SECTION  – intumescent fireproofing

1. General
   1. summary
      1. This Section includes requirements of design, supply and installation of thin film mastic and intumescent fire-resistive coatings (MIFRC) systems consisting of surface preparation, basecoat, and protective decorative finish coat, having a fire resistance rating of 1 hour.
      2. Related Requirements:
         1. Section 07 81 00 – Applied Fireproofing.
         2. Section 07 84 13 – Penetration Firestopping.
         3. Section 07 84 43 – Joint Firestopping.
         4. Section 07 92 00 – Joint Sealants.
         5. Section 09 96 46 – Intumescent Painting.
   2. reference standards
      1. Underwriters Laboratories of Canada (ULC)
         1. CAN/ULC S101 07, Fire Endurance Tests of Building Construction and Materials.
         2. CAN/ULC S102 10, Surface burning characteristics of building materials and assemblies.
         3. ULC List of Equipment and Materials, latest edition.
      2. Society for Protective Coatings (SSPC)/National Association of Corrosion Engineers (NACE International):
         1. Coating Materials Guidelines.
         2. Surface Preparation Guidelines.
         3. SSPC PA2, Paint Application Specification No.2 Measurement of Dry Paint Thickness with Magnetic Gages.
      3. American Society for Testing of Materials (ASTM):
         1. ASTM E605 93 (2011), Tests for Thickness and Density of Sprayed Fire Resistive Material Applied to Structural Members.
         2. ASTM E736-00 (2011), Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
         3. ASTM E759-92 (2011), Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
         4. ASTM E761-92 (2011), Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
         5. ASTM E859-93 (2011), Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
   3. PREINSTALLATION MEETINGS
      1. Preinstallation Conference: Conduct conference at Project site.
         1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.
   4. action submittals
      1. Product Data: For each type of product.
         1. Submit product data including certified copies of test reports verifying fire resistant material applied to substrate as constructed on project will meet or exceed requirements of specification.

Spec Note: Edit the following paragraph to include all other types of fireproofing on the Project.

* + 1. Installation Schedule: Submit schedule listing surfaces to which fire-resistant material is to be applied indicating minimum thickness required a minimum of one month prior to scheduled application of cementitious fireproofing material.
    2. Shop Drawings: Structural framing plans indicating the following:
       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. Treatment of fireproofing after application.
    3. Samples: For each exposed product and for each colour and texture specified, 12 inches (150 mm) square in size.
  1. INFORMATIONAL SUBMITTALS
     1. Qualification Data: For installer and testing agency.
     2. Product Certificates: For each type of fireproofing.
     3. Certificates: Submit test results in accordance with CAN/ULC S101 for fire endurance and CAN/ULC S102 for surface burning characteristics.
     4. Delegated Design Submittals: Provide engineered judgements and certification for work performed by this Section in accordance with requirements of Authority Having Jurisdiction.

Retain "Field quality-control reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + 1. Field quality-control reports.
  1. QUALITY ASSURANCE

Revise "Installer Qualifications" Paragraph below to suit Project. Verify that MIFRC manufacturers qualify installers who are available to perform work in Project area.

* + 1. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
    2. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

Indicate portion of Work represented by mock-up on Drawings or draw mock-up as separate element.

* + - 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 Consultant specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement in Section 01 40 00 – Quality Requirements for demolishing and removing mock-ups.

* + - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
    1. Certifications: Provide the following during the course of the Work:
       1. Compliance Certification: Provide certificates from manufacturer indicating tested performance requirements required by Authorities Having Jurisdiction.
    2. Field Inspection: An independent testing agency, hired by the Owner, to test random samples, as applied, to verify thickness of intumescent fireproofing.
       1. Inspection shall be carried out prior to application of the protective topcoat.
  1. field conditions

Revise "Environmental Limitations" Paragraph below if different temperature or time limits apply to required products. Temperature below is common for waterborne products. Some products, such as epoxies, may require higher mixing and application temperatures; others, such as solvent-borne products, may allow lower temperatures to 35 deg F (2 deg C).

* + 1. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 deg F (10 deg 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 twenty-four (24) hours after product application.
    2. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.
  1. DELIVERY, STORAGE AND HANDLING
     1. Delivery and Acceptance Requirements: Deliver in original undamaged sealed containers with manufacturer's labels, application instructions, and labelling agencies labels intact.
     2. Storage and Handling Requirements: Store materials in dry protected area, raised off ground and away from damp surfaces and conditions that have deleterious effect on materials; keep materials dry until ready for use; discard material that has been exposed to water before actual use; use stock before its expiration date.
  2. SEQUENCING AND SCHEDULING
     1. Sequence work in conjunction with structural steel.
     2. Steel surfaces with less than 36 inches (914 mm) clear working access may necessitate applying material to inaccessible surfaces prior to erection of the finished steel members, either at the point of fabrication or on-site.

1. Products
   1. performance requirements

"VOC Content" and "Low-Emitting Materials" paragraphs below apply to LEED v4.

* + 1. VOC Content: For field applications, coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

Categories in subparagraphs below are taken from LEED rating systems and the standards referenced by them; if clarification is required, see those documents or the reference guides.

