PRODUCTS

- A. General: All products shall be cementitious fireproofing materials. Physical properties shall be in accordance with below listed properties. Products shall be a proprietary mixture of gypsum and/or Portland cement, with lightweight\*\* aggregates, mixed with water to form a slurry for conveyance and application. Mineral fiber based products are not permitted.
- 2.01 **Standard Density Cementitious Fireproofing**: Intended for Interior concealed locations or interior exposed but out of reach locations, and therefore not subjected to physical contact or abuse.
- A. Physical Properties:
1. CAN/ULC-S102 (or ASTM E 84): Flame Spread, 0 and Smoke Developed, 0, maximum.
  2. CAN/ULC-S114 (or ASTM E 136): Passes, and is determined non - combustible
  3. ASTM E 605: Density shall be a minimum of 240 kg/m<sup>3</sup> [15 pcf]
  4. ASTM E 736: Cohesion/Adhesion shall be 9.5 kPa [200 psf], with 7.2 kPa (150 psf) minimum acceptable level; if primed steel is used, comply with requirements published by ULC / ULI
  5. ASTM E 759: No cracking, spalling or delamination
  6. ASTM E 760: Impact: No delamination, cracking or spalling
  7. ASTM E 761: Compression shall be 112 kPa [500 psf] @ 10% deformation, minimum
  8. ASTM E 859: Air Erosion shall be 0.00 g/sq.ft.
  9. ASTM E 937: No evidence of corrosion.
  10. ASTM G 21: Mold Resistance: No evidence of growth
- B. Acceptable Cementitious Products: TYPE 5GP™ as manufactured by A/D Fire Protection Systems (Canadian Licensee) and Southwest Fireproofing Products (original manufacturer), or approved equal.

C. Structural members not meeting minimum size requirements specified in a design shall receive a thickness of fireproofing consistent with the member's M/D ratio.

D. Exposed fire protection shall include, but are 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

2.02 **Medium Density Fireproofing:** Intended for interior locations where fireproofing will be exposed and within occupant reach. For high humidity locations use Portland cement based Type 7GP™.

A. Physical Properties:

1. CAN/ULC-S102 (or ASTM E 84): Flame Spread, 0 and Smoke Developed, 0, maximum.
2. CAN/ULC-S114 (or ASTM E 136): Passes, and is determined non - combustible
3. ASTM E 605: Density shall be a minimum of 352 kg/m<sup>3</sup> [22 pcf]
4. ASTM E 736: Cohesion/Adhesion shall be >60.7 kPa [>1268 psf], minimum
5. ASTM E 759: No cracking or delamination
6. ASTM E 760: Impact: No delamination, cracking or spalling
7. ASTM E 761: Compression shall be 813 kPa [118 psi] at 10% deformation, minimum
8. ASTM E 859: Erosion shall be 0.00 g/sq.ft. maximum
9. ASTM E 937: No evidence of corrosion
10. ASTM G 21: Mold Resistance: No evidence of mold growth

B. Acceptable Cementitious Products:

1. **TYPE 7GP™** as manufactured by A/D Fire Protection Systems / Carboline and Southwest Fireproofing Products (original manufacturer), for exposed interior high humidity conditions.
2. **TYPE 5MD™** as manufactured by A/D Fire Protection Systems / Carboline and Southwest Fireproofing Products (original manufacturer), for exposed interior locations without high humidity.
3. or any approved equal given the above-mentioned endurance conditions.

2.03 **High Density Fireproofing:** For exposed interior applications with potential exposure to physical abuse and high humidity or water.

A. Physical Properties:

1. CAN/ULC-S102 (or ASTM E 84): Flame Spread, 0 and Smoke Developed, 0, maximum.
2. CAN/ULC-S114 (or ASTM E 136): Passes, and is determined to be non-combustible
3. ASTM E 605: Density shall be a minimum of 640 kg/m<sup>3</sup> [40 pcf]
4. ASTM E 736: Cohesion/Adhesion shall be 287 kPa [6000 psf], minimum
5. ASTM E 759: No cracking or delamination
6. ASTM E 760: Impact: No delamination, cracking or spalling
7. ASTM E 761: Compression shall be 2411 kPa [350 psi], minimum
8. ASTM E 859: Erosion shall be 0.00 g/sq.ft., maximum
9. ASTM E 937: No evidence of corrosion
10. ASTM G 21: No evidence of mold growth

B. Acceptable Cementitious Products:

1. **TYPE 7HD™** as manufactured by A/D Fire Protection Systems / Carboline and Southwest Fireproofing Products (original manufacturer), or approved equal

2.04 **Miscellaneous Materials:** Provide the following items as standard procedure with each of the fireproofing systems, as recommended by the manufacturer for each condition and substrate.

A. **Primers:** Recommended Steel Primers as being listed on UL's Directory Category CGJM, or any primer for which adhesion/cohesion capabilities of the sprayed fire resistive material has been verified by the fireproofing manufacturer.

*Note to Spec Writer: It is recommended that all structural steel that is intended to receive sprayed fireproofing be unprimed.*

B. **Adhesives:** Provide adhesive as necessary to comply with fireproofing manufacturers' and fire test design requirements. Acceptable adhesives are:

1. General: **TC-55™** water based acrylic adhesive, as manufactured by A/D Fire Protection systems
2. Per Fire Test Design and as required for all Steel Roof Decks: **Type DK™** Cementitious Spatter Coat, as manufactured by A/D Fire Protection Systems / Carboline,
3. Or approved equal.

C. **Lath:** Provide expanded metal lath for areas where adhesion to substrate is questionable, for boxed applications, to comply with ULC/UL requirements for application to primer or painted steel, or as otherwise required by the fire test design information.

