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Engineered Roof Solutions

1600 Airport Road
Waukesha, WI 53188

GT-1: A Deeper Dive

The roof of a building is an integral part of its envelope, and it's no secret that edge metal is the first line of defense to ensure your membrane is secure and sealed to protect against blowoffs and water damage. To provide reassurance and peace of mind, International Building Codes have been updated to incorporate testing requirements to ensure this critical first line of defense is ready to battle the elements.

In this whitepaper, we'll guide you through the new ANSI/SPRI GT-1 testing standard that is now part of the 2021 International Building Code (IBC).

First thing's first: what is ANSI/SPRI GT-1?

After two years of development led by SPRI, the Single Ply Roofing Industry group, ANSI/SPRI GT-1 became an official ANSI standard in May 2016. Like ANSI/SPRI/ FM 4435/ES-1 is to fascia and coping, **ANSI/SPRI GT-1 provides a standard test method for gutter systems that secure membrane on commercial low slope roof systems for load resistance**.

In December of 2019, the International Building Code approved the inclusion of ANSI/SPRI GT-1 into the 2021 cycle.

Who are the key players?

The **American National Standards Institute (ANSI)** is a private, not-for-profit organization that supports the U.S. voluntary standards and conformity assessment system. Encompassing practically every industry, the Institute represents the diverse interests of more than 270,000 companies and 30 million professionals worldwide.

Single Ply Roofing Industry (SPRI) is a national single-ply roofing association comprised of manufacturers and professionals. SPRI is a technical and statistical authority for the single-ply roofing industry. They represent sheet membrane and suppliers in the industry.

Factory Mutual (FM) is formed of a conglomeration of insurance companies. To limit their exposure to loss, FM has developed testing standards for materials used on the properties they insure. All FM Approved products are listed on the RoofNav database.

The **American Society of Civil Engineers (ASCE)** is the most respected engineering society in the US and represents civil engineers around the world. ASCE maintains the Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7), that is a vital part of many building codes.

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How'd we get where we are today?

SPRI published "Wind Design Guide for Edge Systems Used with Low Slope Roofing Systems," their first guide, back in 1994. Four years later the first edition of ANSI/SPRI/ES-1 was created, having been derived from the original SPRI version. In 2003, ASNI/SPRI/ES-1 was introduced into the International Building Code.

Gutters were not included until 2010, when ANSI/SPRI GD-1 was established. The following year, FM Global updated their edge metal testing standard, FM 4435, to match the ES-1 method, now known as ANSI/SPRI/FM 4435/ES-1.

ANSI/SPRI GT-1 became an ANSI standard on May 26, 2016, after roughly two years in development. GT-1 further separated the design and testing standards for edge systems:

- Design: Fascia, Coping, Gutters (ANSI/SPRI/ED-1)
- Testing: Fascia, Coping (ANSI/SPRI/FM 4435/ES-1)
- Testing: Gutters (ANSI/SPRI/GT-1)

ANSI/SPRI GT-1 was subsequently adopted into the IBC in 2021.

Why even have a testing standard?

ANSI/SPRI GT-1 provides a consensus for an expectable level of performance with real world practicality. When design professionals, fabricators, and installers are looking for testing information on wind load resistance and roof edge securement, ANSI/SPRI GT-1 has their answers. Overall, the main goal of having ANSI/SPRI GT-1 is to protect owners, occupants, architects, and installers by providing a universal guide for consistent performance.

When will the new code be adopted in my state?

ANSI/SPRI GT-1 is vital for architects, who should consider getting ahead of the new changes before their state adopts the updated building code. Each state/local municipality or authority having jurisdiction (AHJ) adopts which version of the IBC they follow and when they move to a new code. It's anticipated that several states will quickly adopt the 2021 IBC, and additional states will follow gradually over the next few years. Click here to see what version of IBC your state currently follows.

Where is it referenced in the IBC?

GT-1 will be in Chapter 15, like ES-1 is currently. The new standard can be downloaded here.

Section 1504.6.1 GUTTER SECUREMENT FOR LOW SLOPE ROOFS

"Gutter that are used to secure the perimeter edge of the roof membrane on low-slope (less than 2:12) built-up, modified bitumen, and single ply roofs, shall de designed, constructed, and

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installed to resist wind loads in accordance with section 1609 and shall be tested in accordance with Test Methods G-1 and G-2 pf SPRI GT-1."

How do the GT-1 tests work?

There are two tests conducted: G-1 (Horizontal Test Pressure) and G-2 (Vertical Test Pressure). There is a third test, G-3, that measures the resistance of the gutter system to test forces acting downward such as water, ice, and snow loads. Even though G-3 is part of GT-1 testing, only G-1 and G-2 are directly cited in the 2021 IBC.

