Changes reduce some FM classifications

FM 4470 has been revised, resulting in different uplift resistance criteria

by Mark S. Graham

FM Approvals has revised its criteria for determining the uplift resistances of membrane and liquid-applied roof assemblies. Because many roofing professionals rely on FM Approvals' classifications when designing and specifying low-slope roof assemblies, you should be aware of the changes made and their effects on specific roof assembly classifications.

FM 4470

FM 4470, "Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction," is the basis for FM Approvals' determination of 1-60, 1-90, 1-120, etc., classifications used for low-slope membrane and liquid-applied roof assemblies.

In June 2012, FM Approvals revised FM 4470; the effective date of the new standard was Dec. 31, 2012. The revisions include adding NFPA 276, "Standard Method for Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components," to determine combustibility below the roof deck; changes to the conditions of acceptance for wind uplift and hail damage resistance testing; and adding an alternative test method for determining fasteners' corrosion resistances.

One of the more significant changes to FM 4470 is how steel roof decks are evaluated. With the revised standard, steel roof decks cannot exceed the allowable stresses provided for in AISI S100, "North American Specification for the Design of Cold-Formed Steel Structural Members." The maximum allowable deflection for steel roof decks is based on a 200-pound point load; previously, a 300-pound point load was used. Also, minimum designs of steel roof decks now are based on a minimum 0.7-mm-thick (slightly less than 22-gauge), 33-ksi yield strength steel. Previously, minimum 0.75-mm-thick (22-gauge) steel complying with the ASTM International specification was used for evaluation.

The method of analyzing attachment of steel decks also has been revised. Deck fasteners now are tested for fastener "pull over" (pull through) of the deck material. Also, stress calculations are performed on both steel decks and fastener heads, and the lower of the two values is used as the basis for classification.

FM 4470 also now includes additional provisions allowing for optional ratings for dynamic puncture resistance of roof coverings, noncombustible core for roof insulation and solar reflectance of roof surfaces.

All products tested after Dec. 31, 2012, are required to satisfy the new standard's requirements. Products FM Approvals already approved under previous editions of FM 4470 also need to comply with the current edition by the effective date or forfeit classification.

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What this means

If a specific classified assembly results in an overstressed steel roof deck, FM Approvals has, upon consultation with the manufacturer, either changed the assembly's parameters to compensate for the deck overstress or reduced the assembly's wind rating to a level where the deck no longer is overstressed. Assembly parameters likely changed include reducing the deck span and/or increasing the deck's steel thickness and/or yield strength (from 33 ksi to 80 ksi).

For assemblies where the wind rating has been reduced, the assemblies' previous RoofNav numbers have been withdrawn and new RoofNav numbers issued to avoid confusion.

If you use the new version of FM 4470 for an adhered roof assembly applied to a 1½-inch-thick, 22-gauge steel deck at a 6-foot maximum span, FM Approvals has indicated maximum classifications are limited to 1-165 when using a 33-ksi steel deck and 1-300 when using an 80-ksi steel deck. For seam-fastened mechanically attached single-ply membrane assemblies, classifications will vary based on assembly parameters and seam fastener row spacing, but generally classifications will be noticeably lower than with FM 4470's previous version.

Proceed cautiously

Roof system designers and specifiers need to be aware of FM 4470's revision and its effect on assembly parameters, uplift ratings and RoofNav numbers for membrane and liquid-applied roof assemblies using steel roof decks.

For roofing projects designed before the implementation date but that will be installed after the implementation date, clarification needs to be sought regarding which version of FM 4470 applies. If the current version applies, changes to the roof assembly specification may be necessary and affect a project's cost.

I encourage roof system designers and specifiers and roofing contractors to work closely with manufacturers when determining changes to specific assembly parameters, uplift ratings and RoofNav numbers.

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