



Georgia-Pacific
Gypsum

Building Reputations Together™

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Durability: How Cover Boards Contribute*

The proper choice of a cover board can help resist the forces that threaten roof-system durability. Here's how.

A roof is a big investment—and it protects an even bigger investment in the building and its contents. That's why durability in any roofing system translates directly into lower total cost of ownership. Durability is more than just toughness. It's also the ability to protect contents and occupants from fire, water and noise.

Several forces challenge roof-system durability, including:

- Fire
- Moisture exposure
- Sound intrusion
- Impact from hail and foot traffic
- Wind uplift.

Properly chosen cover boards can help reduce the effects of all these forces.

Fire resistance is the sum of the components

Fire resistance in a roofing system comes from all roof components working together—and the choice of cover board can either enhance or detract from fire resistance. Where the decking, insulation or membrane is combustible, a noncombustible cover board can contribute to a lower-risk fire rating.

Lower-risk fire ratings can both ensure code compliance, and help reduce insurance premiums. For example, roofing systems that qualify for a Class 1 rating from Factory Mutual Research (FM) will qualify for the lowest insurance rates from FM affiliated insurance companies. A UL Class A rating (for external fire exposure) can also help qualify for lower premiums. Those lower premiums are a direct payback for enhanced fire durability.

(For more details on fire ratings of roof assemblies with cover boards, refer to the DensDeck® Technical Guide.)

Wind uplift is a durability factor

In extreme wind situations, wind-generated forces trying to lift the roofing off a building can be hundreds of pounds per square foot (psf). For even moderate wind conditions, roofing systems must be tested to withstand at least 60 psf before failure, and 90 psf ratings are becoming a default in many applications that use Construction Specifications Institute (CSI) or American Institute of Architecture (AIA) master specifications. As with fire ratings, higher wind-uplift ratings may qualify for lower insurance premiums, and cover boards can contribute to wind-uplift durability. Here's how:

Where the membrane is held down by a continuous coating of adhesive, wind performance relies on the strength of the substrate. If the membrane is bonded directly to a fragile, low-density insulation layer, uplift forces can literally pull the insulation apart. A cover board with good tensile strength, installed between the membrane and the insulation, can prevent this. Mechanical fasteners penetrate the insulation and transfer uplift forces directly to the rigid deck.

Cover boards can also enhance durability in roof systems using mechanical fasteners rather than adhesives. In these systems, wind forces may try to rock the fasteners sideways, and the fasteners can lose compression or even back out of the decking. A suitable cover board under the membrane can keep the fasteners from rocking and protect the roof.

Impact resistance withstands hail and foot traffic

The third force that tests roof system durability is impact from hail or foot traffic. Without a protective cover board, impact damages both the insulation and the membrane. The rigid cells of low-density insulation foam don't recover from impact compression, so crushing reduces the R-value and damages the bond with the insulation board's facing layer. Insulation compression also forces the membrane to stretch, which makes it more vulnerable to puncture.

Insulation damage from hail impact is obvious. The impact damage caused by foot traffic is less immediately noticeable, but more pervasive. Foot traffic, wheelbarrows and equipment carts all generate loads that compress unprotected insulation and threaten the membrane with stretching and punctures.

Traffic damage comes first during installation of the roof itself, then from installation and maintenance of HVAC, PV systems, and other roof-top equipment. After construction, routine building maintenance continues the stress. This is why some roofing system warranties place a limit on the amount of roof-top traffic that can be tolerated.

Cover boards can protect against both hail and foot traffic damage. Installed between the membrane and the insulation, a rigid cover board with good compressive strength distributes impact to prevent insulation compression. Cover boards also improve puncture resistance by supporting the membrane.

Moisture exposure can be external or internal

Moisture exposure can occur in the form of rain or dew during installation, as well as roof leaks once the roof is completed. Moisture can also come from condensation or migration within the assembly.

All roofing components are to be protected from moisture exposure before, during and after installation. If components are inadvertently exposed to moisture, the ability to retain physical properties when the product dries is a measure of its durability and contribution to sustainability. Many products, like wood fiberboard, perlite and other materials containing organic components are physically changed by exposure. They swell, distort and are weakened.

Products with a gypsum core like DensDeck Roof Boards may retain their physical properties and integrity when allowed to dry after incidental wettings. However, you should consult the product manufacturer for additional information concerning the moisture resistance and recommendations for each product.

(For more details on the moisture resistance of DensDeck Roof Boards, including its limitations, refer to the DensDeck Technical Guide.)

