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Introduction

Fireproofing materials used to protect structural building elements and assemblies include Sprayed Fire-Resistive Materials (SFRM), Intumescent Fire-Resistive Materials (IFRM), Boards and Wraps.

Fireproofing is not a ‘materials’ type application. They are tested and listed systems (Listings), installed in accordance with the fireproofing manufacturer’s instructions – whether in USA, Canada, or other parts of the world. The building codes state this clearly.

Fire-Resistance Basics

Fire-resistance is determined by furnace fire testing building elements and assemblies as a system. The beam, column or horizontal assembly are tested as an individual building element or assembly – but still constitute a system.

The fire test furnace fire and heat exposure follows a standard time/temperature curve. The beam, column or horizontal assembly is exposed to the furnace temperatures starting at ambient, and then moving to 1000°F in 5 minutes, 1700°F after 1 hour of exposure, and 2000°F in 4 hours. The performance of the assembly is influenced by two factors – the heat transmission through protection materials, and the ability of the protection materials to remain in place. For fireproofing, adhesion of the fireproofing to the substrate is critical.

The fire-test procedures ASTM E119 *Standard Test Methods for Fire Tests of Building Construction* and UL 263 *Standard for Safety of Fire Tests of Building Construction* and CAN/ULC-S101, *Standard Method of Fire Endurance Tests of Building Construction and Materials* are examples of test methods used to determine fire-resistance for SFRM, IFRM, and Boards and Wraps in the world. During tests administered in accordance with these standards, the temperature of the structural building elements can be 1000°-1300°F.

The comments below pertain to all types of fireproofing products including SFRM, IFRM, and Boards and Wraps, unless the manufacturer produces data proving otherwise.

Application of Fireproofing Over or Under Air Barrier Materials.

NFCA has fielded questions about air barrier materials that need to be continuous to provide continuous air leakage protection to the building envelope, or exterior. The question is, what is to be done when the air barrier materials meet fireproofing on a fire-resistance-rated structural building element or assembly?

Air barrier materials are made from various chemicals, from liquid applied to sheet applied materials, and generic deemed to comply materials found in the International Energy Conservation Code. Some materials have relatively low melting and points at which the products might melt or ignite.

Should the air barrier/flashing material, residue melt during the fire-test, adhesion of the fireproofing to the air barrier material (or residue if removed), might be lost.

Second, compatibility of the fireproofing to the air barrier/flashing is not known.

Third, we'd ask if the air barrier material manufacturer company has performed a fire test to understand the effects on the fireproofing's fire-resistance performance with an air barrier product under or over fireproofing. Or if the fireproofing material is over a residue left from the air barrier material on the substrate after removal.

Plus, manufacturers of fireproofing will need to state compatibility of the air barrier material to the fireproofing. Surface preparation of the substrate required after removal of material/residue prior to fireproofing application also needs to be expressed.

Application of Air Barrier Materials over Fireproofing

The fire-resistance of a beam, column or horizontal assembly is determined via fire testing in accordance with ASTM E119, UL 263, and in Canada, CAN/ULC, using the standard time/temperature curve furnace fire exposure mentioned above. There have been no fire tests that we know of where fireproofing has been tested with an air barrier material of any kind over the top of the fireproofing.

Should air barrier materials be added under or over the fireproofing, we do not know the fire-resistance performance that will result. The exception would be certain materials that would be considered in Harmathy's principles, as an additive to fire-resistance performance of the fireproofing materials used in the listing. In these cases, the fireproofing manufacturer might have tested these materials as part of a fire-resistance design but not published a listing.

Fire test data backing claims of compatibility and fire-resistance performance is critical to fire and life safety. The Authority Having Jurisdiction (AHJ) uses listings to compare fire-resistance products used in listings – and their ability to meet code requirements.

There might be fire-protection engineers providing fire-modeling about fireproofing material behavior during fire conditions. Remember, fire modeling without fire-test data to back the claim is just that, fire modeling. These are only hypothetical determinations which do not evaluate the interaction of multiple materials in a fire test in accordance with ASTM E119 or UL263, CAN/ULC-S101. Claims based on fire modeling without substantiating fire test data are nothing but claims. It is not actual proof of fire-resistance performance.

UL Solutions has a position on foam applied over fireproofing published in their 'Guide Information', from the listing directory, Product iQ.

BXUV Guide Info <https://iq.ulprospector.com/en/profile?e=206790#SectionItem8>.

When mastic and intumescent coatings are exposed to fire, they expand and form an insulating char. Unless otherwise detailed in the individual designs, mastic and intumescent coatings are tested without any covering adjacent to the tested member that might interfere with the expansion of the coating. The effect on the fire-resistance rating of steel members (beams, columns, etc.) caused by any covering that would interfere with the expansion of a mastic and intumescent coating during a fire has not been investigated. Contact the manufacturer for their required clearance around structural members protected with mastic and intumescent coatings.

Unless otherwise noted in the individual designs or certifications, the application of sprayed polyurethane foam or other insulation over sprayed fire-resistive materials (SFRM) or intumescent fire-resistive materials (IFRM) coatings has not been investigated.

UL UK has published a Guide to Steelwork Fire Protection as well – stating a similar position.

Epoxy Mastic and Intumescent Coatings Certified to CDWZ, that are certified without a reference to a topcoat may have aesthetic topcoats applied without detriment to the system performance. Where topcoats are not listed in the design/certification, topcoats are to be used at the discretion of the manufacturer of the fire resistive coating and the AHJ. When such topcoats have been deemed acceptable by the manufacturer of the fire resistive coating and the AHJ, it should be understood that such products are not under UL Certification and have not been evaluated for their impact to the fire resistance rating.”

There are sometimes surface coatings used on top of SFRM’s for color. UL Solutions has a position on this situation, including only SFRM and not IFRM.

“For SFRMs, UL allows for surface coatings such as water-based latex, vinyl acrylic, urethane or chlorinated rubber coatings to be used as a topcoat on UL Classified materials. If used, the coatings are intended for surface coloring only. Their application must be controlled so that the coatings do not saturate the SFRM and thus influence the bond between the SFRM and the steel substrate. Unless specifically indicated, these systems have not been investigated for exterior use. The flame spread index of the surface coating shall be less than 200 as determined by the test method in ANSI/UL 723 (ASTM E84 and NFPA 255). Surface Burning Classifications are contained in the UL Building Materials Directory.”

Conclusion & NFCA Statement

As mentioned earlier, fireproofing including SFRM, IFRM, Boards and Wraps, as mandated by building codes, are not a ‘materials’ type application. They are tested and listed system designs (listings), installed in accordance with the fireproofing manufacturer’s instructions – whether in USA, Canada, or other parts of the world.

Absent specific instructions from the fire-test laboratory (fire-resistance designs) and manufacturer’s statements (compatibility) for application of air barrier materials over or under fireproofing, industry documents have stated that there is no fire-test data published to allow use and still maintain fire-resistance protection.

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