D. **Reinforcements:** Provide fiberglass mesh or wire lath for areas where adhesion is not compatible and for application of fireproofing to steel joists.

E. **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.

F. **Top Coats:** Use as required and recommended by fireproofing manufacturer or compatible products.

#### 2.05 **Miscellaneous Surface Treatments**

A. **Finished Surface Treatment:** Use as required by architect and recommended by fireproofing manufacturer or compatible products.

1. **TC-55™** spray applied latex-based elastomeric Primer/Undercoat, as manufactured by A/D Fire Protection Systems / Carboline. Use at a rate recommended by the manufacturer for fireproofing that will be painted.
2. **TC-55™** spray applied latex-based elastomeric economical Surface Sealer/Hardener, as manufactured by A/D Fire Protection Systems / Carboline. Use at a rate recommended by the manufacturer for a [medium] [heavy] coat.

B. **Impact-Resistant Surface Treatment:** Spray-On Polymerized Extra High Density Cementitious Surface Cladding Product to be applied over sprayed cementitious fireproofing.

1. Acceptable Product: **Type HC™** (HARD CLAD) as manufactured by A/D Fire Protection Systems / Carboline and Southwest Fireproofing Products or approved equal

## **PART 3 – EXECUTION**

3.01 Pre-Installation Examination: The applicator and the contractor shall examine surfaces to be fire protected, and determined if the surfaces are satisfactory. Substrate conditions must comply with the following:

A. 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.

Structural steel shall be unprimed. Steel roof and floor decking shall be galvanized only.

B. Any objects such as hangers, piping attachments, and other suspended retainer devices shall be properly secured.

C. Ducts, piping, and other equipment shall not be placed or suspended until after application of the sprayed fireproofing materials.

3.02 Preparation:

A. Clean any substrate not ready to receive fireproofing. Consult with manufacturer if conditions exist that are not easily remedied.

B. Mask all work subjected to potential overspray during application. Provide temporary enclosure when necessary to temporarily confine fireproofing and protect the environment.

C. Assure maintenance of ambient temperatures, and/or heat and ventilation when required.

D. Apply the sprayed water-based or cementitious adhesive when necessary.

3.03 Installation, General

A. Comply with manufacturers written application instructions and procedures for mixing, conveying and applying products, in accordance with the types of recommended equipment and specific procedures regarding the particular jobsite conditions.

B. If steel or concrete substrates have been coated with the sprayed water-based adhesive, apply the sprayed Fireproofing while the adhesive remains tacky.

C. Apply fireproofing materials to required thickness per approved fire test design information. Thicker applications may require multiple passes, allowing each coat to set between coats.

D. Provide a uniform surface matching ULC/cUL/UL design requirements. Apply product at the minimum density required by the fire test design, or greater.

E. Cure fireproofing to prevent premature drying if such site conditions apply.

F. Protect from freezing until cured - refer to Section 1.05 of this specification.

OPTIONAL:

G. Final Surface Pattern And Finish Smoothness:

1. Provide a troweled surface of appearance previously determined prior to installation.

2. Surfaces shall be within tolerances of 1/8 inch\*\*\*.

3. Mask edges of termination's so as to achieve neat and sharp edges.



3.04 Field Quality Control:

A. Testing Agency: The owner shall engage as ICC certified special inspector as the independent (third-party) testing agency to perform field quality inspections of applied fireproofing, and prepare reports.

B. Testing shall be done in accordance with the building code following procedure in AWCI Technical Manual 12-A, Third Edition, "Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide" and ASTM E 605.

C. Field Tests shall be done for [thickness] [and] [density].

D. Variances shall be corrected with the testing agency present, and while the applicator is performing work in the same area, to permit expedient corrections.

E. A schedule of tests to be performed shall be agreed upon by applicator, contractor and testing agency.

3.05 Cleaning and Repair:

A. After completion of each day's work, the applicator shall broom clean the area fireproofed. Finished surfaces that are not intended to receive fireproofing shall be masked.

B. All patching of damaged fireproofing shall be completed by the Fireproofing Trade Contractor.

C. Hand patches may be tolerated for very small-sized patches. Every patch over a square foot of area should be managed with spray equipment.

3.06 Schedule:

A. Fire resistance ratings, in hours, shall be as listed in the schedule/chart below, unless otherwise mentioned in the architectural drawings.

ELEMENT OR TYPE OF CONSTRUCTION	FIRE RESISTANCE RATINGS, hours) ***	FIRE TESTED DESIGN REFERENCE ****
Floor Assembly ***		
Roof Assembly ***		
Columns		
Bracings		
[Beams becoming fully exposed once they extend beyond the mezzanine slab edge]		
[Primary Beams]		
[Secondary Beams ]		
[Heavy Trusses]		

[B. List below other provisions not covered in the Chart:]

**Note to Spec Writer:**

**\*\*\* Restrained and Unrestrained Conditions**

***The test methods described in CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials, may result in a Restrained and / or an Unrestrained Rating being assigned to floor, roof and beam assemblies. Appendix A in the Standard is***

***titled, "Guide for Determining Conditions of Thermal Restraint for Floor and Roof Assemblies and for Individual Beams". It has been the practice of fireproofing contractors in the Canadian market to bid on the basis of Restrained fire resistance ratings unless Unrestrained ratings are indicated in the specification documents.***

References

NFCA 100 Standard Practice For The Application of Spray-Applied Fire Resistive Materials

NFCA 200 Quality Assurance Procedures for Application of Spray-Applied Fire Resistive Materials

**END OF THIS SECTION**

Prepared by: A/D Fire Protection Systems, Technical Staff, January, 2011

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