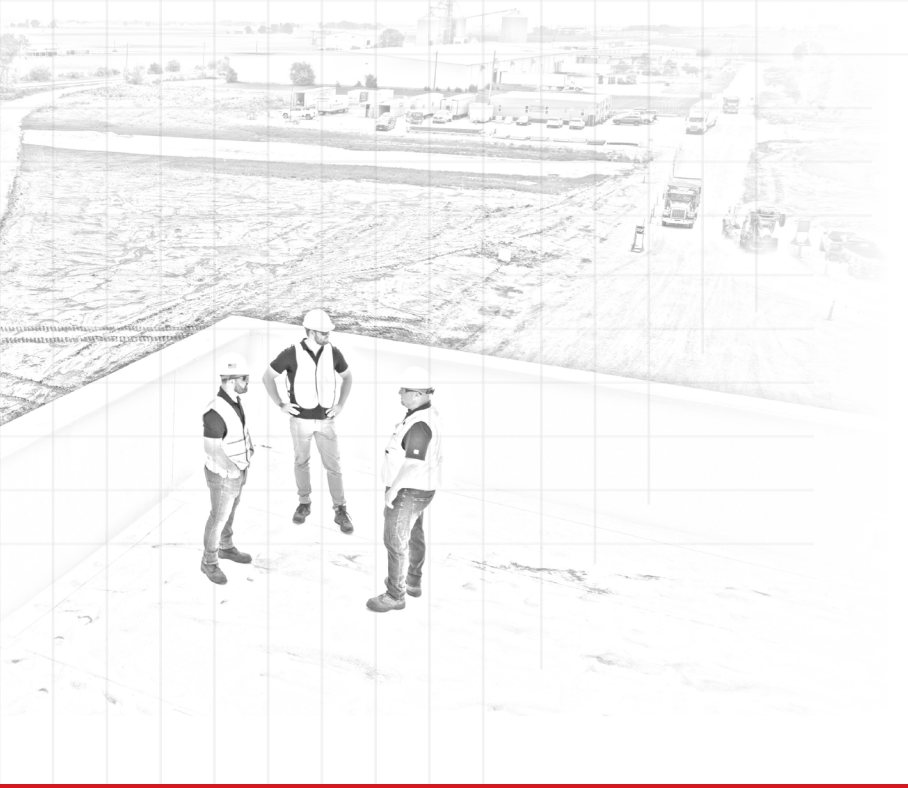
GAF Commercial



GAF COMMERCIAL ROOF DESIGNER'S GUIDE BOOK

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GAF COMMERCIAL ROOF DESIGNER'S GUIDE BOOK

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The following pages introduce essential low-slope roofing concepts — from system components to codes, and sustainability to GAF support services — as well as an overview of GAF products that may be right for your specification.

For more assistance, our regionalized Design Services team is ready to collaborate with you to solve challenges including preparing guide specs and assembly letters, LEED® requirements, fastening patterns, tapered design, product selection, and more.

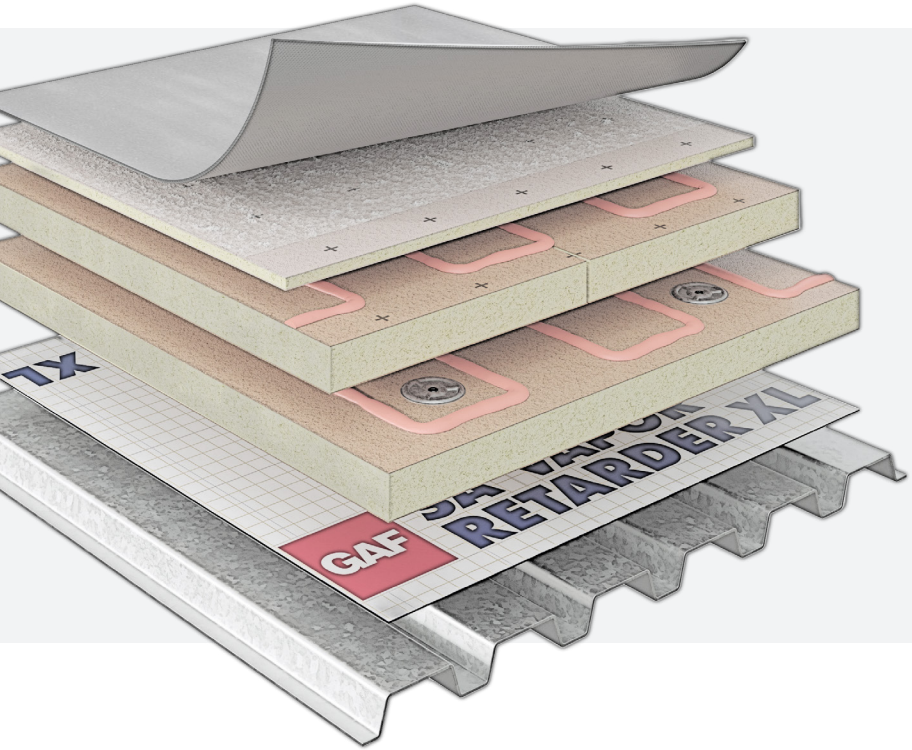
To learn more, explore the many educational and collaborative opportunities offered by the GAF/Siplast Building and Roofing Science team:

Design Pro Resources

AIA **Collaboration Partner**

Choosing the right roofing system starts with choosing the right roofing company.

