



Advanced Topics and Current Issues in Low-Slope Roofing
The University of Wisconsin Madison
Madison, Wisconsin – March 20, 2024

Edge metal testing

presented by

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National Roofing Contractors Association
Rosemont, Illinois

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Topics

Edge metal testing

- Code requirements
- ANSI/SPRI/FM 4435/ES-1
- ANSI/SPRI GT-1
- FM 4435
- NRCA's edge metal testing and certification
- Certification directory listings

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ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

1504.5 Ballasted low-slope single-ply roof systems. Ballasted low-slope single-ply roof system coverings installed in accordance with Section 1507.12 shall be designed in accordance with ANSI/SPRI-4.

1504.6 Edge systems for low-slope roofs. Metal edge systems, except gutters and counterflashing, installed on built-up, modified bitumen and single-ply roof systems on a *low-slope* roof 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 ES-1, except *basic wind speed*, V, shall be determined from Figures 1609.3(1) through 1609.3(4), as applicable.

1504.6.1 Gutter securement for low-slope roofs. Gutters that are used to secure the perimeter edge of the roof membrane on *low-slope* built-up, modified bitumen, and single-ply roofs, shall be designed, constructed and installed to resist wind loads in accordance with Section 1609 and shall be tested in accordance with Test Methods G-1 and G-2 of SPRI GT-1.

TABLE 1504.8—MINIMUM REQUIRED PARAPET HEIGHT (INCHES) FOR AGGREGATE SURFACED ROOFS^{a,b,c,d,e,f}

AGGREGATE SIZE	MEAN ROOF HEIGHT (ft)	WIND EXPOSURE AND BASIC WIND SPEED, V (MPH)																			
		Exposure B						Exposure C													
		≤95	100	105	110	115	120	130	140	150	≤95	100	105	110	115	120	130	140	150		
ASTM D1582 (No. 1 or No. 47)	15	2	2	2	2	2	12	12	16	20	24	2	13	15	18	20	23	27	32	37	
	20	2	2	2	2	2	12	14	18	22	26	2	13	15	17	19	22	24	29	34	39
	30	2	2	2	2	13	15	17	21	25	30	14	17	19	22	24	27	32	37	42	
	50	12	12	14	16	18	21	25	30	35	37	19	22	25	28	30	33	41	47		
ASTM D1583 (No. 4)	15	17	19	22	25	27	30	36	41	46	23	26	29	32	35	38	44	50	56		
	20	2	2	2	2	12	12	13	13	17	21	2	2	13	15	17	19	23	28	32	
	30	2	2	2	2	12	12	16	20	24	2	13	14	17	19	23	26	31	35		
	50	12	12	12	12	14	16	20	24	28	12	15	17	19	22	24	28	34	39		
ASTM D1583 (No. 4)	100	12	12	14	16	19	21	25	30	35	16	18	21	24	26	29	34	39	45		
	150	12	14	17	19	22	24	29	34	39	18	21	23	26	29	32	37	43	48		

SECTION 1505—FIRE CLASSIFICATION

[B] 1505.1 General. Fire classification of roof assemblies shall be in accordance with Section 1505. The minimum fire classification of roof assemblies installed on buildings shall comply with Table 1505.1 based on type of construction of the building. Class A, B and C roof assemblies and roof coverings required to be listed by this section shall be tested in accordance with ASTM E108 or UL 790. In addition, fire-retardant-treated wood roof coverings shall be tested in accordance with ASTM D2535.

Exception: Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

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INTERNATIONAL CODE COUNCIL

Note: ANSI/SPRI GT-1's Test Method G-3 is not included in the code requirement

[Link](#)

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ANSI/SPRIFM 4435/ES-1 2017
Test Standard for Edge Systems Used with Low Slope Roofing Systems
 Approved January 24, 2017

