Do you overspecify?

by Mark S. Graham

A large number of project specifications for low-slope membrane roof systems designate an Underwriters Laboratories (UL) Inc. Class A fire-resistance rating and FM Approvals 1-90 wind-resistance approval. For many buildings' roof systems, these classifications are in excess of building codes' minimum requirements.

This month, I will explain how specific fire- and wind-resistance classifications are determined.

External fire resistance

Roof assemblies' resistances to exterior fire exposure are tested and classified using two similar test methods: ASTM E108, "Standard Test Methods for Fire Tests of Roof Coverings," and UL 790, "Tests for Fire Resistance of Roof Covering Materials." These tests provide the basis for the "Class A," "Class B" and "Class C" designations.

Class A designates resistance to severe fire-test exposure; Class B designates resistance to moderate fire-test exposure; and Class C designates resistance to light fire-test exposure.

The minimum exterior fire-resistance classification necessary for a specific building's roof is determined based on the building's type of construction. In the *International Building Code* (IBC), Table 1505.1 provides the minimum roof covering classification for types of construction. This table is reproduced in the figure. It is important to note a Class B classification is the most restrictive classification required according to IBC unless footnote "a" in the table applies, which is rare.

Table 1505.1[a,b] Minimum roof covering classification for types of construction

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C[c]	B	C[c]	B	B	C[c]

a. Unless otherwise required in accordance with the *International Urban Wildland Interface Code* or due to the location of the building within the fire district in accordance with Appendix D

b. Nonclassified roof coverings shall be permitted on buildings of Group R-3, as applicable in Section 101.2, and Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.

c. Buildings that are not more than two stories in height and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or publica ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles.

Table 1505.1 from the *International Building Code*, 2003 Edition

Wind resistance

FM Approvals tests the wind resistance of low-slope membrane roof systems and assemblies using two test methods: FM 4450, "Approval Standard for Class 1 Insulated Steel Roof Decks," and FM 4470, "Approval Standard for Class 1 Roof Covers." These tests provide the basis for the "1-60," "1-75," "1-90," etc., designations.

The minimum wind-resistance classification necessary for a specific building's roof is determined based on IBC's Section 1609—Wind Loads or ASCE 7, "Minimum Design Loads for Buildings and Other Structures." Calculations based on ASCE 7 reveal a 1-60 classification is adequate for most buildings in regions where the basic wind speed is 90 mph (40 m/sec) or less and building height is less than 60 feet (18 m)—these parameters apply to most buildings in the U.S. outside of coastline areas.

Closing thoughts

For many projects, designers specify fire- and wind-resistance ratings for roof assemblies that are in excess of code requirements. Although this practice is not incorrect, it often results in increased costs to building owners with little or no quantifiable benefit in terms of increased roof assembly performance or longevity. In many instances, building owners would be better served if these additional costs were allocated toward specifying upgraded roof assembly components or details or improving contractor selection.

I encourage specifiers to evaluate requirements for fire- and wind-resistance classifications on a project-by-project basis and specify roof assemblies' fire- and wind-resistance classifications commensurate with specific project requirements.

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