As North America's largest roofing manufacturer, our broad product offering means we're not vested in a single technology. And as an **AIA Collaboration Partner**, our priority is helping you select the roofing system that's right for your application.



Low-slope roofing systems overview

A low-slope roof is a system of layers working together to provide protection from weather, impact, and UV radiation; thermal and acoustic insulation; and aesthetics. Often they're also designed to provide a base for vegetative roofing, solar power installations, and to assist with stormwater management. While the possible material combinations are virtually limitless, most low-slope roofs will include the following layers:

Deck — This weight-bearing layer — engineered to support the rest of the roof — may be constructed of thick-gauge steel, wood, or concrete, usually installed atop structural support beams.

Vapor Retarder — Depending on building use and environmental factors, a vapor retarder membrane will cover the deck and reduce moisture transfer into and out of the building. Installing a substrate board over a metal deck to fully support the membrane is best practice. A vapor retarder may also act as the roof assembly air barrier.

Insulation — The insulation layer reduces thermal transfer, measured in R-value, between the interior and exterior of the building. The most common type of roof insulation in use today is polyisocyanurate foam (AKA polyiso, or simply ISO).

Cover board — Providing a durable surface with relatively high compressive strength, cover boards are most often made of ISO, gypsum, or wood fiber. Their purpose is to help protect the lower compressive strength insulation layer from foot traffic or hail damage.

Waterproofing Membrane — The upper layer(s) of the roof can be a single-ply membrane such as TPO or PVC, asphalt built-up roofing (BUR), modified bitumen, or a liquid-applied membrane. Its purpose is to create a durable surface that protects the building from external elements.

Perimeter Edge Metal — Primarily comprised of fascia, coping, drip edge, and gutters, edge metal plays a vital role in building a watertight roofing system, by closing gaps between membrane and wall; helping transition horizontal to vertical roof planes; creating physical boundaries for roof gravel and water; and creating a clean, aesthetically pleasing line. It also serves as the first line of defense in regards to wind-uplift resistance.

Overburden — Overburden installations include applications such as solar, vegetative roofing, and amenity decks, and can make a significant impact on the sustainability goals of a building.

Membrane Types

TPO Roofing

Short for thermoplastic polyolefin, TPO is a single-ply roofing membrane that offers excellent performance and has been the most popular roofing membrane for many years.

It's often specified for its flexibility without using plasticizers, durability, UV reflectivity, heat stability, and heat-sealable properties, as well as inherent fungal resistance.*

About GAF EverGuard® TPO membrane:

- Our TPO membrane construction has remained consistent for more than 20 years, during which the company has sold more than 6 billion square feet of membrane.
- GAF EverGuard® TPO is supported with specialized GAF training videos, CARE classes, and unmatched technical support and is available with guarantees up to 30 years.†
- For particularly demanding projects, including high-heat and solar applications, GAF EverGuard® Extreme TPO includes an enhanced weathering package that allows GAF to offer a guarantee of up to 35 years†, the longest in the industry.
- For time- or temperature-sensitive projects, GAF EverGuard® SA (self-adhered) TPO is ready to install direct from the factory, can be installed in temperatures down to 20°F (-6.6°C), and is available with guarantees up to 25 years.†

Available GAF TPO membranes:

- EverGuard® TPO Smooth Membrane (45, 60 & 80 mil)
- EverGuard® SA TPO Self-Adhered Roof Membrane (60 & 80 mil)
- EverGuard® TPO Fleece-Back Membrane (45, 60 & 80 mil)
- EverGuard® TPO 100, 115 & 135 Fleece-Back Membrane
- EverGuard Extreme® TPO Smooth Membrane (50, 60, 70 & 80 mil)
- EverGuard Extreme® TPO Fleece-Back Membrane (50, 60, 70 & 80 mil)

Learn more

* GAF warranties and guarantees do not provide coverage against fungi or other biological growth. Refer to gaf.com for specific information on warranty and guarantee coverage and restrictions.
† For qualified projects additional requirements apply. Contact GAF for more information.

