



CLOSING THE STANDARDS GAP IN METAL ROOF ATTACHMENTS



Safe Harbor Marina
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The Role of Rigorous Testing and Certification

Executive Summary

For decades, the metal roof attachment industry has faced a critical challenge: a lack of clearly defined standards, test protocols and certifications specific to metal roof attachment systems. In an industry where safety, code compliance and system reliability are non-negotiable, this absence has led to inconsistencies in product performance, confusion among contractors, and added complexity for Authorities Having Jurisdiction (AHJs).

Historically, metal roof attachments operated in a regulatory gray area—lacking specific guidance in major building codes or dedicated performance metrics. The result has been permitting delays, exaggerated or irrelevant product claims, and in many cases, system failures.

In recent years, forward-thinking manufacturers and industry stakeholders have begun to close this gap by subjecting products to rigorous third-party testing, aligning with established engineering principles, and pursuing relevant certifications from recognized bodies. These efforts are defining a new standard for performance, safety and reliability in metal roof attachment technology.

Building owners, designers and contractors must align with relevant codes and standards to ensure products are engineered to meet—or exceed—the requirements of the International Building Code (IBC) and International Residential Code (IRC). This approach not only promotes safety and performance but also supports AHJs in applying appropriate standards tailored to regional and geographic conditions. Ensuring compliance streamlines the permitting process for both new construction and retrofit projects.

This document outlines the current landscape of testing, certifications and engineering protocols in the industry—and provides guidance on what to look for in a trusted, code-compliant attachment solution.



Certified Testing

Central to establishing product integrity is rigorous testing and certification to recognized industry standards. These next two sections will examine these factors in detail, with particular emphasis on the relevant testing protocols, standards and certifications that underpin confidence in attachment technology for metal roofs.

Structural Load Testing

Systems should be tested to withstand real-world conditions including:

- **Wind uplift** (including high-velocity hurricane zones)
- **Drag loads** induced by forces of sliding snow
- **Seismic forces** (when pertinent)
- Design that accommodates **thermal expansion** (when appropriate)
- Design that compensates **vibration** (when appropriate)

Each product should be third-party tested on actual metal roof panels of various types, profile geometries, gauges and materials.

Laboratory Testing

All performance testing should be conducted in a Nationally Recognized Testing Laboratory (NRTL) accredited to ISO 17025 or an equally rigorous standard, to ensure the highest level of credibility and accuracy in test results across the industry.

Product Specific Load Testing

Product evaluation should be based on testing that is specific to the exact roof product and application, rather than relying on data from similar or substitute products. Preference should be given to manufacturers who provide load testing aligned with defined design criteria. Testing should be comprehensive and cover all major metal panel types and profiles. Transparency and access to detailed, product-specific test data are essential for informed decision-making and ensuring performance, safety and code compliance.

Testing should include:

