Physical Performance Standards For Spray-Applied Fire Resistive Materials (SFRMs)

Physical performance standards for spray-applied fire resistive materials (SFRMs) are used to evaluate the performance of the materials when subjected to various simulated forces.

Acceptable in-place physical performance of SFRMs is based on ASTM Test Standard procedures and specific test values as required by AIA MasterSpec® and other code organizations.

ASTM (American Society for Testing and Materials) has developed test standards that have been created and adopted by SFRM manufacturers and specifiers as a means of determining acceptable, long-term physical performance of fire protection materials. Whether or not the performance is acceptable depends on the specific project requirements. The required performance for commercial buildings is typically the standard performance specified by AIA MasterSpec or other agencies and/or organizations. These are the performance values that should be specified and used as a bench mark for acceptable on-site performance.

When manufacturers test their materials in accordance with ASTM procedures, tests are conducted under controlled conditions at independent laboratories. An independent laboratory test typically results in one tested value, or an average value of multiple tests, that often well exceed both the acceptable standards (AIA etc. minimum requirements) and the actual in-place performance of the product at the project site. Therefore, project specifications should not list specific independent test results conducted on one manufacturer's product, but instead should reference the typical in-place industry performance or acceptable standard values as indicated by AIA MasterSpec, etc. Please refer to the summary of the ASTM Test Methods used to evaluate the performance of SFRMs in addition to the attached chart. The performance values of SFRMs evaluated in accordance with these standards can be used in comparison with one another. It is imperative SFRMs of the same density category be compared to each other.

ASTM E84 – Surface Burning Characteristics
This test method is used to determine the relative burning behavior of the building material by observing the flame spread and smoke developed characteristics of the specimen.

ASTM E605 – Thickness and Density
These test methods cover procedures for determining the basic properties of density and thickness. Fire resistance ratings are contingent upon meeting minimum in-place density and thickness values.

ASTM E736 – Cohesion and Adhesion
This test method measures the cohesion/adhesion (bond strength) of the material to the substrate. Bond strength is critical to the in-place performance of the material which, when insufficient, could jeopardize the hourly fire resistance ratings.

ASTM E759 – Deflection
This test method subjects the material to defection and records whether cracking, spalling or delamination of the material occurs when applied to the underside of steel deck. The test is performed to simulate deflection which can result from excessive loads.

ASTM E760 – Bond Impact
This test method determines the effect of impact loading on the bond of the material applied to the underside of steel deck. Impact loading may occur when loads of material, equipment or machinery are dropped onto decking.

ASTM E761 – Compressive Strength
This test method measures the compressive strength of the material when applied to a rigid substrate. The test determines the material's susceptibility to outside forces which may cause deformation or damage.

ASTM E859 – Air Erosion
This test method determines the effect of air flow across the surface of the material. The tested material is subjected to an air velocity of 1,200 feet per minute, which well exceeds the typical air velocity in an air plemum area.

ASTM E937 – This test method indicates whether corrosion occurs on steel protected by an SFRM and exposed to evaluated temperature and humidity conditions. Testing is performed on bare, galvanized and shop-coated steel.

ASTM G21 – This test method is used to determine the effects of fungi on certain properties of synthetic polymeric materials. This test method evaluates a materials resistance to mold growth over a 28 day period under specified conditions.

ASTM E136 – This standard is used to measure and describe the responses of a building material to heat and flame (combustion characteristics) under controlled conditions. A substance that will not ignite, burn, support combustion, or release flammable vapors when subject to this test is considered non-combustible.

800.631.9600 or + 1 973.347.1200
technical@isolatek.com | sales@isolatek.com
technical-international@isolatek.com | sales-international@isolatek.com
www.isolatek.com

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ISOLATEK® INTERNATIONAL
Corporate Headquarters

Isolatek International
41 Furnace Street
Stanhope, NJ 07874
Telephone: 973.347.1200

ASTM Physical Performance Standards

		Recommended Performance Requirements		
Physical Property	**ASTM Standard**	**Commercial Density**	**Medium Density**	**High Density**
Surface Burning Characteristics	ASTM E84	Flame Spread: 10 or less Smoke Developed: 0	Flame Spread: 10 or less Smoke Developed: 0	Flame Spread: 10 or less Smoke Developed: 0
Density	ASTM E605	15 pcf (240 kg/m^3)	Min 22 pcf (353 kg/m^3)	40-44 pcf (641-750 kg/m^3)
Cohesion / Adhesion (Bond Strength)	ASTM E736	150 psf (7.2 kPa)	Min 430 psf (20 kPa)	1,000 psf (47.9 kPa)
Deflection	ASTM E759	No cracks, spalling, or delamination	No cracks, spalling, or delamination	No cracks, spalling, or delamination
Bond Impact	ASTM E760	No cracks, spalling, or delamination	No cracks, spalling, or delamination	No cracks, spalling, or delamination
Compressive Strength	ASTM E761	1,440 psf (68.9 kPa)	Min 7,344 psf (351.7 kPa)	43,200 psf (2,068 kPa)
Corrosion	ASTM E937	Does not promote corrosion of steel	Does not promote corrosion of steel	Does not promote corrosion of steel
Air Erosion	ASTM E859	Max. 0.025 g/ft^2	Max. 0.025 g/ft^2	Max. 0.025 g/ft^2
Fungal Resistance	ASTM G21	Zero Growth After 28 days	Zero Growth After 28 days	Zero Growth After 28 days
Combustibility	ASTM E136	Noncombustible	Noncombustible	Noncombustible

Recommended Performance based on industry standards and practices