Scope of ASTM D790

Some project specifications in Oil & Gas and Petrochemical installations call for passive fire protection materials to be tested according to ASTM D790.

The subject of ASTM D790 is "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials". Essentially, the test method comprises a three-point bending test of a small strip of material. The results of the test can be expressed as the bending strength, the modulus of elasticity under bending or the maximum flexural strain before failing. This test is suitable for plastics to evaluate if the material is sufficiently flexible to undergo imposed deformations without failing or yielding, which is generally a relevant property for plastics and electrical insulation materials.

Relevance for Passive Fire Protection

ASTM D790 is sometimes used for Intumescent Fire Resistive Materials (IFRM's) to demonstrate the flexibility of the material. It is potentially a measure that gives a rough indication about the material to accommodate substrate deformations without being damaged. However, the performance does not directly influence the fire resistance performance of the material.

Cementitious spray mortars (Spray Applied Fire Resistive Materials, SFRM's) are relatively stiff. Small and slow deformations of the substrate can be accommodated by elasticity or relaxation of the material, and larger or faster deformations may cause hairline cracks, provided that the correct bonding to the substrate has been achieved. Such hairline cracks do not negatively influence the fire resistance performance of the SFRM. Depending on weather conditions or aesthetical requirements, an SFRM can be covered by a topcoat that will also cover such hairline cracks and avoid water ingress.

Alternative evaluation basis for Promat FENDOLITE® MII

ASTM D790 is not considered a suitable basis for the evaluation of the performance of cement-based SFRM's. Instead, the correct performance should be evaluated in three steps:

- Proper bonding to the substrate: no adhesive failure allowed in ASTM E736 tests,
- Demonstrable fire performance of cracked material, by fire tests or validated models,
- Depending on weather and aesthetical requirements, application of a suitable topcoat.

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