- **Tension and/or compression strength**
- **Shear and pullout resistance**

PE-Stamped Reports

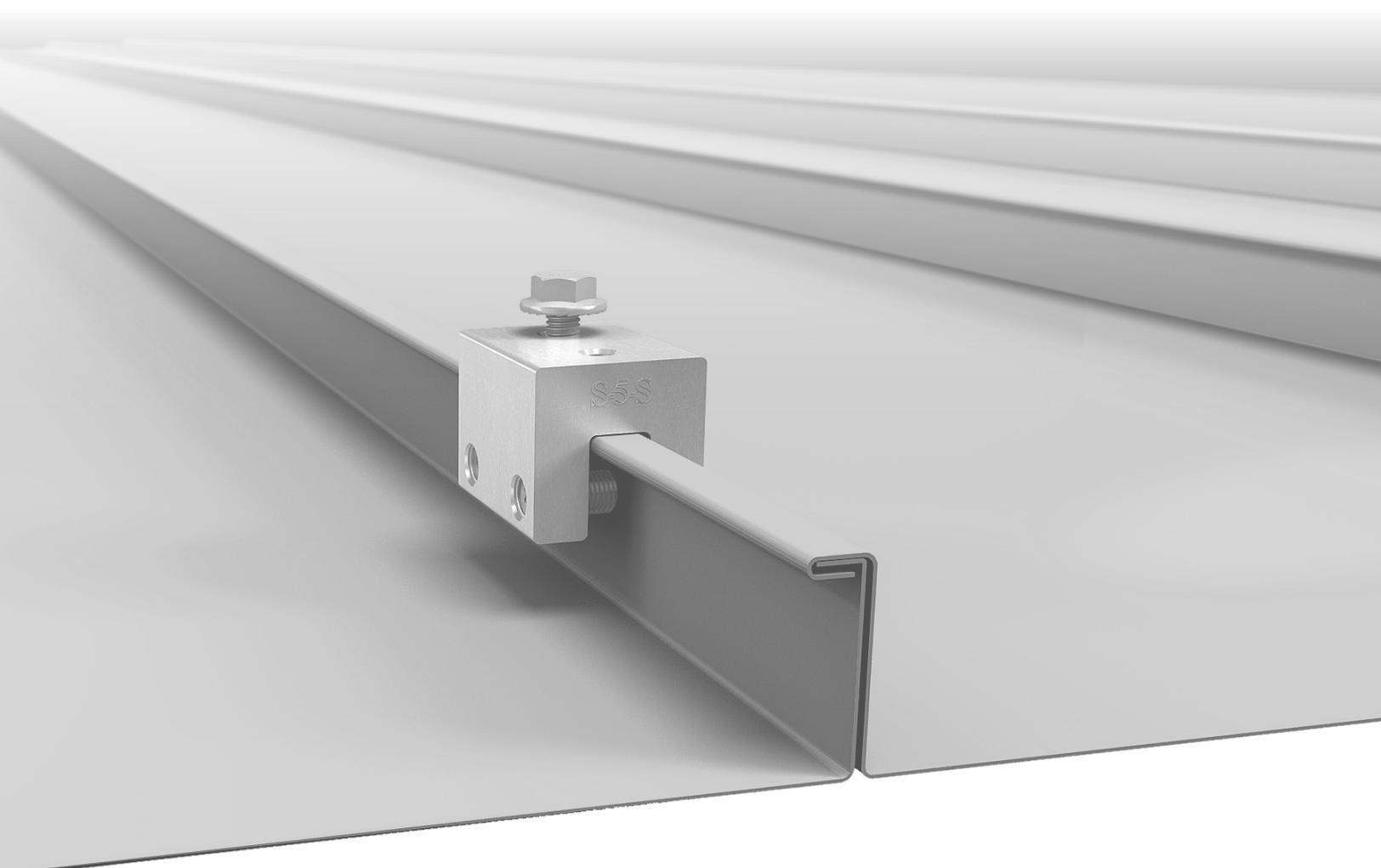
If project-specific testing and analysis are required, reports should be certified by a Professional Engineer (PE). Manufacturers should provide PE stamped letters and reports for all 50 U.S. states and Canada to support fast approval by AHJs and instill confidence in the structural and code compliance of their products.

Critical Product Certifications

for Metal Roof Attachments

In the installation of metal roof attachments, safety and structural integrity are critical considerations for contractors, engineers, inspectors and AHJs. Products backed by third-party testing and certified to recognized standards provide objective assurance of performance, compliance with applicable building codes, and durability, addressing the critical standards gap within the metal roofing attachment sector and reducing risk in both design and installation.

Relying on certified attachments contributes to more predictable outcomes and aligns with best practices in structural and building envelope design.



Below is an easy reference chart listing the codes and/or standards professionals should use for validation that the selected product meets the minimum requirements for rooftop-mounted snow guard or solar systems.

[check list by product type]

Solar - Rail-less and Rail based systems		
REQUIREMENTS	Standing Seam	Exposed Fastener
Design Requirements	Project Engineering Reports	Project Engineering Reports
Mechanical Strength	UL 2703	UL 2703
Water Penetration	ASTM E2140, UL 2703A	ASTM E2140, UL 2703A
Material Compatibility	UL 2703	UL 2703
Fire Resistance	UL 2703	UL 2703
Grounding and Bonding	UL 2703	UL 2703
PV Hazardous Control	UL 3741	UL3741
Company Operations/Quality	ISO-9001 Manufacturer	ISO-9001 Manufacturer
Seismic	ASCE 7, SEOC PV-1	ASCE 7, SEOC PV-1
Wind Uplift	ASCE 7, SEOC PV-2, Florida Product Approval HVHZ	ASCE 7, SEOC PV-2, Florida Product Approval HVHZ