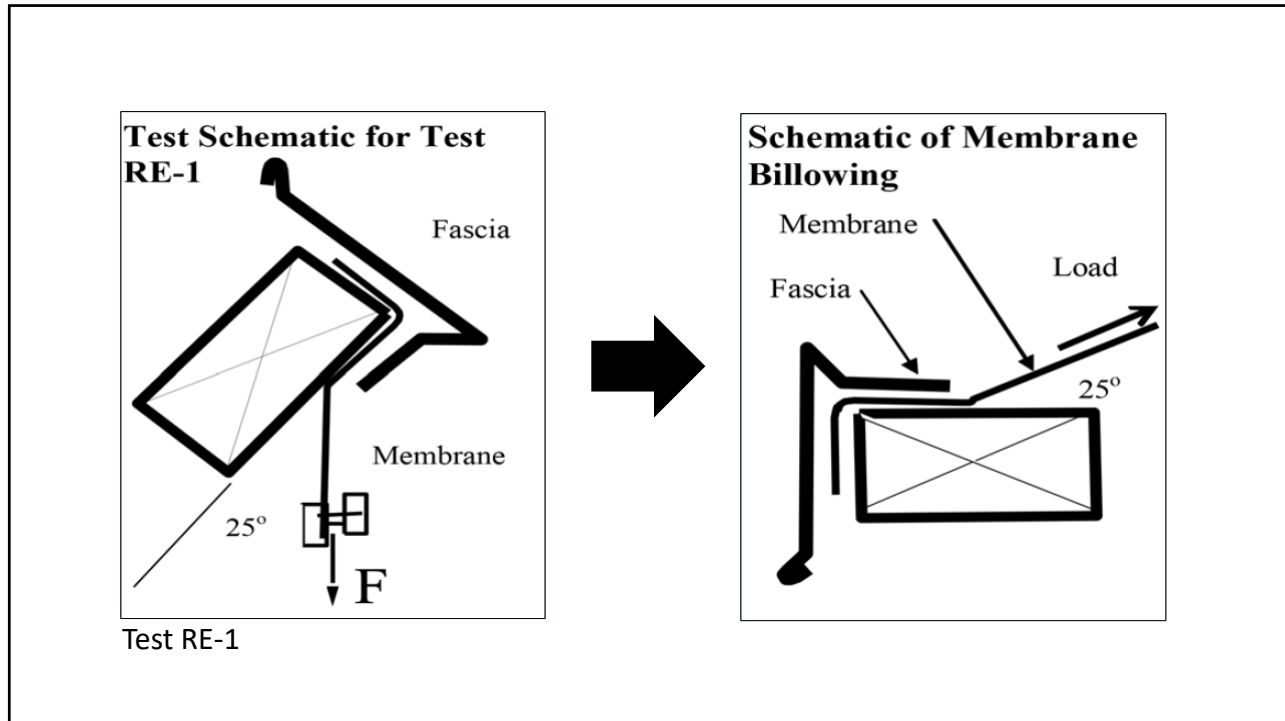
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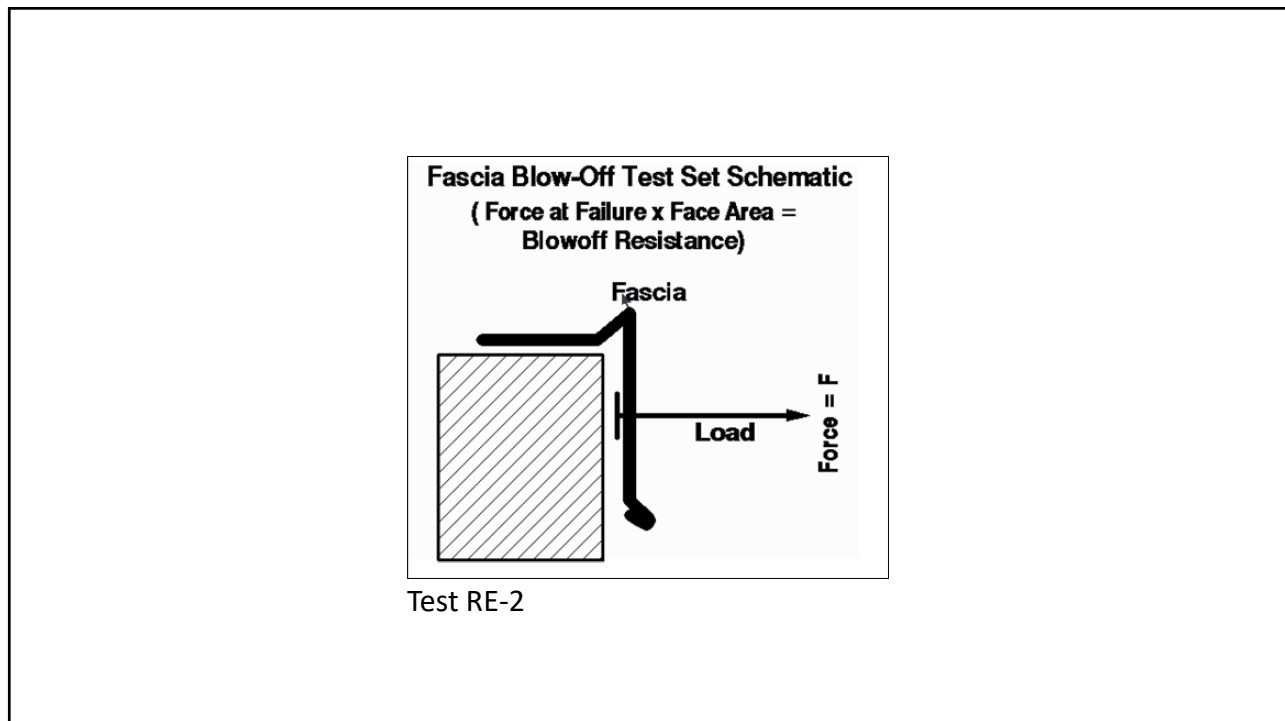
ANSI/SPRI/FM 4435/ES-1, “Test Standard for Edge Systems Used with Low Slope Roofing Systems”