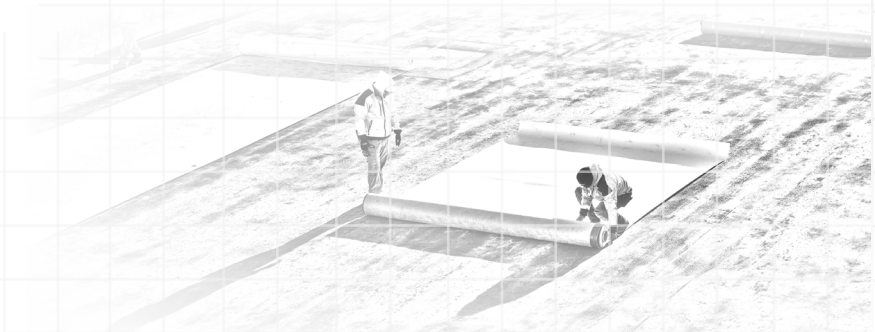
Notes

About MembraneShield Temporary Dirt-Blocking Film:

Protect new TPO membrane from dirt and staining during installation by specifying MembraneShield Temporary Dirt-Blocking Film — **a monolayer protective sheet** that is factory-applied to EverGuard® TPO membranes. Only EverGuard® TPO labeled **"With MembraneShield Temporary Dirt-Blocking Film"** includes this feature. MembraneShield Temporary Dirt-Blocking Film is adhered to the TPO membrane with a **water-insoluble acrylic-based adhesive** and is designed to be left on during installation of the roof and to be removed after installation is completed or up to 90 days after installation. MembraneShield Temporary Dirt-Blocking Film helps protect aesthetic impact of visible (below skyline) roofs, is a great choice for new roofs that may require additional foot traffic from other building trades, and helps keep roofs clean during tear offs and recovers of EPDM and Asphaltic roofs.

About Fleece-Back Membranes:

Fleece-back TPO and PVC membranes are key components of many Very Severe Hail-rated systems* and wherever strong protection against foot traffic, punctures, and hail† is paramount. EverGuard® fleece-back TPO and PVC are also suitable for re-cover applications, where they can add years to a roof's life at a fraction of the time and expense of a full reroof. Depending on the condition of the existing roof, the membrane can be mechanically attached or adhered with low-rise foam. Choosing a re-roof with fleece-back membrane can postpone the need for a roof tear-off; save labor; reduce material waste from re-roofing; and minimize disruption, odor, and noise.



Learn more

* Systems approved under FM 4470 — Very Severe Hail (Class 1-VSH). See FM Global Data Sheet 1-34 for more information. Visit RoofNav.com for approved assemblies.

† GAF warranties and guarantees do not provide coverage against traffic except where GAF walkways are applied, or against hail or other impact. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions. Hail or puncture-resistance coverage may be available for purchase for eligible systems. Contact GAF for more information.

Notes

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PVC Roofing

Short for polyvinyl chloride, PVC is a single-ply roofing membrane that offers excellent performance against chemicals* compared to other singly-ply roofing technologies, as well as long-term weathering and UV resistance. It's also known for its high flexibility, which is great for use on difficult contours and curves, and heat-welded PVC seams provide greater seam strength compared to taped seams.

PVC KEE: A variant of PVC known as PVC KEE is often specified in applications that call for increased protection against chemicals such as grease, animal fats, and jet fuel*. KEE (Ketone Ethylene Ester, aka Dow® ELVALOY™ KEE) is a highly flexible polymer used as a plasticizer. Unlike the liquid plasticizers used in traditional PVC, KEE is a solid. PVC KEE membranes can also help protect against dirt pickup and mold/mildew growth, helping to keep the roof clean and reflective.

About GAF EverGuard® PVC

- Enhanced fire protection is exhibited when tested in accordance with Class A E108, where specific EverGuard® PVC roofing assemblies demonstrated the capability to extinguish even when the flame source remains applied to the assembly
- Thanks to a highly reflective and emissive white surface, GAF EverGuard® PVC (white membranes only) offers potential cooling costs‡ and urban heat island effect reductions
- Guarantees are available up to 30 years for qualified systems†

Available GAF PVC membranes:

- EverGuard® PVC Smooth Membrane (50, 60 & 80 mil)
- EverGuard® PVC Fleece-Back Membrane (50, 60 & 80 mil)
- EverGuard® PVC KEE Smooth Membrane (50, 60 & 80 mil)
- EverGuard® PVC KEE Fleece-Back Membrane (60 & 80 mil)

Learn more

* GAF warranties and guarantees do not provide coverage against chemical exposure or exposure to grease, animal fats, and jet fuel. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions.
† Additional requirements apply. Contact GAF for more information.
‡ Energy cost savings are not guaranteed and the amount of savings may vary based on climate zone, utility rates, radiative of roofing products, insulation levels, HVAC equipment efficiency, and other factors.

