

ISOLUTIONS™

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Primed Steel Guidelines for Spray-Applied Fire Resistive Materials (SFRMs)

Primed/Painted structural steel is a very important project condition that cannot be overlooked when installing spray-applied fire resistive materials.

As a leading manufacturer of passive fire protection products, we recommend that structural steel members and steel deck to receive SFRMs shall be unprimed/unpainted in order to ensure proper adhesion to the substrate. Most fire testing by UL and/or SFRM manufacturers has been conducted on unprimed steel and therefore we do not recommend the application of our SFRMs to painted surfaces unless classified or referenced in the UL Fire Resistance Directory. UL allows the application of SFRMs to primed/painted wide flange steel members (**beams and columns**) provided the guidelines highlighted below are followed. These guidelines are listed in their entirety on page 2 of the 1998 UL Fire Resistance Directory -Volume 1 (see attached).

Prior to 1989, Underwriters

Laboratories, Inc. (UL) did not have any fire test data for the application of a sprayed fire protection product to a painted or primed member. Since then, numerous tests with paints and primers were conducted with different manufacturers' products. This began a database of tested structural steel sizes. The largest beam tested had a flange width of 12 inches and a web depth of 16 inches. Likewise, the largest column tested had dimensions of 16 inches, web and flange. Therefore, any member exceeding these dimensions requires that a mechanical break such as metal lath or steel studs with discs be used prior to the installation of the fire protection material. If metal strip lath is utilized, no less than 25 percent of the width of the oversize flange or web element shall be covered by the metal lath. The strips of metal lath shall be a minimum 3-1/2 in. wide. If steel studs with discs are used, the studs shall be welded to the oversized element in rows such that the maximum clear span is in accordance with

either the 12 inch or 16 inch requirements previously mentioned. The spacing of studs along each row shall not exceed 24 in. and a minimum of one stud per 256 sq. in. shall be provided. Please note that even if the steel member is "oversized" and requires one of the preceding mechanical breaks, acceptable bond strength values still must be achieved. At times, achieving these acceptable bond-strength values may require the additional application of a bonding adhesive. In these cases, the SFRM manufacturer should be contacted for specific details.

The direct application of SFRMs to painted bar *joists* is acceptable, provided the SFRM thickness is in accordance with the appropriate UL design. Therefore, the use of metal lath or nonmetallic fiber mesh is optional and is only used to help aid in the application.

If a steel floor or roof *deck* is painted, it must be listed in the

specified design as a classified painted deck for the particular fire protection product, and certified for fire test compatibility by the deck manufacturer for the exact deck designation.

Painted deck conditions can often cause future problems and therefore it is recommended that ISOLATEK INTERNATIONAL or another SFRM manufacturer be contacted for assistance in all cases.

Furthermore, any classified painted floor or roof deck listed in a UL fire resistance design may be substituted into any other design provided they are of the same series (D700, D800, P700, P800, etc.) and same type of spray-applied fire resistive material.

The following information has been provided as a summary of the requirements necessary for the proper installation of SFRMs to various primed/painted structural steel members and decking.

Isolatek International is a registered provider with the AIA Continuing Education System . Please contact our Marketing Department for information on how you can earn AIA/CES Learning Units.

Have a question or concern about the fire protection industry?

Let us know and we will be glad to provide you with the information.

Dedicated to servicing the "Life Safety" needs of the construction industry for over 100 years, **ISOLATEK International** can provide further information on this and other topics of interest to professionals in the fire protection industry. If you have an immediate need, our technical service department can be contacted by phone at 973-347-1200 or by fax at (973) 347-9170 or you can visit our web site at www.cafco.com.

THE FIRE PROTECTION

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FIRE RESISTANCE RATINGS - ANSI/UL263 (BXUV)—Continued

The numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

The prefix numbers with an asterisk (*) and the design numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

GENERAL

The following information is appropriate to all fire resistive designs described in this Directory. It is recommended that the users review this information in addition to the general guidelines provided for specific materials and construction types.