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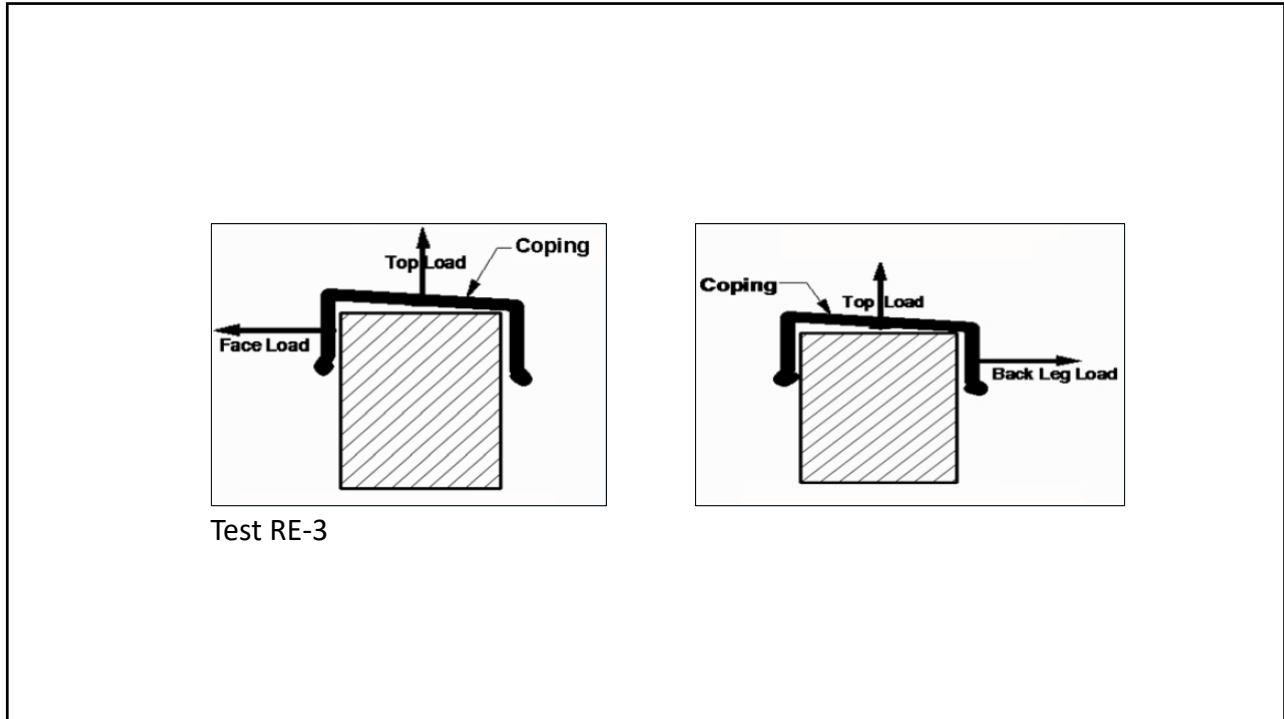
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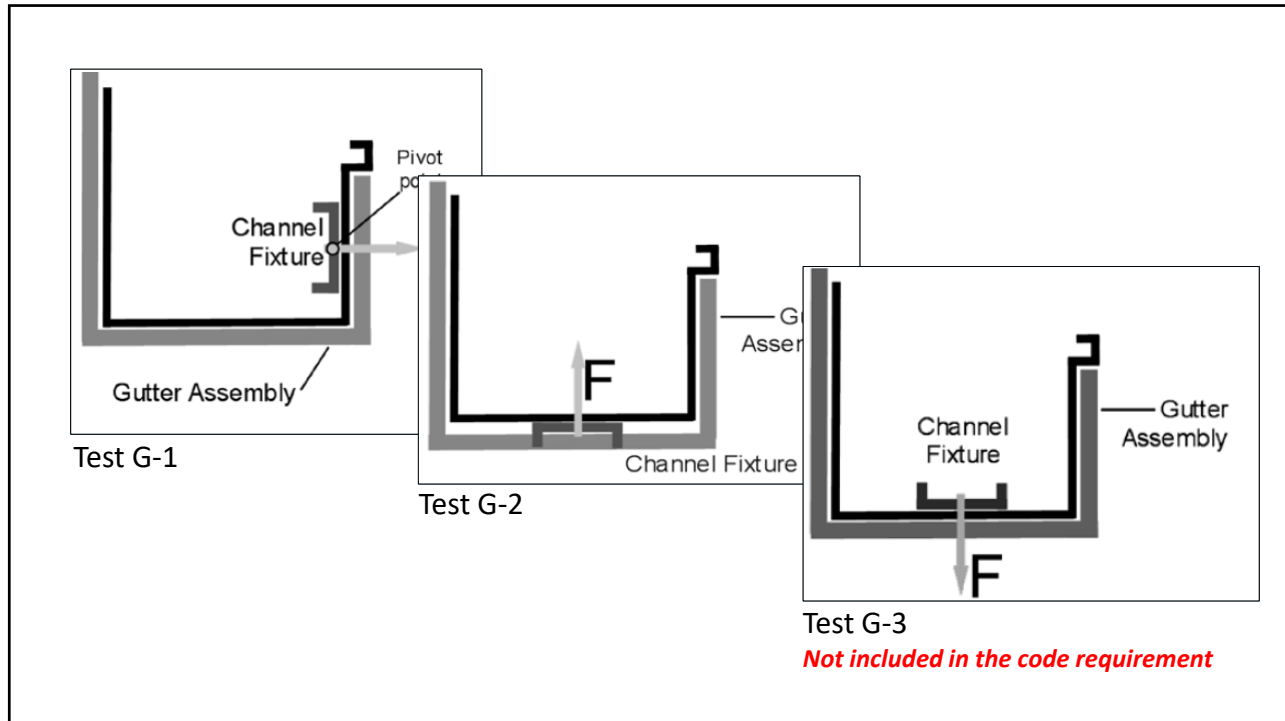


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The image shows the cover page of the ANSI/SPRI GT-1 Test Standard for Gutter Systems. The page features the ANSI logo (American National Standards Institute) and the SPRI logo (Society of Professional Roofing Institute). The title is 'ANSI/SPRI GT-1 Test Standard for Gutter Systems', approved May 26, 2016. A table of contents is provided, listing sections such as Purpose, Scope, Definitions, Test Requirements, and Test Reporting. A disclaimer at the bottom states that the standard is for use by architects, engineers, roofing contractors, and building owners. A blue 'Link' text is positioned at the bottom right of the page.