Notes

Smooth vs. Fleeceback:
Which is right for your project?

Choosing a fleece backing on your TPO or PVC membrane adds even more durability, protection, and strength to the system.

Factory-applied polyester fleece provides enhanced puncture resistance against foot traffic, hail, and other impacts*, and does not require a slip sheet when installed over a variety of existing roof systems. It's a suitable option when installing many FM-Approved hail system solutions. Refer to RoofNav.com for specific assemblies.

Visit for more on GAF
Very Severe Hail systems

* GAF warranties and guarantees do not provide coverage against traffic except where GAF walkways are applied, or against hail or other impact. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions. Hail or puncture resistance coverage may be available for purchase for eligible systems. Contact GAF for more information.

Notes

Asphaltic

Asphalt is one of the oldest roofing technologies still in use. Commercial asphaltic roofing systems consist of two or more waterproofing layers, including base membranes and cap membranes.

Commercial asphaltic roofing comprises three main technologies:

BUR (Built-Up Roofing) involves mopping-down multiple plies with hot asphalt and finishing with a flood coat and gravel or a cap sheet.

Available GAF BUR membranes:

- GAFGLAS® base, cap & ply sheets (mineral-surfaced, venting & EnergyCap™ available)
- Tri-Ply® base, cap & ply sheets

APP Asphalt has been modified with atactic polypropylene — a plastic polymer that allows the roofing membrane to achieve durability and protection against the damaging effects of UV rays and weather events. APP is typically applied via a torch and installed over either an APP, BUR base sheet, or thermal barriers.

Available GAF Modified-Bitumen APP Membranes

- RUBEROID® base/ply & cap membranes (heat weld, mop smooth, Granule FR & EnergyCap™ membranes available)
- Tri-Ply® base/ply & cap sheets (torch smooth & torch granule available)

SBS Asphalt has been modified with a synthetic rubber polymer called styrene-butadiene-styrene, which allows these modified bitumen sheets to achieve greater elongation ratings than other types of asphaltic systems. SBS systems can be hot-mopped, cold-applied, torched, self-adhered, or mechanically fastened.

Available GAF Modified-Bitumen SBS Membranes

- RUBEROID® base/ply & cap membranes (torch smooth, torch granule & EnergyCap™ available)
- Tri-Ply® base/ply & cap sheets (torch smooth & torch granule available)

Learn more

Notes

What is hybrid roofing?

A hybrid roof assembly is where two roofing membranes, composed of different technologies, are used in one roof system. For example, base layers of asphaltic modified bitumen can be combined with a top layer of reflective single-ply membrane such as a fleece-back TPO or PVC. Together, this system combines the best selected characteristics of both membranes.

Protection and Durability

Inclusion of a bottom layer of asphaltic membrane provides redundancy and protection against punctures*, and adds overall thickness to the system.

Increased Solar Reflectance

The addition of a white single-ply reflective membrane over a dark-colored asphaltic membrane will significantly increase the Solar Reflectance Index (SRI) of the roof surface.

Versatility

A hybrid roof solution offers the opportunity to select a membrane or cap sheet to address specific challenges, including conditions or the need for overburden, and more.

Can help reduce odor and noise disturbance

The selection of a single-ply membrane as the top layer allows for installation with low-VOC options that can have minimum odor and noise disturbance if construction is taking place while the building is occupied.

Learn more

* GAF warranties and guarantees do not provide coverage against hail or other punctures except where additional puncture resistance coverage is purchased on eligible jobs. Contact GAF for more information. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions.

Notes

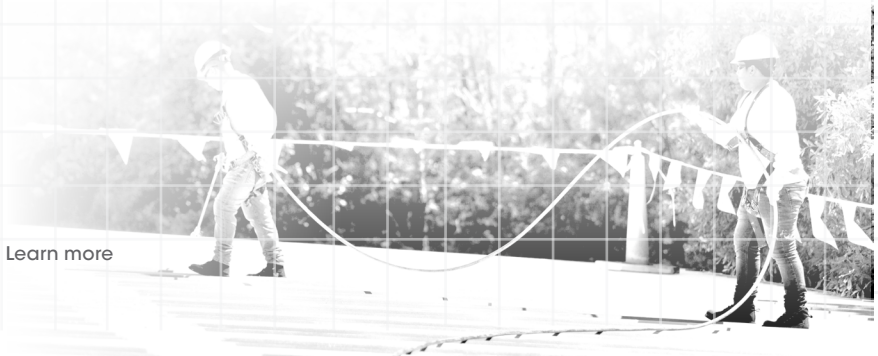
Liquid-Applied Membranes and Coatings

Reroofs and restorations often call for a liquid solution that can create a durable, long-lasting roof or help extend the life of the existing roofing system. GAF offers a wide range of liquid-applied solutions, including silicone, acrylic, or fully reinforced systems featuring alternating layers of coating and fabric.

