SPRI Updates and Improves Roof Edge Standards

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Florida roofing professionals have long recognized the importance of proper low-slope roof edge and gutter designs, particularly in high-wind conditions. For this reason, SPRI, the association representing sheet membrane and component suppliers to the commercial roofing industry, has spent more than a decade enhancing test and design standards for these roofing details.

SPRI introduced the first version of its landmark standard, ANSI/SPRI/ES-1 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems," in 1998. Since then, the association has continually revised, re-designated and re-approved the document as an ANSI (American National Standards Institute) standard. Testing of edge securement per ANSI/SPRI ES-1 is currently recognized in the International Building Code (IBC), which has been adopted by all states, including Florida.

As of this writing, Florida has finished submitting code modifications for the next code cycle using the 2015 IBC as a base code to create the 2017 Florida Building Code (FBC), Sixth Edition. (See "Changes to the 2017 Florida Building Code," February 2017 Florida Roofing Magazine, page 21, for more information on the current FBC.)

Florida has also recognized and acknowledged the importance of perimeter edge securement in High Velocity Hurricane Zones as part of a statewide Florida Approval requirement. The general public may perceive that if the buildings they occupy are inland, they are not subject to hurricanes and are impervious to blow off. However, industry and government data suggests that roofing professionals should continue to protect the assets of property owners through enhanced roof edge securement standards and testing.

ES-1: Putting Roof Edge Metal to the Test

ANSI/SPRI ES-1 prescribes methodology for testing roof edge assemblies, excluding gutters, to evaluate their resistance to wind loads. The Design Standard focuses primarily on design and testing for wind resistance. However, it does address other factors, such as corrosion and fascia thicknesses that lead to satisfactory flatness of the roof edge metal.

Further, the standard is intended for use with the specifications and requirements of the manufacturers of the specific roofing materials and the edge systems used in the roofing assembly, excluding gutters. The document clearly states that the membrane manufacturer should be consulted for specific recommendations for making the roof watertight at the edge.

ANSI/SPRI/ES-1 has been widely accepted by industry and code approval organizations over the years. In addition, the standard has been referenced in FM Global data sheets and test standards as part of its third-party Approvals process.

SPRI addressed roof gutters in 2010 with the development of ANSI/SPRI GD-1. This document was recently separated into two different standards, a test standard and a design standard. The test standard, GT-1, "Test Standard for Gutter Systems," was approved as an American National Standard on May 25, 2016.

Similarly, SPRI has separated ANSI/SPRI/FM4435/ES-1 into two separate documents, a Test Standard and a Design Standard. Both standards will be a reference for those who design, specify, manufacture, test or install edge materials used with low-slope roofing systems.

Separating both standards (ES-1 and GD-1) into stand-alone design and testing documents will make it easier for designers, contractors and building code officials to consult the specific design or testing requirements needed for a particular roofing project.

IBC requires that perimeter edge metal (fascia and coping), excluding gutters, be tested per three test methods, referred to as RE-1, RE-2 and RE-3 in the ES-1 standard. The design elements of ES-1 were never referenced in code, which caused some confusion as to how ES-1 was to be applied. The latest version of ES-1 (2017) only includes the tests referenced in code to eliminate that confusion.

Test methods in ES-1 2017 have the same names RE-1, RE-2, and RE-3, and use the same test method as ANSI/SPRI/FM 4435/ES-1 2011. Because there are no changes to the test methods, any edge system tested to the 2011 version would not need to be retested using the 2017 version.

FM Global's input was instrumental in the changes in 2011 when ANSI/SPRI ES-1 incorporated components of FM 4435 to become ANSI/SPRI/FM 4434/ES-1. However, there are no additional FM related changes in the latest ES-1 standard.

Per ANSI requirements, ANSI/SPRI/FM 4435/ES-1 2011 needed to be reballoted, which is required by ANSI every five years. SPRI took this opportunity to have it approved as a test standard only to eliminate the confusion referenced above. FM Global was consulted and indicated it wanted to keep "FM" in the title. (FM was on the canvas list for the test standard and actually uses it as its own test standard.)

The design portions of ES-1 and the GD-1 gutter standard have been combined and are now referenced by SPRI as ED-1. It is currently being developed as an ANSI standard that will provide guidance for designing all perimeter edge metal including fascia, coping, and gutter.

ED-1 will be canvassed per the ANSI process later this year. SPRI is not planning to submit ED-1 for code approval.

Using the GT-1 Standard to Your Benefit

Testing of gutters in not currently required by IBC, and is not required in FL. However, field observations of numerous gutter failures in moderate to high winds, along with investigations by RICOWI following hurricanes have shown that improperly designed or installed gutters frequently fail in high wind events. GT-1 provides a test method that can be used by manufacturers of gutters, including contractors that brake or roll form gutters, to determine if the gutter will resist wind design loads. Installing gutters tested to resist anticipated wind forces can give contractors peace of mind, and may provide a competitive advantage when presented to the building owner.

Extensive roof damage shown here after a Florida hurricane includes portions of the roof edge assembly. (Photo credit: SPRI.)

GT-1 tests full size and length samples (maximum 12'-0") of gutter with brackets, straps, and fasteners installed per the gutter design. It is critical that the gutter be installed with the same brackets, straps, and fasteners, at the same spacing and locations as per the tested design to assure the gutter will perform in the field as tested. The contractor should also have the manufacturer label the gutter and/or provide documentation that the gutter system has been tested per GT-1 to resist the design loads required.

The ANSI/SPRI GT-1 test standard was developed by SPRI and received ANSI Approval in May of 2016, as noted above. GT-1 consists primarily of three test methods, G-1, G-2 and G-3. Test method G-1 tests the resistance to wind loads acting outwardly on the face of the gutter, and G-2 tests the resistance to wind loads acting upwardly on the bottom of the gutter. G-3 tests resistance to the loads of ice and water acting downwardly on the bottom of the gutter.

Tests G-1 and G-2 are cycled (load, relax, increase load) tests to failure in both the original GD-1 standard and the new GT-1. The only change being that in GD-1 the loads are increased in 10 lbf/ft2 increments from 0 to failure, and in GT-1 they are increased in 15 lbs/lf increments from 0 to 60 lbs/lf, then in 5 lbs/lf increments from above 60 lbs/lf to failure.

Note also that the units changed from lbf/ft2 to lbs/lf, which was done so that the tests could be run using the test apparatus loads without having to convert to pressures.

The GT-1 standard specifies a laboratory method for static testing external gutters. However, testing of gutters with a circular cross-section is not addressed in the standard, nor does the standard address water removal or the water-carrying capability of the gutter. In addition, downspouts and leaders are not included in the scope of the standard.

SPRI intends to submit ANSI/SPRI GT-1 for adoption in the next IBC code cycle.

All current and previously approved ANSI/SPRI standards can be accessed directly by visiting https://www.spri.org/publications/policy.htm. For further information about SPRI and its activities, visit SPRI's website at www.spri.org or contact the association at info@spri.org.

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