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FM Approvals[®]
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**Examination Standard
for
Edge Systems
Used with
Low Slope Roofing Systems**

Class Number 4435

December 2022

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[Link](#)

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FM 4435

- Testing based on ANSI/SPRI/FM 4435/ES-1 and ANSI/SPRI GT-1
- Results reported as FM Approvals' classifications
 - Class 60, 90, etc.
- FM Approvals' surveillance audits

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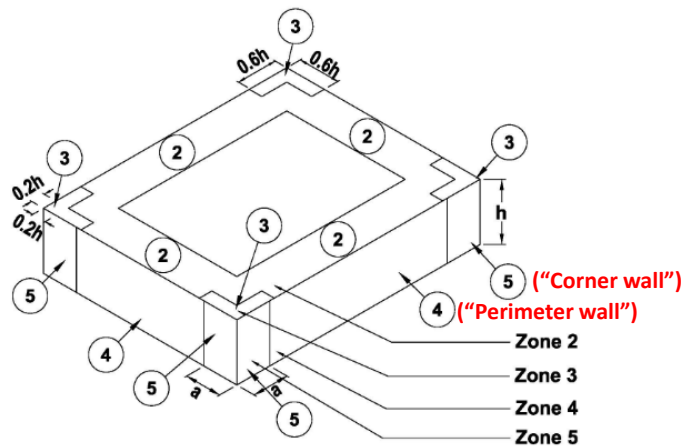
ES-1 and GT-1 (and FM 4435) provide tested resistance

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***Design wind loads come from ASCE 7...
the same calculation applies, except some
additional pressure coefficients are used for
Zone 4 and Zone 5 (vertical surfaces).***

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Zones for buildings $h \leq 60$ ft.

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Roof Wind Designer

www.roofwinddesigner.com

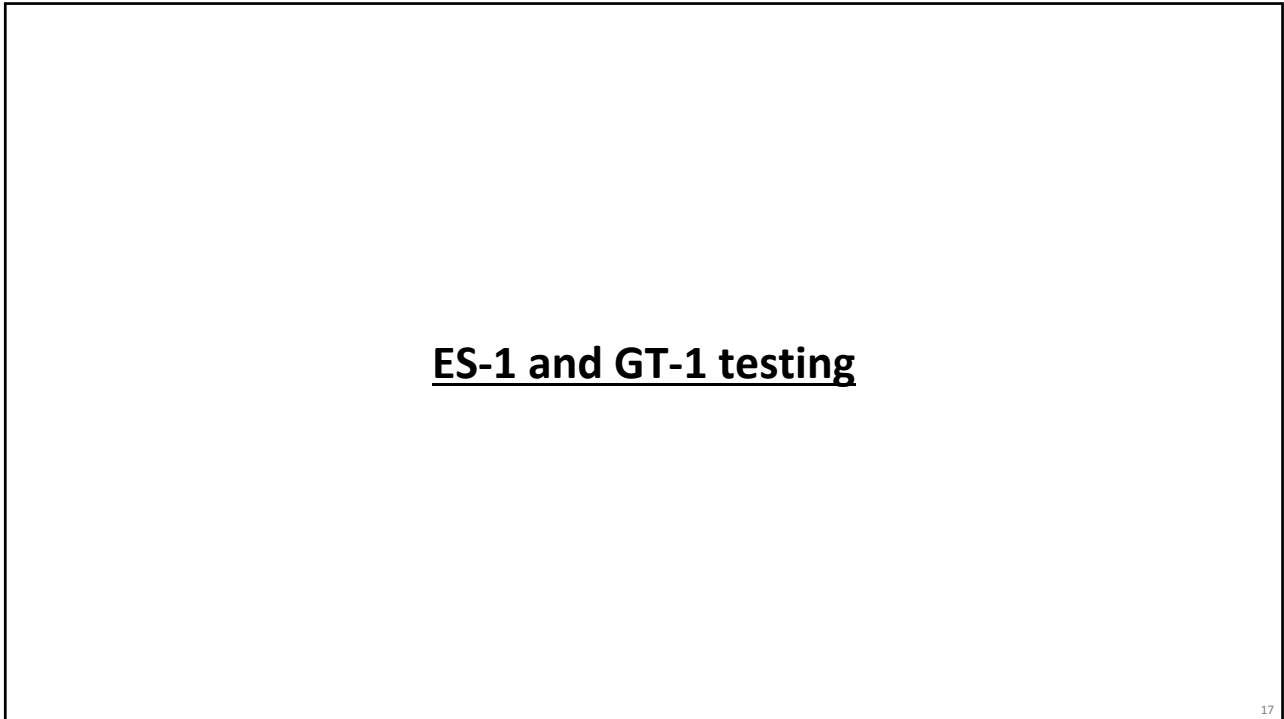
**Roof Wind Designer provides
design wind loads for ES-1 and GT-1**

Buildings with $h > 60$ ft [$h > 18.3$ m], and Part 4: Building appurtenances, rooftop structures and equipment.
[A more detailed explanation of ASCE 7's four editions.](#)

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***Remember, tested resistance needs to be
greater than the design wind loads***

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NRCA's ES-1 and GT-1 testing and certifications

- NRCA has tested various fascia, gravel stop, coping and gutters
 - Accredited testing laboratory
- NRCA has obtained third-party certifications for compliance
 - UL Solutions
 - Intertek Testing Services, N.A.