Stand up to ponding water: Silicone Coatings offer a wide temperature application window and tenacious adhesion when restoring structurally sound existing metal, asphaltic, aged single-ply, SPF, and previously coated roofs.

Restore structurally sound roofs: Acrylic Coatings provide protection against normal weathering, aging, and UV exposure on roofs that need moderate restoration and extension of life. They can be used on BUR, SBS, APP, metal, structural concrete, aged single-ply, SPF, and previously coated acrylic roofs.

Recover, reroof, and new roof applications: Full-fabric liquid-applied membrane assemblies such as the GAF Premium Acrylic HydroStop® System offer adhesion to a variety of substrates, including new and existing metal, structural concrete, TPO, PVC, Hypalon®, EPDM, polyiso, gypsum roof board, and asphaltic roofs. They can often be recoated and renewed with proper maintenance to further extend the life of the liquid-applied membrane system.



Learn more

Notes

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Attachment Methods

Depending on the material chosen, a wide variety of attachment methods is available. Each offers its own advantages.

Mechanically Attached

Provides excellent wind-uplift resistance and can be installed quickly and easily, making it a popular choice for commercial and industrial roofs. (TPO, PVC, Asphaltic)

GAF offers a full line of Drill-Tec™ fasteners and plates for insulation and single-ply mechanically attached and induction-welded applications.

For more information, please visit:

Adhered

Enhances performance by providing excellent wind-uplift resistance. It helps maintain a higher R-Value and minimizes membrane flutter. (TPO, PVC, Asphaltic)

- EverGuard® Quick Spray Adhesive (in TPO or PVC formulation)
- GAF Low-Rise Foam adhesives such as GAF LRF Adhesive XF Canister
- MATRIX™ 101 Premium SBS Membrane Adhesive
- Self-Adhered TPO
- And more

For more information, please visit:

Notes

Attachment Methods Cont.

Cold-Applied

Consider Cold-Applied roofing for safety, foot traffic, and hard-to-reach roofs. It's cost-competitive and reduces clutter from equipment. (Asphaltic)

Torch-Applied

The torch melts the asphalt on the underside of the asphaltic roll to bind the roofing material to the substrate, creating a strong and durable bond. (Asphaltic)

Induction–Welded

Boosts productivity with faster installation and fewer screws/plates. It enhances performance with better wind resistance versus in-seam fastening and eliminates half sheets, reducing membrane flutter. (TPO, PVC)

Notes

About Polyiso Insulation

In every commercial roof system, the insulation layer performs multiple functions toward the performance and protection of the building, primarily by reducing thermal transfer between the interior and exterior of the building.

Polyisocyanurate foam (AKA polyiso, or simply ISO) is the most common type of roof insulation in use today. Lightweight, easy to cut, and easy to maneuver, polyiso also provides a higher R-value per inch compared to non-polyiso types of insulation of equivalent thickness, making it one of the best thermal solutions for low-slope roof systems. (R-value: a measure of the resistance of an insulating or building material to heat flow, expressed as R-11, R-30, and so on; the higher the number, the greater the resistance to heat flow.)

Compatible with most roofing systems and assembly attachments, polyiso has over 70% market share for new and retrofit roofing applications.

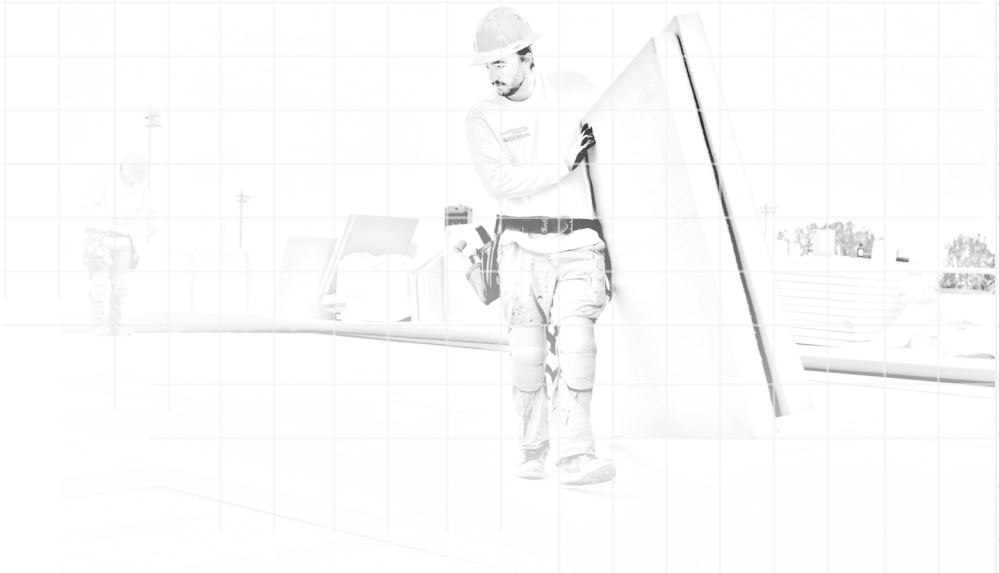
Sized for precision: To help you meet specific R-value requirements, polyiso boards are available in thicknesses ranging from ½" – 4.6", typically in flat board sizes of 4' x 4' and 4' x 8'. Polyiso is also available in specially cut widths, straight or bevel, to fit in the flutes on a steel deck to add additional R-value.