Note: Always check local building code demands

Snow Guard Systems (Rooftop)		
REQUIREMENTS	Standing Seam	Exposed Fastener
Design Requirements	ASCE 7	ASCE 7
Mechanical Strength	IAPMO EC-029, ICC-ES	IAPMO EC-029, ICC-ES
Water Penetration	N/A	ASTM E2140
Company Operations/Quality	ISO-9001	ISO-9001

Note: Always check local building code demands

Domestic Certifications

Solar Attachments

UL 2703	<p>UL 2703 is the safety standard for mounting systems, mounting devices, clamping/retention devices and ground lugs used with flat-plate photovoltaic (PV) modules and panels. It establishes the requirements for both roof-mounted and ground-mounted systems as part of a nonstructural building component.</p> <p>This standard also plays a critical role in determining the fire classification of rooftop-mounted PV systems. Specifically, it evaluates the combined fire performance of a particular PV module and its associated racking system. Compliance with UL 2703 helps ensure that the PV system maintains the fire-resistant integrity of the roof, in accordance with building code requirements, by assessing the system's resistance to external fire exposure.</p>
UL 3741	<p>UL 3741 is a standard to evaluate photovoltaic (PV) hazard control systems that reduce electric shock risks from energized PV equipment, allowing certain rooftop PV arrays to meet rapid shutdown requirements without module-level electronics.</p> <p>This standard is specifically designed to enhance safety for firefighters and professionals responding to emergencies in buildings with PV systems and aims to prevent exposure to hazardous current paths. Recognized by both the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC), UL 3741 offers harmonized safety requirements for both U.S. and Canadian markets, facilitating safer PV system.</p>
IAPMO EC 029	<p>The International Association of Plumbing and Mechanical Officials (IAPMO) Evaluation Criteria (EC) 029 "Evaluation Criteria for Metal Roof Attachment Methods for Photovoltaic Module Mounting Systems, Snow Retention Systems and Other Accessories" formalizes testing methods for holding strength, durability and compatibility with various seam profiles—and enables PV attachments to be evaluated to EC 029 via an Evaluation Report (ER).</p>
ICC-ES	<p>An ICC-ES Report (from the International Code Council Evaluation Service) serves as independent verification that a solar product complies with building codes and performance standards. It presents the findings, conclusions and recommendations from a particular evaluation and what code requirements or acceptance criteria were used to evaluate a product, and how the product should be identified, installed and much more.</p>
FM 4478	<p>FM Approvals Standard 4478, "American National Standard for Roof Mounted Rigid Photovoltaic Module Systems," applies to all rigid photovoltaic (PV) module systems mounted on frames that are independently secured to the ground or elevated structures. The standard includes rigorous testing procedures to evaluate fire resistance, hail impact, simulated wind uplift and overall electrical safety and performance. Optional tests may also assess structural loading on the modules and their connections. FM 4478 is widely recognized as the most stringent standard for rooftop PV systems.</p>
Florida Product Approvals	<p>Florida Product Approvals certify wind uplift and water intrusion protection for high-velocity hurricane zones. Florida's unique regulatory process is renowned for its stringent standards, particularly due to the state's susceptibility to high winds and severe weather conditions. State approval shows builders, architects, building officials and inspectors that a manufacturer's products have completed rigorous testing requirements and meet the standards specified in the Florida Building Code.</p>

Domestic Certifications

Snow Guard Attachments

IAPMO EC 029

In the absence of building code that covers snow retention, compliance with the International Association of Plumbing and Mechanical Officials (IAPMO) Evaluation Criteria (EC) 029 "Evaluation Criteria for Metal Roof Attachment Methods for Photovoltaic Module Mounting Systems, Snow Retention Systems and Other Accessories" is considered "code equivalent". EC 029 Evaluation Reports (ER) from IAPMO may be utilized by specification to qualify proper design, testing and production of snow retention systems and are widely accepted by jurisdictional code compliance agencies whereas other means of evaluation often are not.

ICC-ES

An ICC-ES Report (from the International Code Council Evaluation Service) serves as independent verification that a snow retention product complies with building codes and performance standards. It presents the findings, conclusions and recommendations from a particular evaluation and what code requirements or acceptance criteria were used to evaluate a product, and how the product should be identified, installed and much more.