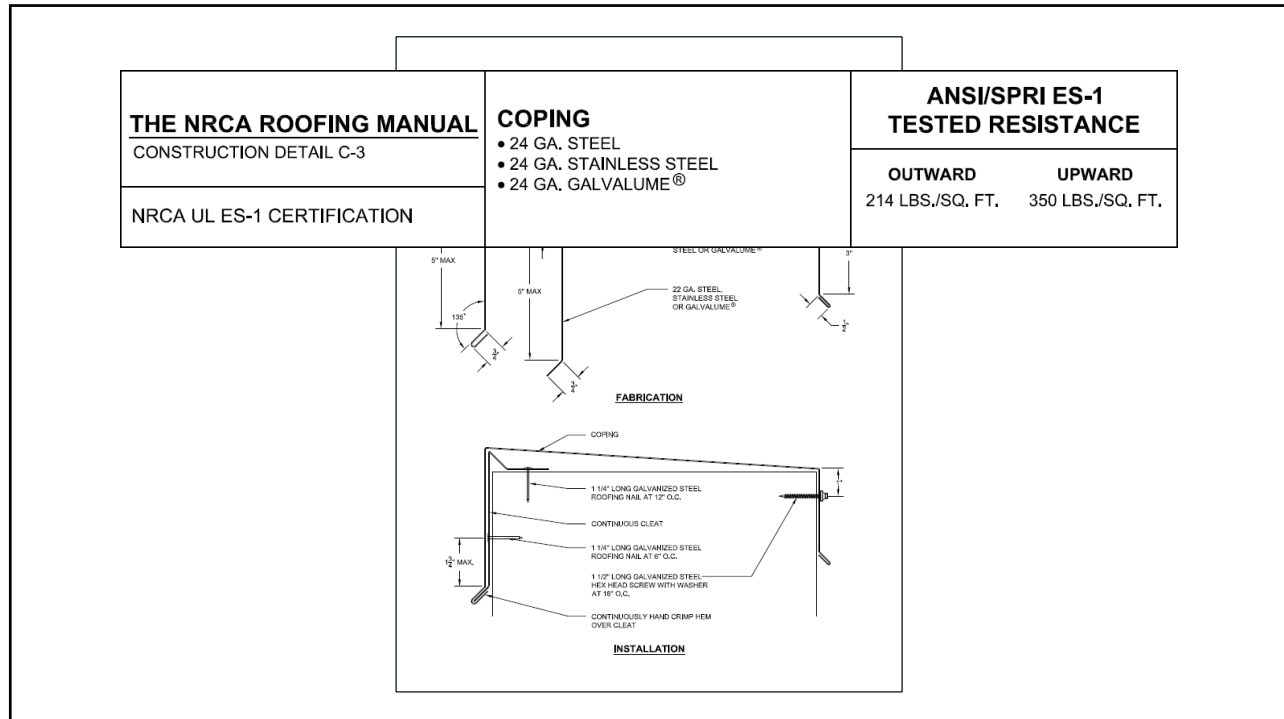
UL and Intertek are recognized, code-approved testing and certification agencies

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Steps for a sheet metal shop to obtain a certification

- Execute NRCA's Authorized Fabricator Agreement
- Initial "factory" inspection
 - Orientation
 - Verify capability
- Fabricate and install as tested

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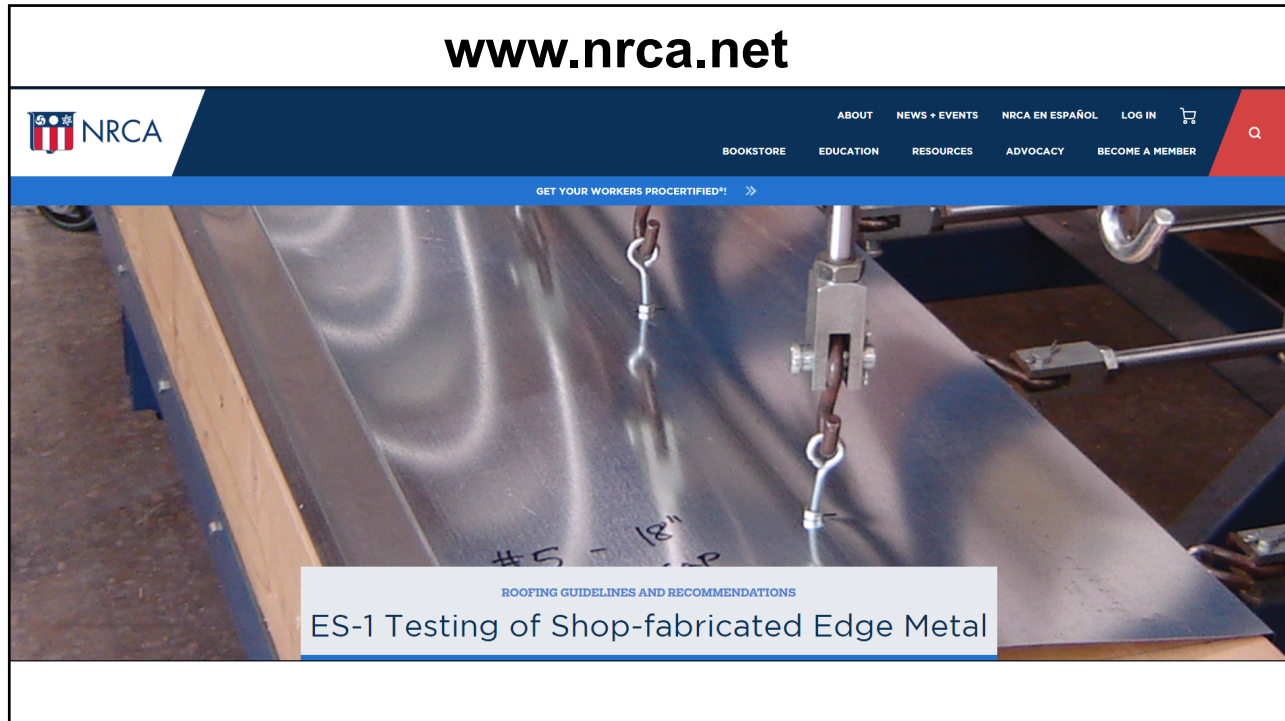