Available GAF EnergyGuard™ Polyiso products (Various sizes/thicknesses):

- EnergyGuard™ Polyiso Insulation
- EnergyGuard™ Tapered Polyiso Insulation
- EnergyGuard™ Ultra Polyiso Insulation
- EnergyGuard™ Ultra Tapered Polyiso Insulation
- EnergyGuard™ Barrier Polyiso Insulation

Learn more

Notes



Polyiso Facer Options

The polyisocyanurate foam core of a polyiso board is sandwiched by facers, which provide strength and serve a number of functions during the service life of the product. Two of the most common facers used are Glass-Reinforced Facer (GRF) and Coated Glass Facer (CGF).

A **GRF** facer, which comes standard on EnergyGuard® Polyiso, is composed of a cellulosic fiber felt (often called "paper") and offers compatibility with a variety of systems, adhesives, and self-adhered technologies.

A **CGF** facer, available on the EnergyGuard® Ultra line of polyiso, is composed of coated polymer-bonded fibrous glass mats, offering better adhesive coverage than paper-facer polyiso, greater moisture resistance, reduced potential for mold growth, and reduced adhesive absorption. Consider using a CGF-faced board, such as EnergyGuard® Ultra, for buildings exposed to excessive humidity or moisture such as fitness centers, cold storage, hospitals, and data centers.

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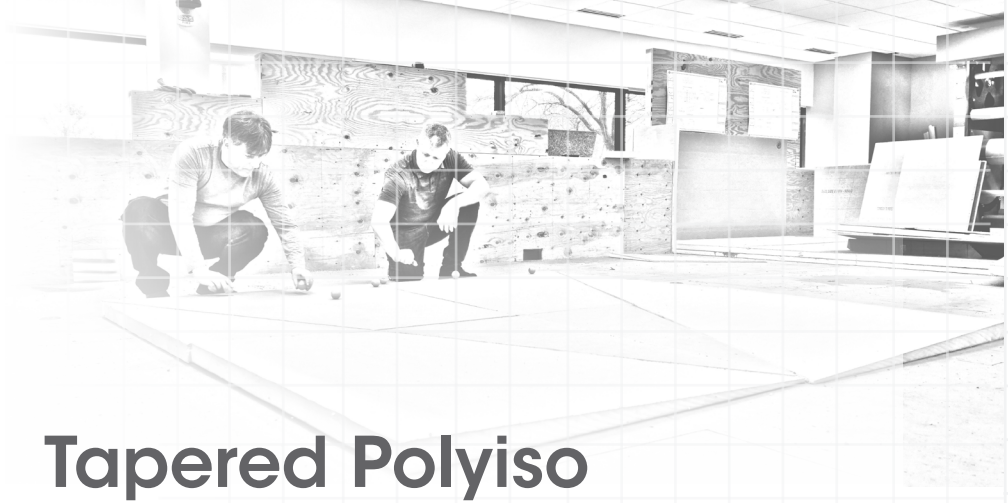

Tapered Polyiso

Standing or "ponding" water can threaten the integrity and longevity of a commercial roof system. Left unaddressed, standing water will add weight to the roof and may eventually lead to leaks and bacteria growth — which can degrade the components of the roof assembly. A tapered polyiso insulation system incorporates a combination of flat and tapered panels that provide slope on an otherwise low-slope (flat) roof deck to ensure positive drainage.

The dedicated, regionalized GAF Tapered Design Group works with architects, specifiers, and contractors to develop custom tapered polyiso design solutions to meet budgetary and specification requirements.

Available Tapered Polyiso:
- EnergyGuard™ Tapered
- EnergyGuard™ Ultra Tapered

Visit to access a wide range of tapered design resources

GAF **Tapered** Design Group

Full-Service Tapered Design and Takeoff Solutions
Call: 866-207-7123

Notes

TCPP FREE

To Help Meet Sustainability Goals: Non-Halogenated ISO

GAF offers a polyiso option with a non-halogenated flame retardant free of TCPP — a red-list chemical — at standard polyiso pricing.