* + - 1. Flat Paints and Coatings: 50 g/L.
      2. Nonflat Paints and Coatings: 50 g/L.
      3. Primers, Sealers, and Undercoaters: 100 g/L.
  1. MATERIALS, GENERAL
     1. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

Retain "Source Limitations" Paragraph if fire-resistance designs are based on products by single manufacturer. Retain option if one manufacturer cannot satisfy all design conditions.

* + 1. Source Limitations: Obtain fireproofingfor each fire-resistance design from single source.
    2. Fire-Resistance Design: Indicated on Drawings, tested 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.
    3. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
    4. Asbestos: Provide products containing no detectable asbestos.
  1. MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

MIFRC materials and finishes vary with manufacturer and product and are based on approved fire-resistance designs that comply with the fire-resistance ratings of building elements as required by code.

Copy "MIFRC" Paragraph below and re-edit for each product or fire-resistance design. Topcoat may be mandatory or optional; it provides additional protection to fireproofing and offers greater colour selection.

Insert drawing designation; consider using the approved fire-resistance design as drawing designation. Use these designations on Drawings to identify each product or fire-resistance design.

* + 1. MIFRC <**Insert drawing designation**>: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.
       1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
          1. Albi Manufacturing, Division of StanChem Inc.; Albi Clad TF.
          2. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; AD Firefilm III.
          3. Hilti, Inc.; [Hilti Fire Finish CFP-SP WB].
          4. Isolatek International; Cafco SprayFilm-WB 5

Retain "Application" Subparagraph below if applicable. UL's "Fire Resistance Directory" includes testing for these three optional uses (exposures). See Evaluations.

* + - 1. Application: Designated for [**"exterior"**] [**"interior general purpose"**] [**and**] [**"conditioned interior space purpose"**] use by a qualified testing agency acceptable to authorities having jurisdiction.
      2. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
      3. Surface-Burning Characteristics: Comply with CAN/ULC S102; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
         1. Flame-Spread Index: 25 or less.
         2. Smoke-Developed Index: 50 or less.

Retain "Finish" Subparagraph below if appearance is a concern; consult manufacturer for recommendations and revise to suit Project. If retaining more than one finish, indicate locations of each on Drawings or by inserts.

* + - 1. Finish: As selected by Consultant from manufacturer's standard finishes.

Consider retaining "Color and Gloss" Subparagraph below if important to Project's appearance; consult manufacturer for recommendations.

* + - * 1. Colour and Gloss: [As indicated by manufacturer's designations] [Match Consultant's sample] [As selected by Consultant from manufacturer's full range][White][As indicated in Section 09 06 05 Product and Finish Schedule.]
  1. AUXILIARY MATERIALS
     1. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by ULC or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
     2. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by ULC or another testing and inspecting agency acceptable to authorities having jurisdiction.

Retain "Reinforcing Fabric" and "Reinforcing Mesh" paragraphs below if required. Consult manufacturers for recommendations and revise to suit Project; delete both paragraphs if not required.

* + 1. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
    2. Reinforcing Mesh: 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.

"Topcoat" Paragraph below is a generic description; retain if required and revise to suit Project.

* + 1. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.
    2. If decorative paints or coatings over fireproofing are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting," verify compatibility with products in this Section and verify acceptability to authorities having jurisdiction.

1. Execution
   1. EXAMINATION
      1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
         1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
         2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
         3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
      2. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
      3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
      4. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. PREPARATION
      1. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
      2. Clean substrates of substances that could impair bond of fireproofing.

Generally, retain first paragraph below.

* + 1. 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.

Retain paragraph below unless fireproofing is not visible nor important to Project's appearance.

* + 1. For applications visible on completion of Project, 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 would telegraph through fire-resistive products after application.
  1. application
     1. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
     2. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
     3. 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 other items penetrating fireproofing are in place.
        2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
     4. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
     5. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
     6. Extend fireproofing in full thickness over entire area of each substrate to be protected.
     7. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
     8. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
     9. Cure fireproofing according to fireproofing manufacturer's written recommendations.
     10. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

Retain or revise "Finishes" Paragraph below to suit Project; coordinate with finishes retained in "Mastic and Intumescent Fire-Resistive Coatings" Article.

* + 1. Finishes: Where indicated, apply fireproofing to produce the following finishes:
       1. Manufacturer's 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: Even 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.
  1. FIELD QUALITY CONTROL

Retain first option in "Special Inspections" Paragraph below if Owner engages special inspector. Consider retaining second option if authorities having jurisdiction allow Contractor to engage special inspector. If retaining second option, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article. See "Special Inspections" Article in the Evaluations.

* + 1. Notify Consultant when completed applications are ready for inspection.
    2. Arrange for inspections by the Owner's independent inspection and testing company, appointed by Owner. Co-ordinate with requirements of Division 01.
    3. Perform the 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.

See Section 01 40 00 – Quality Requirements for retesting and reinspecting requirements and Section 01 73 00 – Execution for requirements for correcting the Work.

* + 1. 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.
    2. Prepare test and inspection reports.
  1. CLEANING, PROTECTING, AND REPAIRING
     1. 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.
     2. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.
     3. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
     4. Repair fireproofing damaged by other work before concealing it with other construction.
     5. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION