Understanding FM Approvals' metal edge testing approval

The roofing industry needs more clarity for using FM 4435

by Mark S. Graham

Based on calls being received by NRCA's Technical Services Section, there appears to be confusion in the roofing industry regarding FM 4435, "Approval Standard for Edge Systems Used with Low Slope Roofing Systems," FM Approvals' criteria for metal edge testing. Perhaps the confusion lies with the FM 4435 designation also being included in the title of the U.S. national consensus standard for metal edge flashings. Also, there appears to be some lack of understanding by specifiers regarding how they should properly implement FM 4435. Following is a brief explanation to provide some clarity.

ANSI/SPRI/FM 4435/ES-1

The U.S. national consensus standard for testing the wind resistances of metal edge flashings (except gutters) is ANSI/SPRI/FM 4435/ES-1, "Test Standard for Edge Systems Used with Low Slope Roofing Systems." The most current edition of the standard was published in 2017 and is designated ANSI/SPRI/FM 4435/ES-1-2017.

The standard's previous edition, which was published in 2011 and is designated ANSI/SPRI/FM 4435/ES-1-2011, is referenced in the

International Building Code,® 2015 Edition (IBC® 2015) and IBC 2018.

Earlier editions of the standard were designated as ANSI/SPRI ES-1 (not including the "FM 4435" designation) and were referenced in other IBC editions since the 2003 edition.

FM 4435

FM 4435 is FM Approvals' in-house method for testing and evaluating metal edge flashings. The current edition of FM 4435 was published in June 2013 and had an effective date of Dec. 31, 2014. The previous edition of FM 4435 was dated August 2004.

Unlike ANSI/SPRI/FM 4435/ES-1, FM 4435 is not a recognized consensus standard and not referenced in the IBC.

FM 4435 is referenced in FM Global's Property Loss Prevention Data Sheet 1-49, "Perimeter Flashings" (FM 1-49), as a recommendation for perimeter flashings on FM Global-insured buildings. FM 1-49 also references the construction details contained in The NRCA Roofing Manual: Architectural Metal Flashing and Condensation and Air Leakage Control. FM 4435 has separate guidelines for testing; reporting of test results; quality-assurance procedures for manufacturing; and product or packaging making.

FM 4435 uses ANSI/SPRI/FM 4435/ES-1-2011's RE-1, RE-2 and RE-3 test methods as the basis for its testing. However, instead of reporting test results as resistance pressures in pounds per square foot, FM 4435's results are reported using FM Approvals' classification designations (1-60, 1-90, 1-120, etc.). FM 4435's Table 1 is used to convert ANSI/SPRI/FM 4435/ES-1-2011's RE-1 test results into classification designations. FM 4435's Table 2 is used to convert ANSI/SPRI/FM 4435/ES-1-2011's RE-2 and RE-3 test results into classification designations. It appears FM 4435's tables include some mathematical rounding and the addition of a safety factor for determining classification values.

FM 4435's manufacturing quality-assurance procedures criteria requires fabricators to establish and maintain a quality-assurance program with specific process controls. FM Approvals also conducts periodic—usually one per year—surveillance audits to verify the established quality-assurance program is being carried out.

FM 4435's marking criteria requires fabricators to apply an FM Approvals' mark on the product or its packaging.

Specifying FM 4435

To properly specify FM 4435-compliant metal edge for FM Global-insured projects, designers need to identify the FM Approvals' test criteria and specific FM Approvals' classification desired for the specific project.

FM Approvals' metal edge testing is best identified by using the designation "FM 4435" or "FM Approvals' approved metal edge flashing." FM Approvals' classifications should be designed as "1-60," "1-75," "1-90," etc. as required for the specific project.

Designers can use the Rating Calculator contained in FM Approval's RoofNav application, www.roofnav.com, to help determine project-specific classifications.

Information about specific metal edge flashings currently complying with FM 4435 is accessible using RoofNav's Product Search function.