Other Accreditations & Approvals

FM Global

FM Global Property Loss Prevention Data Sheets and FM Approvals certifications verify which property loss prevention products perform as expected under the most demanding conditions such as wind, fire and hail. The FM Approved mark serves as independent, third-party validation of a product's performance, and is recognized and respected worldwide.

ASTM E2140

ASTM E2140 is the most demanding water penetration test in the roofing industry. This test method is a standard for determining water leakage through a metal roof panel system, specifically at side seams, endlaps and roof plane penetrations when the roof system is subjected to a specified static water pressure. It is a critical benchmark for verifying the watertight integrity of metal roofing systems under challenging conditions.

International Certifications

<p>TÜV (Europe)</p>	<p>TÜV or “Technischer Überwachungsverein” (Technical Inspection Association) refers to a group of independent, German-based testing and certification organizations that are internationally recognized for rigorous safety, quality and performance evaluations.</p> <p>TÜV organizations are widely trusted in Europe and globally for their impartial and high standards approach to testing. Their certifications serve as proof that a product has undergone exhaustive evaluation, typically exceeding local regulatory requirements.</p>
<p>CE Mark (EU)</p>	<p>The CE Mark (short for the French Conformité Européenne) certifies that a product complies with the health, safety and environmental protection standards of the European Union (EU). It is a mandatory certification for many products sold within the European Economic Area (EEA), ensuring they meet EU consumer safety requirements.</p> <p>Manufacturers—both within the EU and internationally—must obtain CE marking where applicable to legally market and distribute their products in Europe.</p>
<p>DIBt (Germany)</p>	<p>Germany’s Deutsches Institut für Bautechnik (DIBt) is a leading authority in national and European technical assessments and the European benchmark for performance validation. Meeting the DIBt standard means a construction product or technique has been technically verified and approved by DIBt, ensuring safety, compliance and quality in construction through grants, the establishment of technical rules, research oversight and market surveillance coordination.</p>
<p>MCS 012 (United Kingdom)</p>	<p>MCS 012 is a certification standard developed by the Microgeneration Certification Scheme (MCS) in the U.K. It specifically addresses the performance and safety of snow guards and roof attachment systems used with solar photovoltaic (PV) installations on pitched roofs. The standard ensures that these systems are tested for mechanical strength and load resistance under conditions such as snow accumulation or wind uplift, helping to ensure reliable, long-term performance and safety for solar installations in various climates.</p>
<p>ETL (Intertek)</p>	<p>The ETL (Intertek) Mark, issued by Intertek, signifies that a product complies with North American safety standards. Recognized by AHJs, code officials, retailers and increasingly by consumers, the ETL Mark is trusted proof of compliance and safety. The ETL Mark is accepted across the U.S., Canada and some cases in Mexico (for specific NOM standards).</p>
<p>UL 2703</p>	<p>UL 2703 is the international safety standard for mounting systems, mounting devices, clamping/retention devices and ground lugs used with flat-plate photovoltaic (PV) modules and panels. It establishes the requirements for both roof-mounted and ground-mounted systems as part of a nonstructural building component.</p> <p>This standard also plays a critical role in determining the fire classification of rooftop-mounted PV systems. Specifically, it evaluates the combined fire performance of a particular PV module and its associated racking system. Compliance with UL 2703 helps ensure that the PV system maintains the fire-resistant integrity of the roof, in accordance with building code requirements, by assessing the system’s resistance to external fire exposure.</p>
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Manufacturing and Quality Assurance

When choosing a manufacturer, it's crucial to understand their production processes and quality assurance practices to ensure the reliability, compatibility and safety of the product or service. Key factors to consider include the sourcing and origin of materials, the methods used in manufacturing or delivery and the credentials of the producing organization. Equally important are the manufacturer's demonstrated expertise, commitment to continuous improvement and ability to adapt to evolving industry standards and customer expectations.

Certified Manufacturing

Working with an ISO 9001:2015 certified manufacturer provides essential assurances, including consistent product quality and fully documented, verifiable processes. This globally recognized standard demonstrates a commitment to key quality management principles—such as continuous improvement, risk management, customer focus and corrective action procedures—which help reduce defects, delays and variability in production.

Often a prerequisite for competitive bids, contracts and strategic partnerships, manufacturing in an ISO 9001:2015 certified facility ensures reliability and commitment to quality. It also supports robust, repeatable, manufacturing processes that standardize operations to minimize errors and defects.