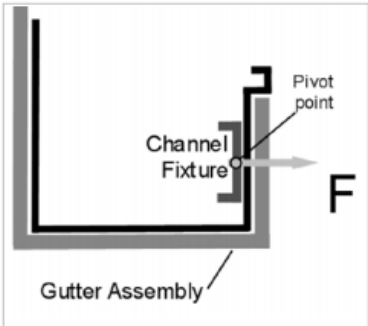

Figure 2. Test Set-up for SPRI Test G-1

Test G-1: Horizontal Test Pressure measures the resistance of the gutter system to test forces acting *outwardly (away from the building).* The highest load held without failure is used to calculate the pressure by dividing the total force by the area of the gutter face.

$$\text{Pressure} = \frac{\text{Load}}{\text{Face Height} \times \text{Length}}$$

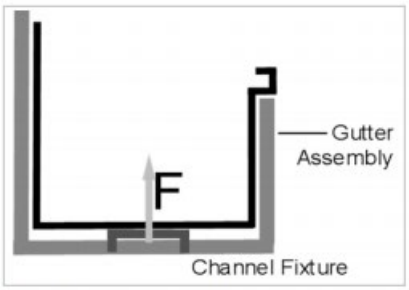

Figure 3. Test Set-up for SPRI Test G-2

Test G-2: Vertical Test Pressure measures the resistance of the gutter system to test forces acting *upwardly tending to lift the gutter off the building.* The highest load held without failure is used to calculate the pressure by dividing the total load by the total width of the gutter.

$$\text{Pressure} = \frac{\text{Load}}{\text{Gutter Width} \times \text{Length}}$$

Bigger picture, what's at stake?

Five years ago, Hurricane Matthew devastated many portions of Florida. In just one example, a 7,000 sq. ft. large box retail building saw substantial damage from 80-90 MPH winds. The cause of the damage was most likely from a loose gutter and/or flashing, which led to the roof covering peeling back.

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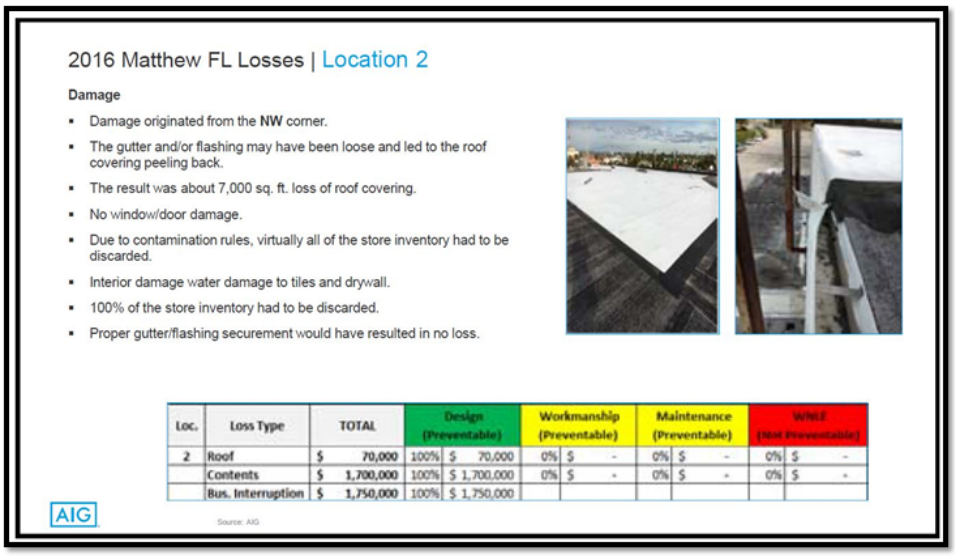

2016 Matthew FL Losses | Location 2

Damage

- Damage originated from the **NW** corner.
- The gutter and/or flashing may have been loose and led to the roof covering peeling back.
- The result was about 7,000 sq. ft. loss of roof covering.
- No window/door damage.
- Due to contamination rules, virtually all of the store inventory had to be discarded.
- Interior damage water damage to tiles and drywall.
- 100% of the store inventory had to be discarded.
- Proper gutter/flashing securement would have resulted in no loss.

Loc.	Loss Type	TOTAL	Design (Preventable)		Workmanship (Preventable)		Maintenance (Preventable)		WNLF (Not Preventable)	
2	Roof	$ 70,000	100%	$ 70,000	0%	$ -	0%	$ -	0%	$ -
	Contents	$ 1,700,000	100%	$ 1,700,000	0%	$ -	0%	$ -	0%	$ -
	Bus. Interruption	$ 1,750,000	100%	$ 1,750,000						

AIG

Source: AIG

Source: AIG RICOWI Presentation Slides March 2019

Proper gutter/flashing securement would have resulted in no loss. Instead, the retail store was hit with a $70,000 repair cost claim, $1.7 million Content Cost claim, and $1.75 million Business Interruption claim for a grand claim total of $3.52 million.

How is GT-1 specified?

During conversations about gutters and the new ANSI/SPRI GT-1 Standard, here are some things to ask or think about to help incorporate gutters into specifications.

How can Metal-Era help?

Metal-Era can help you understand the new GT-1 Standards and help update your low slope membrane gutter specification.

Our Seal-Tite Gold Industrial Gutters are ANSI/SPRI GT-1 approved and backed by a 30-Year, 160 MPH wind warranty.

You can also take advantage of our Gutter Calculator, which will not only give you design pressures for GT-1 but will also calculate the size of the gutter required for specific projects.

Searching for more information on GT-1? Have a specific question we didn't cover? Click here to find your local rep who can assist you with any inquiries.

800-558-2162
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