Closing thoughts

FM 4435 is FM Approvals' proprietary adaption for the metal edge test methods contained in ANSI/SPRI/FM 4435/ES-1-2011. FM 4435 also includes some enhancements, such as establishment of a manufacturing quality-assurance procedure and periodic surveillance audits, which may be desirable to some designers, specifiers and building owners.

The concept of implementing ANSI/SPRI/FM 4435/ES-1-2011 testing with such enhancements is not unique; NRCA has been doing so with its shop-fabricated metal edge testing and certification programs since 2001—before ANSI/SPRI ES-1 testing was a building code requirement.

NRCA's certification programs can be considered even more stringent than FM 4435. For example, in NRCA's UL and Intertek certification programs, its manufacturing quality-assurance procedures are consistent among each of the more than 300 participating fabricators. Also, in the UL certification program, for example, factory audits are conducted by UL four times per year at each fabrication location.

Additional information about NRCA's shop-fabricated metal edge testing and certification programs is available in the Technical section of NRCA's website, www.nrca.net.

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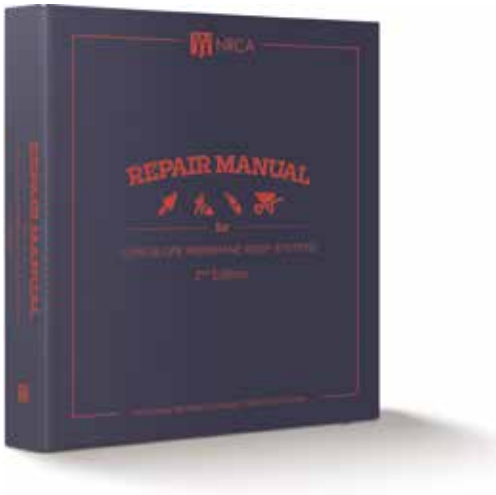
To order a hard copy of the repair manual or download the electronic version, go to www.nrca.net/store/category/technical-resources/9.



Pennsylvania updates its building and plumbing codes

The Pennsylvania Independent Regulatory Review Commission (IRRC) approved the update of its state building code, the Uniform Construction Code (UCC), based on the 2015 International Codes (I-Codes). The I-Codes are a family of comprehensive building codes used in U.S. states and many countries.

Pennsylvania's building codes for residential and commercial construction had not been fully updated in nearly a decade. The updates to the state's building codes took effect Oct. 1.

"This full review is the result of a great collaboration between the Code Council, Pennsylvania's elected leadership, and the construction and building safety community," says Sara Yerkes, senior vice president of government relations for the International Code Council. "We are excited to see Pennsylvania taking this important step to elevate building safety and make it a priority for people throughout the state."

IRRC's decision to update Pennsylvania's building code comes after similar efforts in Philadelphia to modernize building codes at the city level. In June, Philadelphia adopted the *International Building Code,® 2018 edition* into law for commercial construction. The new order, which also took effect in October, will make new commercial and multifamily buildings within Philadelphia more efficient and safer.

Survey reveals technology can help ease the labor shortage

A recent survey of more than 2,500 construction professionals conducted by the Associated General Contractors (AGC) of America and software company Autodesk has revealed some construction companies are introducing new technology in response to the ongoing labor shortage, according to www.constructiondive.com.

Eighty percent of survey respondents indicated they are having difficulty filling hourly craft positions, and 81 percent of construction firms said it will continue to be difficult or become more difficult to find craft workers this year. Nearly half the firms indicated project completions are taking longer and bid prices are higher because of higher than anticipated costs.

Some employers have increased pay, benefits and training to help attract more workers. Other companies, the survey found, are introducing technology such as virtual construction, off-site prefabrication, building information modeling, drones, GPS, laser-guided equipment and 3-D printing to ease labor shortages.