Certified Materials

ISO 9001 plays a critical role in managing internal processes, ensuring that certified materials are used properly and effectively, while certified materials provide assurance that external resources meet defined quality standards. Together, they complement each other in ensuring product quality, regulatory compliance and process efficiency.

It is important to utilize certified materials that are exactly the same as those validated by testing—typically accompanied by documentation—such as certificates of compliance, test results and inspection reports, which confirm adherence to relevant standards. Ongoing monitoring may also be required to ensure the materials retain their certification status and compliance over time.

All components should be fabricated from material certified to American Society for Testing and Materials (ASTM) standards, with proof of traceability. Commonly applied material standards include:

- Extruded structural-grade aluminum components shall be of 6000 series alloy
- Cast aluminum components shall be compliant with ASTM B26/B26M, B108/B108M or ASTM B85/B85M
- Plate and sheet aluminum components shall be compliant with ASTM B209
- Brass components shall be compliant with ASTM B927/B927M
- Stainless steel components shall be 300 series alloy compliant with ASTM A276/A276M

Sustainability in the Built Environment

Sustainability is fundamental to the built environment because it supports development that is environmentally responsible, economically viable and socially beneficial. By integrating sustainable practices into building design, construction and manufacturing operations, stakeholders can reduce environmental impact, conserve natural resources and enhance the health and well-being of the people who use these spaces.

Manufacturers that adopt and demonstrate clear sustainability practices create a competitive advantage—positioning their projects and their brands as responsible, future-ready, committed to long-term viability and attractive to eco-conscious stakeholders.

- **Environmental Social Governance (ESG):** ESG represents a set of standards used to evaluate an organization's impact on the environment, its social responsibility and governance practices. It reflects a holistic commitment to ethical leadership, environmental stewardship and social equity. ESG practices reflect the commitment to improving how business decisions and policies impact opportunities.
 - **Modern Slavery Statement:** Under the Australian Modern Slavery Act 2018, companies are required to identify, assess and address risks of modern slavery in their operations and supply chains. Compliance with this legislation ensures transparency and accountability, affirming that business practices meet rigorous ethical standards outlined in the Act. Manufacturers with clear Modern Slavery Statements and ESG policies reduce exposure to legal, reputational and ethical risks.
 - **Green House Gas (GHG) Emission Goals:** Manufacturers that establish GHG emission action plans demonstrate a measurable commitment to minimizing their environmental impact by reducing GHG emissions by specific percentages within defined time frames.
 - **Environmental Product Disclosures (EPD):** An EPD is a standardized report that discloses the environmental impact of a product throughout its entire life cycle. EPDs support compliance with green building standards such as LEED v5, which advances the goals of decarbonization, improved quality of life and ecosystem conservation. As the most recognized and influential sustainability benchmark in the building industry, LEED v5 reinforces the importance of transparency and performance.
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Technical Support and Design Resources

Reliable technical support and credible data to validate performance claims are just as important as rigorous testing and industry certifications. A trusted attachment technology provider must not only prove product quality through testing but also back it up with accessible design resources and knowledgeable support teams. These tools are essential for informed decision-making and successful project execution in real-world conditions.

To support metal building professionals, contractors, designers, engineers, EPCs and solar installers, a comprehensive suite of documentation and digital tools should be available, including:

- **Product Load Tables**
- **Product Data Sheets**
- **CAD, Revit and BIM Resources**
- **PE Letters for Code Compliance**
- **Engineering Test Data**
- **Technical Bulletins and Installation Guides**

Whether designing a high-wind solar project in Florida or installing snow guards in the Rockies, these technical resources and support personnel ensure you can build with precision, confidence and compliance.



Conclusion: Raising the Standard in Roof Attachments

Metal roofs require attachment solutions that are not only engineered for performance but also rigorously tested, certified and documented. Assumptions and unverified claims have no place in critical roof assemblies—especially when safety, durability and long-term performance are at stake.

Professionals should seek manufacturers that demonstrate true code conformity, structural integrity, verified performance data, watertight reliability and sustainability over the long term.

Choosing a manufacturer actively engaged in industry standards, committed to continuous improvement, and transparent in testing and certification practices is essential. In a sector where the standards gap has long gone unaddressed, now is the time to demand more—and choose solutions that meet the highest level of trust and performance.