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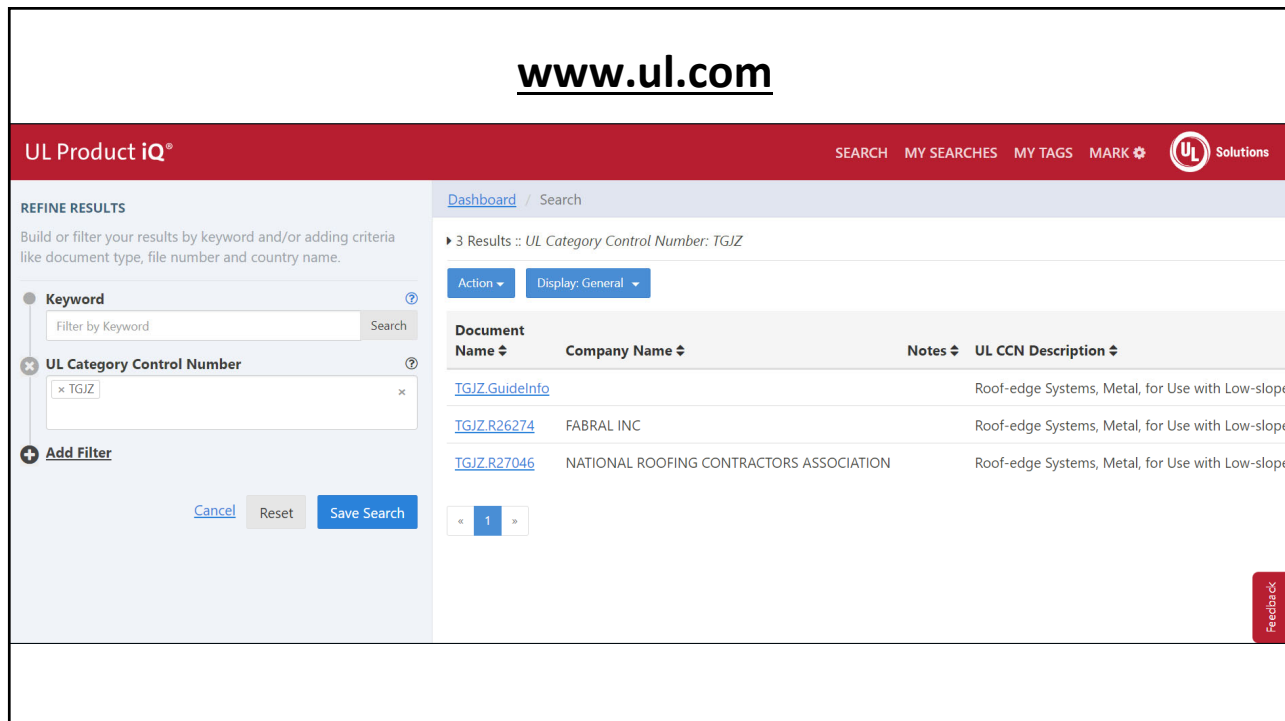
Steps for a sheet metal shop to obtain certification

- Execute NRCA's Authorized Fabricator Agreement
- Initial "factory" inspection
 - Orientation
 - Verify capability
- Fabricate and install as tested
- Product labeling (UL or Intertek mark labels)
- Periodic factory "audits"
 - Verify production documentation... document label usage
 - Material verification... verify mill certificates

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2 Results :: *UL Category Control Number: TGJX*

Action

Document Name	Company Name	Notes	UL CCN Description
TGJX.GuideInfo			Gutters for Use with Low-slope Roofing Systems
TGJX.R40622	NATIONAL ROOFING CONTRACTORS ASSOCIATION		Gutters for Use with Low-slope Roofing Systems

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Feedback

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Keywords: Spec ID:

CCRR #: COC #:

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Company	Listed Product	Spec ID	Standard	More
A.W. Farrell & Son, Inc.	A.W. Farrell & Son, Inc. 24" Coping with 8" Face 0.05 Aluminum with 22 Ga Crest	25392	ANSI / SPRI ES-1 (2003); ANSI / SPRI RE-3 (2003)	
A.W. Farrell & Son, Inc.	A.W. Farrell & Son, Inc. Metal Roof Edge Systems	48461	ANSI / SPRI ES-1 (2003); ANS/SPRI/PM 4435/ES-1 (2011)	
Architectural Roofing & Sheetmetal, Inc.	ARS 24 Ga 18" Metal Coping	23710	ANSI / SPRI ES-1 (2003); ANSI / SPRI RE-3 (2003)	
Architectural Roofing & Sheetmetal, Inc.	ARS 24 Ga Metal Fascia Systems	23876	ANSI / SPRI ES-1 (2003); ANSI / SPRI RE-1 (2003); ANSI / SPRI RE-2 (2003)	
Herzog Roofing, Inc.	Herzog Roofing Gravel Stop and Coping Systems	19311	ANSI / SPRI ES-1 (2003); ANSI / SPRI RE-3 (2003); ANSI / SPRI RE-2 (2003)	
National Roofing Contractors Association (NRCA)	NRCA Edge Systems for Use with Low Slope Roofing Systems	44859	ANSI / SPRI ES-1 (2003); ANSI / SPRI RE-2 (2003); ANSI / SPRI RE-3 (2003); ANS/SPRI/PM 4435/ES-1 (2011)	
Petersen Aluminum Corporation	Petersen Aluminum Roof Edge Coping Systems	27546	ANSI / SPRI ES-1 (1998); ANSI / SPRI RE-3 (1998)	
Rackley Company East TN	C. M. Henley Snap Lock Coping System	23788	ANSI / SPRI ES-1 (2003)	