EnergyGuard™ NH Polyiso Insulation Boards have all the inherent properties and performance factors polyiso insulation is known for, including one of the highest insulation values per inch, but does not contain any halogenated flame retardants.

GAF NH Polyiso options offer a stable low-temperature R-value, maintaining the same R-value when tested according to ASTM C1289 standard using the C518 test method at both a mean temperature of 40°F (4.4°C) and 75°F (24°C).

Available GAF EnergyGuard™ NH Polyiso:

- All EnergyGuard™ Polyiso products offer a non-halogenated option at standard pricing

For code compliance and sustainability information, please refer to individual insulation product data sheets at **gaf.com/nh**.

Learn more about GAF non-halogenated polyiso

Notes

Visit **gaf.com/Commercial**

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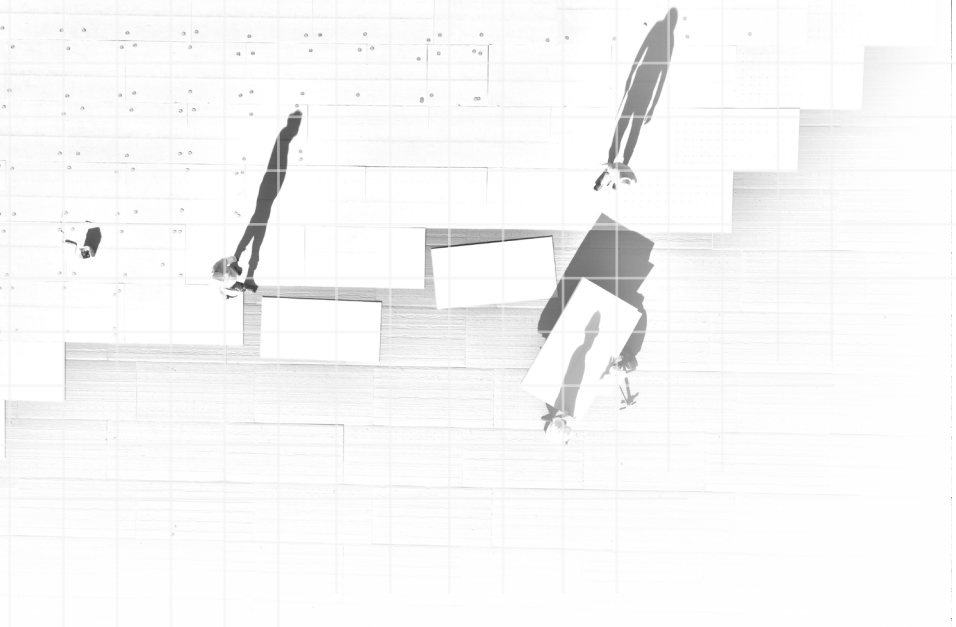


Cover Boards

Cover boards provide a protective layer over polyiso insulation or as a recover over an existing roofing system. They come in a wide variety of high-density materials, including polyiso, gypsum, glass mat, or fiber board.

Your choice of material will depend on your specific application but, in general, a cover board will offer exceptional roof protection from foot traffic, storms, and hail. Choosing the right cover board may also help improve impact protection, fire performance, wind uplift performance, thermal performance, aesthetics, and noise insulation.

Available GAF EnergyGuard™ Polyiso Cover Boards:

- EnergyGuard™ HD/HD Plus & EnergyGuard™ NH HD/HD Plus Polyiso Cover Board
- EnergyGuard™ HD Barrier & EnergyGuard™ NH HD Barrier Polyiso Cover Board

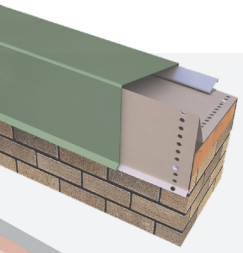
Learn more

Notes

About Perimeter Edge Metal

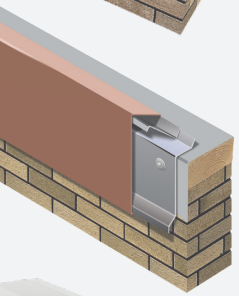
Comprising drip edge, coping, fascia, and more, perimeter edge metal is the first line of defense to protect a roof from blow offs. It plays a critical role in the building design as the termination and transition between the roof and other building components, giving the roof a professional finished look.

Choosing prefabricated edge metal complements building aesthetics while helping to reduce the risk of blow offs by enhancing wind uplift.



