



## ASTM Classifications, Facers, Compressive Strength, and Formulation

### ASTM C1289 Polyiso Roofing Insulation Classifications

This specification covers the general requirements for faced thermal insulation boards composed of rigid cellular polyisocyanurate surfaced with other materials. This standard is intended to apply to rigid cellular polyurethane-modified polyisocyanurate thermal insulation board products that are commercially acceptable as nonstructural panels useful in building construction.\* The materials are classified as follows: Types I, II, III, IV, and V.

ASTM C1289 is also the standard used for testing. The insulation foam core shall be homogeneous and of uniform density. The following test methods

shall be performed to conform to the specified requirements: conditioning; thermal resistance; compressive strength; dimensional stability; flexural strength; tensile strength perpendicular to board surface; water absorption; and water vapor transmission.

The chart below shows where all GAF polyiso products fall within the ASTM C1289 classifications.

**Type I** — Faced with aluminum foil on both surfaces (top and bottom) of the core foam, not currently made by GAF

**Type II** — Faced with either cellulosic facers or glass fiber mat facers on both major surfaces (top and bottom) of the core foam

Class 1	Class 2	Class 4†	Class 5†
Glass fiber-reinforced cellulosic felt containing glass fibers. <b>(GRF)</b>	Coated polymer bonded fibrous glass mats bonded with organic polymer binders and coated with organic polymer, clay, or other inorganic substances on both sides. <b>(CGF)</b>	Coated polymer bonded fibrous glass mats bonded with organic polymer binders and coated with organic polymer, clay, or other inorganic substances on both sides. <b>(CGF)</b>	Glass fiber reinforced cellulosic facers on both major surfaces of the core foam. <b>(GRF)</b>
<i>Grade 2 (20 psi) standard or Grade 3 (25 psi)</i> EnergyGuard™ Polyiso Insulation EnergyGuard™ Tapered Polyiso Insulation EnergyGuard™ NH Polyiso Insulation EnergyGuard™ NH Tapered Polyiso Insulation	<i>Grade 2 (20 psi) standard or Grade 3 (25 psi)</i> EnergyGuard™ Ultra Polyiso EnergyGuard™ Ultra Tapered Polyiso EnergyGuard™ Ultra NH Polyiso EnergyGuard™ Ultra NH Tapered Polyiso EnergyGuard™ Barrier Polyiso Insulation EnergyGuard™ NH Barrier	<i>Grade 1, 80 psi min to 109 psi max</i> EnergyGuard™ HD Cover Board EnergyGuard™ NH HD Cover Board EnergyGuard™ HD Barrier Cover Board  <i>Grade 2, 110 psi min to 139 psi max</i> EnergyGuard™ HD Plus Cover Board EnergyGuard™ NH HD Plus Cover Board	<i>Grade 1, 80 psi min to 109 psi max</i> EnergyGuard™ HD-MA Cover Board

### Facers

Polyiso is classified into Types and Classes. Type II are polyiso panels faced with either cellulosic facers (GRF), or glass fiber mat facers (CGF), on both the top and bottom surfaces available in flat, tapered, and cover board polyiso panels.



**Glass Fiber Reinforced Cellulosic (GRF) Facer**

- **Facer**
  - Common facer references: Organic, Black facer, Paper facer
- **Benefits**
  - Cost-Effective: Generally considered the lower-cost option among facer types
  - Versatile: Compatible with various roofing systems and adhesives, including some self-adhered technologies
- **Applications**
  - As a reliable and cost-efficient option for many roofing applications



**Coated Glass Fiber (CGF) Facer**

- **Facer**
  - Common facer references: Coated glass, Inorganic
- **Benefits**
  - Superior Moisture and Mold Resistance compared to GRF Facer: Provides excellent protection against water absorption and mold growth compared to GRF facer. Passes ASTM D3273 Resistance to mold growth‡
  - Enhanced Fire Performance: EnergyGuard™ Barrier and EnergyGuard™ HD Barrier carry UL Class A ratings directly on wood decks
  - Increased Durability: Offers greater resistance to hail, FM approved including as a component of a Class 1-SH hail-rated assembly, foot traffic, and wind uplift on EnergyGuard™ HD Polyiso Cover boards.§
  - Compatibility: Compatible with a wide range of roofing membranes
- **Applications**
  - When enhanced performance, durability, and moisture resistance are critical
  - Cold Storage, Data Centers

\* Polyiso is a non-structural, non-load-bearing material and must be applied over structural substrates such as steel, concrete, plywood or OSB.