Items Per Page:
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NRCA Edge Systems for Use with Low Slope Roofing Systems

Company: National Roofing Contractors Association (NRCA)

PRODUCT DESCRIPTION:

This specification recognizes metal roof edge systems for use with low slope roofing, including metal coping systems and metal roof edge systems that are independently terminated and that have been tested for wind resistance.

The tables below provide general system configurations and tested wind resistance values per the referenced test standards. Table footnotes provide additional system material and fastening requirements.

The tables reference drawing numbers (Example: "C-1") that can be found in the Construction Details of the 2018 NRCA Roofing Manual: Architectural Metal Flashing and Condensation and Air Leakage Control; Chapter 4 - Construction Details, Section 4.3 Index of Construction Details.

The Intertek Certification Mark applied to each metal edge flashing or coping shows the product has been fabricated by a qualified manufacturer who is authorized to apply the Intertek Certification Mark and who is subject to Intertek periodic follow-up inspections of the manufacturing facility.

ATTRIBUTES

- Criteria ANSI / SPRI ES-1 (2003)
- Criteria ANSI / SPRI RE-2 (2003)
- Criteria ANSI / SPRI RE-3 (2003)
- Criteria ANSI/SPRI/FM 4435/FS-1 (2011)

COPINGS (parapet wall copings)							
Test Standard ANSI/SPRI/ FM 4435 ES-1	Test Method RE-3 Pull-off Test for Copings			Assembly Details Materials			Tested Resistance (PSF)
Item Number / Drawing Number	Max Dimension (in.)			Coping	Cleat	Out	Up
	Width	Front	Back				
1*	C-1/ ITS-1	8	5	3	24 ga*	22 ga*	190 310
2*	C-1/ ITS-2	8	5	3	0.04"AL	0.04"AL	150 250
3*	C-1/ ITS-3	8	5	3	20 oz Cu	24 ga*	135 220
4*	C-1/ ITS-4	12	5	3	24 ga*	22 ga*	265 440

DESIGN DOCUMENTS

No Results

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LISTING INFORMATION OF

NRCA Edge Systems for Use with Low Slope Roofing Systems

SPEC ID: 44859

National Roofing Contractors Association (NRCA)
10255 W. Higgins Road, Suite 600
Rosemont, IL 60018-5607
United States

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INTERTEK DIRECTORY OF BUILDING PRODUCTS

NRCA Gutter Systems for Use with Low Slope Roofs

Company: National Roofing Contractors Association (NRCA)

This specification recognizes NRCA Gutter Systems for Use with Low Slope Roofs.

The table below provides general system configurations and ultimate strength values acquired in accordance with the referenced test standard. Ultimate strength values are based on a single test for each reported design, contain no factors of safety, and are not presented as design values. Table footnotes provide additional system fastening requirements.

The table's referenced drawing numbers (Example: "G1") may be found in NRCA Construction Details. These are made available to authorized manufacturers.

The Intertek Certification Mark applied to each gutter product shows the product has been fabricated by a qualified manufacturer who is authorized to apply the Intertek Certification Mark and who is subject to Intertek periodic follow-up inspections of the manufacturing facility.

Reference Drawing No. and Description*	GT-1 Test Method and Tested Ultimate Strength Values		
	Horizontal	G-3	
		Vertical Upward	Vertical Downward
G1 8-inch Face, 8-inch bottom, 24 ga. Steel Internal Channel Brackets 30 in. on center	265 lb/ft (590 psf)	240 lb/ft (480 psf)	100 lb/ft.
G5 8-inch Face, 8-inch bottom, 24 ga. Steel Internal Channel Brackets 30 in. on center	300 lb/ft (450 psf)	215 lb/ft (322.5 psf)	50 lb/ft
G6 8-in. Face, 8-inch bottom, 0.050 in. Aluminum Internal Channel Brackets 30 in. on center	295 lb/ft (442.5 psf)	85 lb/ft (127.5 psf)	100 lb/ft
G7** 8-in. Face, 8-inch bottom, 24 ga. Steel Wrap Around Brackets 30 in. on center	207 lb/ft (300 psf)	95 lb/ft (142.5 psf)	75 lb/ft
G8** 8-in. Face, 8-inch bottom, 0.050 in. Aluminum Wrap Around Brackets 30 in. on center	155 lb/ft (232.5 psf)	115 lb/ft (172.5 psf)	115 lb/ft

LISTING REPORT RETURN TO SEARCH

ATTRIBUTES

- Criteria: ANSI/SPRI GT-1 (2016)
- CSI Code: 07 71 00 Roof Specialties
- Intertek Services: Certification
- Listed or Inspected: LISTED