Sarah Hodges, senior director of Autodesk's construction business line, believes technology can help construction companies complete projects faster without requiring extra workers. Technology enables connectivity between a company's job site and back office like never before, she says, and changes how information is collected and analyzed, both of which can drive increased efficiencies. Autodesk aims to have students and craft workers exposed to technologies that help automate portions of construction processes and enhance technology users' problem-solving capabilities.

"Construction is not a dangerous, dead-end career," says Ken Simonson, chief economist for AGC of America. "It provides great opportunity to use tools and technologies of many kinds."

Dan Gilbane, senior vice president of Gilbane Building Co.'s southwest division, recognizes the construction industry is experiencing a rare time where most geographies and market sectors are growing. As a result, Gilbane has introduced drones, 3-D printing and virtual environments into his company. Using such technologies has had a "huge impact on our business not only from attracting and retaining talent, but also by accelerating productivity," he says. And the inclusion of technologies within his construction company has the added benefit of appealing to young workers, a group that is notoriously difficult to attract to the industry.

Virtual reality technologies can enhance safety training

The use of virtual reality- (VR-) based simulators and apps are changing how construction industry trainees are learning about safety, according to www.constructiondive.com. VR allows trainees to gain hands-on experience with common job-site hazards without undertaking real-world risks.

In a Sept. 12 webinar, "Upping the game: The evolution of virtual reality technology in the construction industry," presented by Engineering News-Record, presenters explained how VR has evolved and how it will continue to transform safety within the industry.

Thomas E. Kramer, managing principal at engineering firm LJB Inc. and vice chairman of the ANSI Z359 Accredited Standards Committee, said VR can reinforce elements of an effective fall-protection program. Data from the Bureau of Labor Statistics show Occupational Safety and Health Administration citations related to fall safety quadrupled between 1995 and 2016, and annual personal protective equipment sales increased from $300 million to $800 million. Yet annual workplace fall fatalities increased from 651 fatalities to 849 fatalities during the same timeframe.

To help combat the problem, the American Society of Safety Professionals developed a VR, headset-based Fall Protection Experience app designed to simulate high-risk construction environments. Users are immersed in a simulation of a two-story building and prompted to identify common fall hazards before building an appropriate fall-protection system. The app visually demonstrates fall protection as a system of interconnected components, rather than a single piece of equipment, and reportedly can teach trainees in seven minutes what would take hours of lecture time in a classroom.

Kramer also said turning safety training into a game helps hold trainees' attention while they learn about an important topic. The VR app "increases attention spans and reinforces critical behaviors," he said.

To view how virtual reality simulation can work for safety training, go to www.professionalroofing.net.

Sometimes fall-related deaths happen because an untrained person is being asked to conduct temporary work at heights using an improper or inadequate method to reach the height, said Tim Whiteman, CEO and managing director of the International Powered Access Federation (IPAF). He explained powered access via a mobile elevated work platform or mast-climbing work platform is the safest and most effective way to reach a needed height.

Training workers how to safely use powered machines always is a challenge, so IPAF has turned to VR simulations as a new training method. Traditional training methods involve a half-day in a classroom and a half-day on machines before trainees take a test, Whiteman said, but VR simulation takes users through true-to-life demonstrations for enhanced and expedited instruction. The most sophisticated 3-D simulations present such a realistic portrayal of a powered machine that some trainees are initially hesitant to operate them.

"People who haven't been on a simulator have a vastly different opinion of what VR and simulators can be used for compared to those who have been on one for even five minutes," he explained. "It changes your view very quickly."

As with many technologies, VR-based simulators and apps have some drawbacks. A trainee can use the technology to experience high-risk situations, but constant immersion in a VR environment can cause a trainee to develop a false sense of invincibility and reduce his or her reaction to real-life dangers.

Despite the drawbacks, Whiteman expressed confidence simulators can realistically be used to complement real-life training, citing how airline pilots train in simulators.

"VR has the capacity to enhance training and make it more engaging," he said. "We're really only just starting to understand what's possible. There's no doubt there's an exciting future for VR."