Authorities having jurisdiction should be consulted before construction.

Fire resistance ratings apply only to assemblies in their entirety. Except for those separately rated structural members supporting tested assemblies, individual components are not assigned a fire resistance rating and are not intended to be interchanged between assemblies but rather are designated for use in a specific design in order that the ratings of the design may be achieved.

All ratings are based on the assumption that the stability of structural members supporting the assembly are not impaired by the effects of fire. The extent of damage of the test assembly at the rating time is not a criteria for the rating.

The specifications for materials in an assembly are important details in the development of fire resistance ratings. Those materials provided with an "*" in the design text are eligible to be produced under the Follow-Up Service Program of Underwriters Laboratories Inc. Information identifying such materials and the Classified Companies authorized to provide the materials are located in the product category section of this Directory. The appearance of the Classification Marking on the product is the only method provided by UL to identify products that have been produced under its Follow-Up Service.

Metric Dimensions

It is recommended that the Metric Guide for Federal Construction published by the National Institute of Building Sciences (NIBS) be consulted for guidance regarding the use of metric dimensioned building materials. The dimensional conversion of building materials from the inch-pound system to metric may either be hard or soft.

Hard conversions are typically applied to manufactured products used in modular construction. These products include suspended ceiling systems, gypsum wallboard, insulation boards, etc. Classified products which are available in metric sizes are identified in the Classification information for the individual product categories located near the end of this Directory.

For soft conversions, inch-pound dimensions are mathematically converted to exact equivalent metric values. Examples of dimensions which may be soft converted include concrete thickness, depth of concealed space above suspended ceilings and coating thicknesses.

It is recommended that dimensions which are identified as minimum or maximum in fire resistive designs be initially softly converted and, if required, further converted to a hard metric equivalent following the min/max guidance. The spacing of hanger wire and other supports for suspended ceilings would be examples requiring this type of consideration.

Penetrations

Penetrations through all or a portion of an assembly can significantly affect the rating. Firestop systems developed to protect openings created by penetration items are covered in Volume 2 of the Fire Resistance Directory.

Dual Unrestrained Assembly Ratings

Two unrestrained assembly ratings are indicated for some D900 Series floor designs that include unprotected steel floor units. These unrestrained assembly ratings are influenced by the span of the steel floor units. For the longer rating, the maximum span is the span with which the assembly was tested. This rating is determined by the assembly's structural performance during the fire test. The shorter rating is determined by the steel temperatures measured during the test and the span is limited only by the manufacturer's loading tables.

Finish Ratings

A finish rating is established for assemblies containing combustible (wood) supports. The finish rating is defined as the time at which the wood stud or wood joist reaches an average temperature rise of 250 degrees F or an individual temperature rise of 325 degrees F as measured on the plane of the wood nearest the fire. A finish rating is not intended to represent a rating for a membrane ceiling. The requirements for finish ratings are not included in Standard ANSI/UL 263.

Nails

Nails are specified according to Federal Specification FF-N-105B. Nails used to attach gypsum board to wood studs or to wood joists shall be cement coated box nails or cement coated cooler nails unless specified otherwise in the specific designs.

Interior and Exterior Applications

The fire resistive designs and the UL Classified materials are investigated with the understanding their use is limited to interior applications unless the design or the Classification information for the material includes a statement such as "Investigated for exterior use" or unless the exterior use is obvious as in the case of roofs or coated metal wall facings used in exterior walls.

FIRE RESISTANCE RATINGS - ANSI/UL263 (BXUV)—Continued

Exposed Interior Finishes

The surface flammability and smoke development characteristics of Classified materials that may be used as exposed interior finishes are measured by the test method in Standard ANSI/UL 723 (ASTM E84 and NFPA 255), Test for Surface Burning Characteristics of Building Materials. The flame spread index of these materials is less than 200 and the smoke development index of these materials is less than 450. Surface Burning Classifications are contained in the Building Materials Directory.