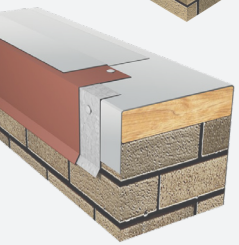
Coping:

Helps prevent water intrusion at the top of the wall with an upper layer of protection



Fascia:

Protects from water damage and gives your roof a finished look



Drip Edge:

Diverts water flow away from the fascia

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About Vegetative Roofs and Overburden

Roofing overburden consists of any manner of material, equipment, or installation situated on top of, and covering all or a portion of, a roof or waterproofing membrane assembly. This includes planters, vegetative roof assemblies, loose gravel, water tanks, tiles, pavers, supporting pedestals, equipment, solar PV arrays, and more. Often, overburden is specified to help meet sustainability goals and include systems like:

Vegetative Roof — Plants installed in trays or built in-place on the roof with extensive or intensive plant configurations.

"Blue" Roof — Systems designed to provide stormwater detention, managing rainfall using orifices, weirs, or other outlet devices that control the discharge rate of rooftop runoff.

"Blue-Green" Roof — A blue roof with a vegetative roof assembly.

Rooftop Solar — Solar PV panels, available in single-sided and bifacial (double-sided) modules. Modules are typically supported by racking systems on the rooftop that are mechanically attached to the roof, mechanically attached to a structural canopy that is attached to the roof, or held in place with ballast.

Agrivoltaics — Agriculture combined with photovoltaics is a symbiotic solution that both increases the efficiency of solar panels, and increases plant size and crop yields by shading and limiting soil evaporation.

Notes

The GAF Sustainability Promise:

Every day GAF is working to deliver high-quality roofing and waterproofing products that families and businesses can count on to protect them when it matters most.

We take that commitment seriously and believe sustainability is a critical part of delivering on that promise. Sustainability underpins our operations and product innovation — and our goal is to create solutions that offer multiple benefits.

From research and development through installation, and at every step in between, we make intentional decisions to offer a broad range of sustainable products and tools that support green building rating systems.

For information on GAF's sustainability mission:

You can find details on specific GAF products:

GAF Commercial Guide to Sustainable Building

Consumer and regulatory demand for sustainable buildings is growing every year. To stay ahead, count on the GAF portfolio of products, along with our expertise in sustainable roofing design options. Our wide range of energy-efficient roofing products have been engineered to provide long-term durable protection of building structures, help minimize waste by maximizing reuse and recycling of materials, help increase occupant comfort and energy efficiency, and offer an unmatched level of product transparency to help you achieve your sustainability objectives.

See the GAF Spec Advisor for Green Building Rating Systems

Notes

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Sustainability Certifications

Here are some of the most impactful designations and certifications to look for, and what they mean to your projects:

An **environmental product declaration** (EPD) transparently reports the lifecycle assessment of a product in a single, comprehensive report, which is verified against the international ISO 14025 standard. For more information, visit **info.nsf.org**.

GAF has product-specific environmental product declarations. Some manufacturers only offer "industry-average" EPDs.

Can be used to comply with the **Title 24** Part 6, Cool Roof requirements of the California Code of Regulations.For more information, visit **energy.ca.gov**.

NOTE: This badge is not associated with the State of California or its Code of Regulations. It was created by GAF to help you identify which GAF products can be used to comply with this regulation.

GREENGUARD Gold Certified products are low emitting and can contribute to cleaner indoor air. Certified products are screened for more than 15,000 VOCs known to pollute indoor air. For more information, visit **ul.com**.

GreenCircle is a third-party certification entity whose Recycled Content certification demonstrates a product's reuse of materials in an effort to support circular economy and reduce their reliance on virgin materials. For more information, visit **greencirclecertified.com**.

GAF has achieved GreenCircle's Life Cycle Assessment (LCA) Optimized certification for several products. This certification demonstrates GAF's commitment to continuous improvement within the overall life cycle impacts of their products.

Declare labels disclose all intentionally added ingredients and residuals at or above 100 ppm (0.01%) present in the final product by weight. For more information visit **declare.living-future.org**.

Notes

Your GAF Resources:

GAF Design Services

Call: 877-423-7663 Option 4, Option 3
Email: DesignServices@gaf.com

- Product information
- Wind (enhanced coverage requirements, calculations)
- Fastening patterns & sheet layout
- Guide specifications & assembly letters
- LEED® & other code requirements
- General design questions

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Building & Roofing Science

Our professionally diverse and regionally dedicated Building and Roofing Science team is available for consultation and education, at industry events nationwide as well as by appointment during dedicated "office hours" or by requesting a lunch & learn in your office.

Regional teams:

Request Lunch & Learn for your office:

Earn CEU Credits:

Be the first to know about webinars and events near you:

Check out the BRS Building Survival Guide

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