Coping With Changes to FM 4470

By Mike Ennis, RRC

Over the past several years, SPRI, representing sheet membrane and component suppliers to the commercial roofing industry, has developed 11 American National Standards Institute (ANSI)-approved standards, three of which have been adopted by the International Building Code® (IBC). Besides developing meaningful standards for the roofing industry, SPRI also takes a keen interest in technical issues that affect roof consultants, designers, and contractors.

SPRI stands ready to support or challenge proposed code changes that affect the commercial roofing industry. However, much of the association's efforts involve education.

For example, on November 7, 2012, SPRI published the first of two detailed bulletins that include recommendations for the designer, consultant, and contractor communities on important changes made to FM Approvals Standard 4470. The SPRI bulletins, an Excel worksheet, and an executive summary are available for download at www.spri.org/publications/policy.htm.

REVISIONS TO FM APPROVALS STANDARD 4470

On October 18, 2012, FM officially notified roofing system manufacturers and component suppliers of the revised FM Approval Standard 4470 (FM 4470), *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.* These changes mostly involve roof decking and went into effect on December 31, 2012. FM Approvals' notification letter is included with *SPRI Bulletin No.1-12* on the SPRI website.

As author of FM 4470, FM Approvals made changes to its standard. These changes include new testing requirements listed in FM Standard 4450. While these revisions are clearly of interest to all roof consultants, it should be noted that FM Approvals of Norwood, MA, is a member of the FM Global Group—a commercial and industrial property insurance company. FM 4470 need only be followed when FM Global-insured buildings are having roof systems installed.

FM Approvals has confirmed that it has no loss history with mechanically fastened single-ply membranes (8-, 10-, or 12-ft.-wide panels) causing damage to the decking or structure. These mechanically attached systems, which have been tested for wind uplift performance at various accredited laboratories, will continue to be offered in the market place. (Photo courtesy of GAF, Wayne, NJ.)

Neither the existing nor the revised FM Standard 4470 is a consensus standard that is included in the current IBC editions 2009 and 2012.

Nevertheless, the revisions to FM 4470 can have a significant impact on FM-insured projects as well as non-FM-insured buildings where FM 4470 is specified by the designer of record.

As of this writing, however, neither FM Approvals nor FM Global has provided transition plans or guidance when incorporating these changes on FM-insured roofing projects that were bid prior to the revisions becoming effective on RoofNav, FM Approvals' complimentary web-based tool for roofing professionals. (To visit the RoofNav website, access www.fmglobal.com/page.aspx?id=50050000.)

The good news is that Mark Tyrol, PE, of FM Approvals will be making a presentation on the changes to FM 4470 at RCI Inc.'s 28th International Convention & Trade Show on March 14-16 in Orlando, FL. FM Approvals representatives have also conducted a number of face-to-face meetings with code specialists employed by the larger roof system manufacturers.

WHY THE CHANGES?

While SPRI is in no position to speak for FM Approvals, it is likely that the company believes its changes to FM 4470 will reduce insurance risk and provide greater safety factors on FM-insured buildings. Over the years, the number of roof fasteners required on the corners and perimeters of mechanically attached roof systems has been increased to meet design wind loads. It now appears that FM Approvals is looking at the roof system/roof deck interface with an eye toward reducing the stresses on steel roof decking.

In fact, FM's notification letter states that the following new requirements have been added to Standard 4470:

- "Stresses induced to steel roof decking shall be determined by rational analysis and shall not exceed the allowable stresses per the latest edition of the *North American Specification for the Design of Cold-Formed Steel Structural Members*, AISI S100-2001."
- "Limits on roof deck fastener stress have also been added."

SPRI Releases Second Bulletin on FM 4470 Revisions

SPRI has published a second, detailed bulletin (*No. 2-12*) that includes further clarifications for the designer, consultant, and contractor communities on important changes recently made to FM Approvals Standard 4470.

The second SPRI bulletin emphasizes that meeting the entire criteria established in FM 4470 is not a requirement of the 2009 International Building Code® (IBC).

The SPRI document clearly points out sections of the IBC that determine the requirements for building design, including explanations of Sections 1504.3, 1504.3.1 (Wind Resistance), and 1504.7 (Impact Resistance). In these sections, the IBC does reference specific FM Approvals test procedures.

In general, however, the IBC requires testing to be conducted by an "approved" testing agency. Many "approved" third-party test laboratories are located throughout the country to conduct roof system testing and issue final test reports. Roof system manufacturers can then use these test reports as documentation to show compliance with the IBC.

SPRI Bulletins 1-12 and *2-12*, an Excel spreadsheet, and other information on the revisions to FM 4470 can be downloaded at http://www.spri.org/publications/policy.htm.

It is likely that FM Approvals believes its changes to FM 4470 will reduce insurance risk and provide greater safety factors on FM-insured buildings. Despite the roof damage shown here after a Florida hurricane, the integrity of the roof deck has not been compromised. (Photo courtesy of SPRI.)

In addition, FM is conducting a full review of all current RoofNav-Approved steel deck assemblies that, in its opinion, "overstress the deck." The following changes are then expected to take place:

- "For the existing RoofNav assemblies, reduce the deck span and increase the deck thickness and/or the grade of steel to provide the maximum number of steel deck options available while maintaining the qualified wind rating of the assembly."
- "Create new RoofNav assemblies from the existing assemblies with the wind rating reduced to a level where the roof deck is not overstressed, while maintaining all parameters of the assembly (i.e., deck span, grades, and thicknesses)."