† When evaluating the compressive strength of cover boards ASTM recognizes them as follows, ASTM C1289 Type II Class 4 or 5, and they come in three grades.

‡ GAF warranties and guarantees do not provide coverage against mold or other biological growth. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions.

§ GAF warranties and guarantees do not provide coverage against traffic except where GAF walkways are applied, and do not provide coverage against hail except where additional puncture resistance coverage is purchased on eligible jobs. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions.

# What is Compressive Strength?

Compressive Strength is a material's capacity to withstand forces that push or squeeze together, measured as the maximum stress it can handle before deforming. It is calculated by dividing the maximum load the material can bear by the area over the load that is applied, typically expressed in a pounds per square inch (psi).

GAF manufactures flat and tapered polyiso in two compressive strengths: 20 and 25 psi. The higher compressive strength is more durable, making it suitable for applications requiring greater structural support and in general the most common option.

## 16 psi Polyiso

- Traditionally used in foil faced wall sheathing products. GAF does not manufacture this product.

## 20 psi Polyiso

- Standard Compressive Strength — This is a common and standard compressive strength

## 25 psi Polyiso

- Increased Compressive Strength — The 25 psi rating signifies a higher minimum compressive strength, meaning it can withstand greater pressure before deforming.
- Enhanced Durability — The increased strength provides greater resistance to crushing and other physical stresses
- Better for Heavy-Load Applications — Ideal for situations where the insulation will be under significant weight

## Key Considerations

### ▪ Application

- The primary factor in choosing between the two is the intended use and the expected loads on the insulation. An engineer can calculate load weights and help to determine which psi is desired for the system

### ▪ Structural Requirements

- For high-traffic areas, heavy mechanical equipment, the higher 25 psi rating is a better choice to ensure longevity and performance. A higher compressive strength cover board is also recommended for protection of the roof assembly from heavy traffic and heavy equipment\*\*

## Formulation

### Standard

Polyiso is formulated by reacting an isocyanurate (specifically MDI) with a polyol in the presence of a blowing agent (pentane) and catalysts, polyols and surfactants to create a rigid foam core sandwiched between two layers of facing material.

### Class A Formulation

GAF offers a line of products that achieve an ANSI/ UL 790 Class A fire resistance rating as a component of UL Classified roofing assemblies over combustible decks with a minimum five board thickness when installed directly onto a combustible deck. These products have the name Barrier in them.

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See individual product data sheets for physical property values.

## Use of a cover board is considered "best practice" in all roofing applications.

High Density Polyiso Cover boards come in 3 compressive strengths, GAF manufactures two of them. ASTM C1289 compliance for compressive strength is achieved by meeting the minimum value. The ASTM C1289 Standard shows that "Grade 1" cover board falls between a minimum compressive strength of 80 psi and a maximum compressive strength of 109 psi. **Note:** Some manufacturers list their compressive strength as the higher value in the range, followed by maximum. We list the approved range on our data sheets.

### Grade 1 — 80 psi Min - 109 psi Max

- Standard compressive strength for cover-boards

### Grade 2 — 110 psi Min - 139 psi Max

- Enhanced durability and compressive strength for heavy overburden, enhanced wind uplift ratings

## Non-Halogenated Formulation

GAF's NH formulation, has the same attributes as standard polyiso but manufactured with a non-halogenated, TCPP-Free, Red List-Free fire retardant. This product line qualifies for green building certifications.

## Certifications



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