Sprayed-Applied Fire-Resistive Materials

The type of material is specified in each design. Materials that have been investigated for exterior applications are so indicated in the individual designs.

The surfaces on to which the material is intended to be applied must be free of dirt, oil and scale. Mixing and spraying instructions are printed on each bag of material.

The densities shown in the illustrated designs are intended to be considered as the minimum average densities of the material that will provide the performance indicated by the design.

Dry-density measurements may be determined by removing sections of at least 150 x 150 mm randomly selected from the building, subjecting them to 50°C in an oven until constant mass is obtained, followed by accurate weighing, measuring and calculation of the density in kg/m^3. Constant mass is usually obtained after 24 to 48 h exposure within a 50°C oven.

The sprayed-applied fire-resistive material thickness specification given in a design may be considered the minimum average thickness of the individual thickness readings measured in accordance with ANSI/ASTM E605, "Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members." Individual measured thickness, which exceeds the thickness specified in a design by 6 mm or more, is intended to be recorded as the thickness specified in the design plus 6 mm. No individual measured thickness should be more than 6 mm less than the thickness specified in a design.

The thickness of the sprayed-applied fire-resistive material should be corrected by applying additional material at any location where: (1) the calculated average thickness of the material is less than that required by the design, or (2) an individual measured thickness reading is more than 6 mm less than the specified thickness required by the design.

Selected areas of the structural frame and/or floor area are intended to be chosen to obtain representative average thicknesses. Thickness readings on floor or wall areas are intended to be taken symmetrically over the selected area. The average of all measurements should be considered the average thickness of the area. Thickness measurements on beams and/or columns are intended to be made around the member at sections within 300 mm of each other. The average thickness should be considered the average of the readings taken at both sections.

New Requirements for the Use of Sprayed-Applied Fire-Resistive Materials on Primed Steel Surfaces

Effective date for the revised clarifications is January 01, 2009

The surfaces on which the material is intended to be applied must be free of dirt, oil and loose scale. Surfaces may be primed with UL Classified primers/paints covered under Primers for Structural Steel (CGJM).

The following method of determining the bond strength of the spray-applied materials only applies to primers or paints not covered under Primers for Structural Steel (CGJM). Unless specifically prohibited in a design, materials identified as Spray-applied Fire-resistive Materials (CHPXC) may be applied to primed or similarly painted wide-flange steel shapes and pipe and tube-shaped columns, provided: (A) the beam flange width does not exceed 305 mm; (B) the column flange width does not exceed 406 mm; (C) the beam or column web depth does not exceed 406 mm; (D) the pipe outer diameter or tube width does not exceed 305 mm; (E) bond tests conducted in accordance with ANSI/ASTM E736, "Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials (SFRM) Applied to Structural Members," should indicate a minimum average bond strength of 80% and a minimum individual bond strength of 50% when compared to the bond strength of the fire-resistive coating as applied to clean uncoated 3.2 mm thick steel plate. The average and minimum bond strength values should be determined based upon a minimum of five bond tests conducted in accordance with ANSI/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 should be coated with material, cured and subjected to five bond tests each, in accordance with ANSI/ASTM E736. If the failure mode of the sections treated with the bonding agent is 100% 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 should be compared to the control value using the minimum 80% average, 50% individual bond strength acceptance criteria established in ANSI/ASTM E736.

If condition (E) is not met, a mechanical bond may be obtained by wrapping the structural member with expanded metal lath (minimum 0.927 kg/m^2).

If any of the conditions specified in (A), (B), (C) or (D) are not met, a mechanical break should be provided. A mechanical break may be provided by mechanically fastening one or more minimum 0.927 Kg/m^2 metal lath strips to the flange, web or tube and pipe surface either by weld, screw, or powder-actuated fasteners, on maximum 305 mm centers, on each longitudinal edge of the strip, so that the clear spans do not exceed the limits established in conditions (A), (B), (C) or (D) as appropriate. No less than 25% of the width of the oversize flange or web element should be covered by the metal lath. No strip of metal lath should be less than 90 mm wide.

As an alternative to metal lath, the mechanical break may be provided by the use of minimum 2.5 mm steel studs with minimum 0.36 mm 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 should be welded to the oversize element in rows such that the maximum clear span conforms to conditions (A), (B), (C) or (D) as appropriate. The spacing of studs along each row should not exceed 610 mm and a minimum one stud per 0.165 m^2 should be provided.

Where metal lath strips or steel studs and disks are used, acceptable bond strength as described in item (E) should 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.

Cavities, if any, between the upper beam flanges and open web steel joist (OWSJ) flanges, and the steel floor or roof units are intended to be filled with the fire-resistive coating material applied to the beam and OWSJ flanges, unless specified otherwise in the individual designs.