FM's Excel spreadsheet provides two tabs (spreadsheets)—one for 33 ksi decking, and the other for 80 ksi decking—that delineate what an "FM-Approved Steel Deck Attachment" is, as well as the maximum membrane fastener row spacing allowed per deck type and span.

Considering these new FM Approvals requirements, designers may not want to use the revised FM 4470 as the basis for their specifications unless the building is to be FM-insured.

When the building or tenant is FM-insured, SPRI recommends that the appropriate FM field office be contacted prior to starting work to reconfirm acceptance of the roofing system to FM requirements.

When the building is not FM-insured, SPRI recommends contacting the roofing system manufacturer and component supplier for wind uplift resistance performance to comply with local code.

It should also be noted that FM Approvals has confirmed that it has no loss history with mechanically fastened single-ply membranes (8-ft.-, 10-ft.-, or 12-ft.-wide panels) causing damage to the decking or structure. These mechanically attached systems, which have been tested for wind uplift performance at various accredited laboratories, will continue to be offered in the marketplace.

According to George A. Smith, PE, AVP area director for FM Approvals, "Screening tests may be used to identify crucial components used for full-scale tests.... Alternative components must perform at an equal or higher level than the component qualified for large-scale testing."

The revised standard also includes three optional ratings: Dynamic Puncture Resistance Rating of Roof Covers, NCC- (Noncombustible Core) Rated Roof Insulation, and Solar Reflectance of Roof Surfaces.

KEEPING COMMUNICATION LINES OPEN

If a contract or a quote for roofing work will start after the RoofNav constructions have been revised, SPRI recommends bringing the change in the FM 4470 Standard to the attention of all parties who are involved in the project. This would include the building owner, architect, general contractor, etc., so that all are informed of the changes and possible cost increases on the project.

On FM-insured projects, roof consultants will likely want to confirm the specific characteristics of the steel decking for the project; gauge; strength (ksi); how the decking is to be supported on 5- or 6-ft. spans; and how the decking is or will be attached to the supports, fasteners, welds, etc.

Also consider the following facts:

- Table 1 is located in FM Loss Prevention Data Sheet 1-29, "Roof Deck Securement and Above-Deck Roof Components." This table is referenced in the FM Contractor Package to provide the recommended rating in the field, perimeter, and corner, based from a field design pressure.
- Though not stated in the FM notification letter, the maximum wind uplift rating on 22-gauge, 33-ksi decking supported on 6-ft. spans will reportedly be limited to an FM 1-165 rating. Table 1 shows that, even for an FM 1-90 rating, an FM 1-150 rating and an FM 1-225 rating are required in the perimeter and corner zones. This could require changes to the building structure if following FM 4470 requirements.

SPRI encourages consultants to ensure FM provides direction on the steel decking, and confirms that the proposed steel decking is acceptable for the project. This would be particularly true for buildings located in coastal areas where higher wind uplift ratings are needed at the perimeters and corners of the building.

Furthermore, SPRI recommends that consultants confirm with the applicable FM field office if a re-cover application is acceptable or if the roofing system will have to be

removed down to the steel deck. The newly revised FM 4470 allows for a prescriptive enhancement under section 4.3.1.1.6. This enhancement is only applicable for a reroof condition.

In view of the foregoing, it is also advisable to confirm with the applicable FM field office what products are considered "rigid cover board." FM 4470 has a new definition for "rigid cover board" but has not provided a list of these acceptable products as of this writing.

On non-FM-insured buildings, it is important to remember that FM 4470 is not codified. The IBC allows wind uplift testing to be conducted in accordance with a variety of test methods, including FM 4474, at ICC-ES certified and approved testing laboratories. If a design pressure is specified for the project, third-party certification from the roof system manufacturer can be provided. This can take the form of a test report from an accredited lab, ICC ES report, Florida Product Approval, Miami Dade County Notice of Acceptance, or UL online certification directory.

Unlike the newly revised FM 4470, however, these other entities document building code compliance using codified standards. By not referencing FM 4470 and FM Approvals nomenclatures (FM 1-90, 1-120, etc.), designers may well avoid ambiguous specifications between the requirements of the building code and FM recommendations and/or requirements.

In short, one is encouraged to identify and comply with the IBC, along with the designer of record and/or authorities having jurisdiction related to the specifications. When the building or tenant is FM-insured, SPRI recommends that the appropriate FM field office be contacted prior to starting any work to reconfirm acceptance of the roofing system to FM requirements.

"SPRI is dedicated to improving the roofing industry through research, standard development, and education," summarizes SPRI President Bob LeClare. "The development and advancement of the NT-1, WD-1, FX-1, and ES-1 standards exemplify SPRI's effort to advance roofing standards, and its recent bulletin explaining changes to FM 4470 is but one further example of the ongoing education SPRI offers to the industry."

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Mike Ennis joined SPRI in 1993. He has chaired a variety of SPRI committees and task forces and served as president from 2004-2006. He became technical director of SPRI in 2007. For more information about SPRI, its members, and its activities, visit SPRI's website at www.spri.org or contact the association at info@spri.org.