Radiant Heating Cables

The effect of the use of electrical radiant heating cables or wires on the fire resistance performance of assemblies has not been evaluated.

Coating Materials

Coating materials include products identified as Cementitious Mixtures, Mastic Coatings and Sprayed Fibers. On January 2, 1996, the product categories Cementitious Mixtures and Sprayed Fiber were combined into a single product category titled, Spray-Applied Fire Resistive Materials. The introduction of the new product category is in harmony with terminology in publications by the Model Code Organizations and ASTM.

The type of material is specified in each design. Materials that have been evaluated for exterior application are so indicated in the individual designs and in the product category.

Regulations governing the application and use of coating materials have been promulgated by many governmental agencies. Authorities having jurisdiction should be consulted for current local requirements.

The surfaces on to which the material is to be applied must be free of dirt, oil and loose scale.

Unless specifically prohibited in a design, materials identified as Spray-Applied Fire Resistive Materials (CHPX) may be applied to primed or similarly painted wide flange steel shapes provided: (A) the beam flange width does not exceed 12 in.; (B) the column flange width does not exceed 16 in.; (C) the beam or column web depth does not exceed 16 in.; (D) bond tests conducted in accordance with the Standard Test Method for Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members, ASTM E736, shall indicate a minimum average bond strength of 80 percent and a minimum individual bond strength of 50 percent when compared to the bond strength of the fire resistive coating as applied to clean uncoated 1/8 in. thick steel plate. The average and minimum bond strength values shall be determined based upon a minimum of five bond tests conducted in accordance with ASTM E736.

The bond tests need only be conducted when the fire resistive coating is applied to a primed or similarly painted surface for which acceptable bond strength performance between the primer or other similar material and the fire resistive coating has not been measured. A bonding agent may be applied to the primed or similarly painted surface to obtain the minimum required bond strength where the bond strengths are found to be below the minimum acceptable values.

As an alternative to the bond test conducted on control samples applied to an uncoated steel plate, the following method may be used for unknown coatings in existing structures. Sections of painted steel are to be coated with a bonding agent compatible with the sprayed material being used on the project. The treated and untreated substrates shall be coated with material, cured and subjected to five bond tests each, in accordance with ASTM E736. If the failure mode of the sections treated with the bonding agent is 100 percent cohesive in nature, it will be acceptable to use this bond test value as the control bond strength. The value obtained on the untreated painted section shall be compared to the control value using the minimum 80 percent average, 50 percent individual bond strength acceptance criteria established in ASTM E736.

If condition (D) is not met, a mechanical bond may be obtained by wrapping the structural member with expanded metal lath (minimum 1.7 lbs per sq yd).

If any of the conditions specified in (A), (B), or (C) are not met, a mechanical break shall be provided. A mechanical break may be provided by mechanically fastening one or more minimum 1.7 lbs per sq yd metal lath strips to the flange or web either by weld, screw, or powder actuated fasteners, on maximum 12 in. centers, on each longitudinal edge of the strip, so that the clear spans do not exceed the limits established in conditions (A), (B), or (C) as appropriate. No less than 25 percent of the width of the oversize flange or web element shall be covered by the metal lath. No strip of metal lath shall be less than 3-1/2 in. wide.

As an alternative to metal lath, the mechanical break may be provided by the use of minimum No. 12 gauge steel studs with minimum No. 28 gauge galvanized steel disks if such a system is described in a specific design (usually bottomless trench in an electrified floor design) for the fire resistive coating being applied. The studs shall be welded to the oversize element in rows such that the maximum clear span conforms to conditions (A), (B), or (C) as appropriate. The spacing of studs along each row shall not exceed 24 in. and a minimum one stud per 256 sq in. shall be provided.

Where metal lath strips or steel studs and disks are used, acceptable bond strength as described in item (D) shall also be provided. A bonding agent may be applied to the painted surface to obtain the required minimum bond strength where bond strengths to a painted surface are found to be below minimum acceptable values.