Why ES-1? A Quick Reference Guide

Q. What is ANSI?
A. The American National Standard Institute (ANSI) is a non-profit organization that administers and coordinates a voluntary standardization system.

Q. What is SPRI?
A. SPRI (Single-Ply Roofing Industry) is a non-profit trade association representing the sheet membrane and component supplier to the commercial roofing industry. SPRI is an official ANSI canvasser and has worked with representatives of the roofing industry to develop many consensus standards.

Q. What is FM Global?
A. FM Global provides commercial and industrial property insurance and engineering-driven risk management solutions.

Q. What are ICC & the IBC?
A. The International Code Council (ICC) is a non-profit organization that works to develop a single set of comprehensive and coordinated national model construction codes. The International Building Code (IBC) is a consensus standard for commercial construction codes.

Q. How and when did all these organizations get involved in setting roofing industry standards?
A. Prior to 1980 there were no roofing edge standards to which manufacturers could hold themselves. FM Global then created a proprietary system of standards and approvals to use on FM Global insured properties. The design community adopted this system because there were no other available standards at the time. In 1998 SPRI developed a consensus standard (ANSI/SPRI ES-1) outlining three tests for determining the quality and durability of fascia and coping. These tests are required for ES-1 approval. In 2002 the ICC incorporated the ES-1 standard into the 2003 IBC. All states have adopted the 2003 or later version of IBC, which require that edge metal be tested per ES-1. SPRI and FM Approvals worked together to create an aligned version of the standard (ANSI/SPRI/FM 4435/ES-1), which encompassed both FM's and SPRI's standards. This new version, first published in 2011, is now used for both FM Approval and IBC compliance.

Q. What is the ANSI/SPRI/FM 4435/ES-1 standard?
A. It is a test standard for those who fabricate, specify, or install edge materials used with low-slope roofing systems. It addresses how to test the resistance of copings and roof edges against wind loads.

Q. How are the wind loads on edge metal calculated?
A. Wind loads are calculated per ASCE-7, based upon:

- Wind Speed
- Building Occupancy
- Building Height
- Location of the edge device on Roof
- Building Location

Three tests prescribed in ES-1 are used to determine if a roof edge will withstand the determined loads.

RE-1: This tests the roof edge termination for mechanically attached and ballasted roofing systems. The RE-1 test evaluates the perimeter attachment to ensure that it resists the loads imparted by a billowing membrane. Based upon which edition of ES-1 is referenced, the membrane is either pulled at a 45-angle to the roof deck at 100 lbs/LF (ANSI/SPRI ES-1) or pulled at a 25-degree angle to the roof deck to the required design load (ANSI/SPRI/FM 4435/ES-1). Failure is defined as any event that allows the membrane to come free of the edge termination or the termination to come free.

RE-2: This is a pull-off test for metal edge flashing. It evaluates the strength of the metal edge flashing to ensure that the fascia system meets or exceeds the building's calculated design wind load. A load is applied to the fascia metal, simulating wind load on the fascia. The results must meet or exceed the calculated wind design load of the building.

RE-3: This test is a pull-off test for metal wall coping. It evaluates the strength of the metal coping cap to ensure that it meets or exceeds the building's calculated design wind pressure. A load is applied to the coping cap, simulating wind load. Simultaneous up and out forces are used. The results must meet or exceed the calculated wind design load of the building.

Q. How does the code actually read?
A. Code language varies slightly depending upon which version of IBC is referenced. The 2021 IBC reads as follows:

> **1504.6 Edge systems for low-slope roofs**. Metal edge systems, except gutters, installed on low-slope built-up, modified bitumen and single-ply roof systems, having a slope of less than 2:12, shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with Test Methods RE-1, RE-2 and RE-3 of ANSI/SPRI/FM 4435/ES-1, except V_{ult} wind speed shall be determined from figure 1609A, 1609B, or 1609C as applicable.

All editions of the ES-1 standard can be downloaded in their entirety for free from SPRI (www.spri.org/publications)

Q. Which areas have adopted editions of IBC that require edge metal to be tested per ES-1?
A. All of the United States has adopted some edition of the IBC that require ES-1 testing. To determine which edition of IBC a jurisdiction has adopted visit the ICC website.
(https://www.iccsafe.org/adoptions/)

Q. Who is involved in ES-1 testing and what products have been tested?
A. There are a variety of sources available for ES-1 tested products. Most companies producing pre-manufactured roof edge systems have had some or all their standard products tested in accordance with the ES-1 standard. Any edge product that is FM Approved will have been ES-1 tested. There are several independent labs that have ES-1 tested products for fabricators nationwide. Additionally, the NRCA has ES-1 tested some products that fabricators can sub-list to produce – for more details go to:

https://nrca.net/technical/guidelines-resources/shop-fabricated-edge-metal-testing/its.

Q. What does this mean for me? Do you have any recommendations on how to assure my edge metal meets code?
A. Check the edition of IBC that is applicable to your project and determine the wind loads as calculated per referenced ASCE-7. Then fabricate or source edge metal products that have been tested per ES-1 to resist that design load.