DESIGN DOCUMENTS

No Results

PUBLIC DOCUMENTS

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MY PROJECTS PRODUCT SEARCH SYSTEM SEARCH ASSEMBLY SEARCH RATINGS CALCULATOR REFERENCE MATERIALS

Search Criteria Search Results


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Trade Name	Company Name	Approved Use
2-Piece Snap-On Compression System, #2600	Exceptional Metals	Fascia
2-Piece Snap-On Compression System, #2602	Exceptional Metals	Fascia
All-Term - Aluminum	Exceptional Metals	Fascia
All-Term - Bonderized Steel	Exceptional Metals	Fascia
All-Term - Galvalume	Exceptional Metals	Fascia
All-Term - Stainless Steel	Exceptional Metals	Fascia
AnchorGard Canted WD Fascia (aluminum)	Holcim Solutions and Products US, LLC	Fascia
AnchorGard Canted WD Fascia (steel)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Drip Edge (aluminum)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Drip Edge (steel)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard MB Extended Fascia - BUR/MOD Version	Holcim Solutions and Products US, LLC	Fascia
Anchorgard MB Fascia (aluminum)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard MB Fascia (steel)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard MB HG Fascia (aluminum)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard MB HG Fascia (steel)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Nailer-T	Holcim Solutions and Products US, LLC	Coping
Anchorgard Platinum Extended Fascia - BUR/MOD Version	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Platinum Fascia (aluminum)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Platinum Fascia (steel)	Holcim Solutions and Products US, LLC	Fascia
Anchorgard Platinum HG Fascia	Holcim Solutions and Products US, LLC	Fascia

1 - 20 of 1401 items

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RESEARCH+TECH



Understanding FM Approvals' metal edge testing approval

The roofing industry needs more clarity for using FM 4435

by Mark S. Graham

26 www.professionalroofing.net NOVEMBER 2018

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Link

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Understanding ES-1

Proper Specification and Implementation

By Mark S. Graham

Figure 1 - ES-1 test of a coping.

ANSI/SPRI FM 4435/ES-1 (ES-1) provides a basis for laboratory testing of roof perimeter metal edge fasteners (except gutters). It is also referenced as a requirement in the International Building Code (IBC) for metal fascia (gated stop) and copings used with built-up, polymer-modified-bitumen and single-ply membrane roof systems.

Proper specification and implementation of ES-1 are important considerations in ensuring building code compliance and roof system performance in high winds.

The following is a brief overview of the IBC's ES-1 requirement, ES-1's test methods, and how to properly specify and implement ES-1 compliance.

IBC REQUIREMENT
In the IBC, 2018 Edition (IBC 2018), the following requirement applies to edge metal fasteners:

1504.5 Edge attachment for low-slope roofs. Low-slope built-up, modified-bitumen and single-ply roof system metal edge attachments, except gutters, 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 ES-1, except basic design wind speed, V, shall be determined from Figures 1609.3(1) through 1609.3(8) as applicable.

IBC 2018's Chapter 16, "Reference Standards," indicates that the version of ES-1 that applies in ANSI/SPRI/FM 4435-11 (2011 Edition), Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems, SPRI has published an updated version of ES-1—ANSI/SPRI/FM 4435/ES-1-17 (2017 Edition), Test Standard for Edge Systems Used with Low Slope Roofing Systems—but it is not referenced in IBC 2018; it will be referenced in IBC 2021.

It is important to note only ES-1's Test Methods RE-1, RE-2, and RE-3 are referenced in and required by IBC 2018; ES-1 in its entirety is not. As a result, ES-1's Sections 1 through 10, Appendix A, Appendix C, and Commentary can be interpreted as not being applicable to IBC 2018. IBC 2018's Section 1504.5 requirement for determining design wind loads in accordance with Chapter 16 using a basic design wind determined using IBC 2018's Figures 1609.3(1) through 1609.3(8) prescribes design wind loads be determined using ASCE 7-10's basic tributary design wind.

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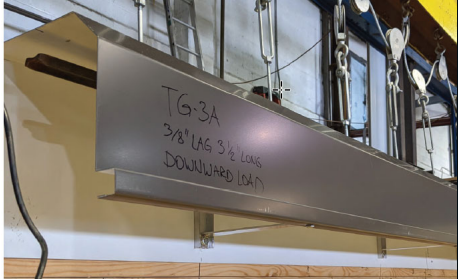
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March 2020

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RESEARCH+TECH



Getting closer to gutters
NRCA tests metal roof edge gutters and maintains certification programs
by Mark S. Graham

NNRCA has conducted testing of metal roof edge gutters according to ANSI/SFBI GT-1-2006, "Test Standard for Gutter Systems." If you design, shop fabricate and/or install gutters for low-slope membrane roof systems, you should be aware of ANSI/SFBI GT-1, the building code requirement that requires gutter testing, and NRCA's gutter testing and certification programs.

ANSI/SFBI GT-1
ANSI/SFBI GT-1 provides a methodology for testing static load resistance of exterior hanging gutters used with low-slope roof systems. Gutter resistance are tested in three directions as shown in the figure. Test G-1 tests a gutter's resistance to a horizontal outward load, such as an outward wind load. Test G-2 tests a gutter's resistance to a vertical upward load, such as an upward wind load. Test G-3 tests a gutter's resistance to a downward load, such as the weight of water, snow and ice.
The test method does not assess a gutter's water-carrying capacity or water removal.
ANSI/SFBI GT-1 was developed and is promulgated as a national

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Questions....

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