* Information presented in this article concerning roofing systems and assemblies is presented as a general guide for illustration purposes only. Please consult the appropriate system manufacturer or design authority for system specifications and instructions for any specific system or assembly. Georgia-Pacific Gypsum does not provide roofing design services.

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Mold needs organic material to grow

Mold requires four factors for growth: spores, proper temperature, moisture and an organic food source. The first two, spores and proper temperatures, are universally present in roof systems. The third, moisture, can be partly controlled through proper building design. Adequate roof ventilation and vapor retarders can help reduce condensation and moisture retention in the roof system, but can't eliminate it entirely.

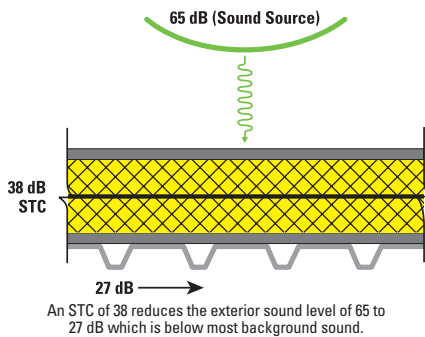
One element that we can practically limit is the organic food source. A cover board which contains primarily inorganic elements, such as gypsum board with fiberglass facings, can help to resist mold growth when compared to other roof board substrates with high amounts of organic materials.

Sound intrusion affects quality of life

The sound transmission properties of a roofing system are not part of the direct physical protection the roof offers, but sound transmission affects the quality of life inside the building. In general, people like it quiet inside occupied buildings and studies have shown that students perform better in a quiet environment. Keeping out noise from aircraft, traffic and equipment is one of the tasks of a roof system. Adding one or more layers of high-density material, such as a gypsum

cover board, can help attenuate outside noise and significantly raise the Sound Transmission Class (STC) of the roof assembly.

(For more details on STC ratings of roof assemblies with and without cover boards, refer to the DensDeck® Technical Guide.)



Cover board selection—look at all the forces together

If the proper cover board can improve durability in many roof systems, how do you select a cover board material? Consider these factors:

- Fire resistance
- Strength to resist both wind uplift and impact
- Moisture exposure and mold growth
- Sound transmission qualities.

The seven most common cover board materials are:

- **Asphaltic board.** Fiberglass-faced asphalt board in a variety of thicknesses
- **Plywood or Oriented Strand Board (OSB).** Plywood: thin sheets of veneer in layers. OSB: cross-laminated layers of oriented, resin-bonded wood strands
- **Wood fiberboard.** Organic fibers bonded with resins, lightweight
- **Perlite.** Mineral aggregate board with cellulose binders and sizing agents, lightweight
- **Paper-faced gypsum.** Gypsum core with paper facers on both sides
- **Cellulose fiber reinforced gypsum.** High-density gypsum based board
- **Glass-mat faced gypsum board (DensDeck Roof Board)** Treated, high-density gypsum board with fiberglass mats embedded on both sides.

In resisting the forces that challenge roof-system durability, no other common cover board material delivers the all-around performance of gypsum board finished with fiberglass mat. It is the clear choice in almost any roofing application.

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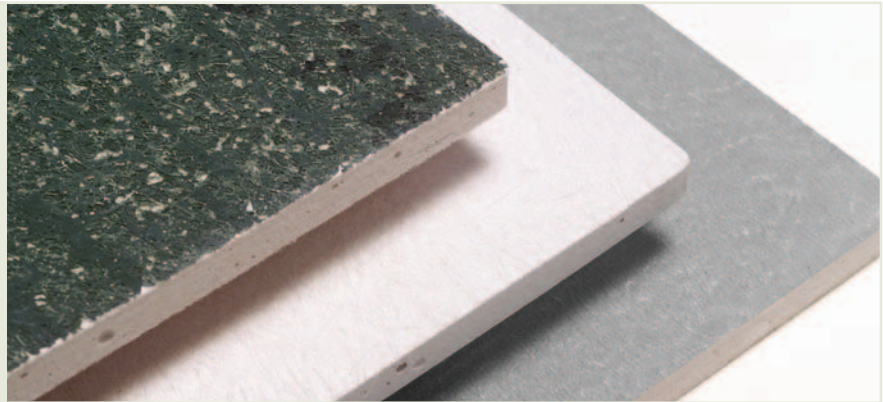
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South: **1-800-327-2344**
Northeast: **1-800-947-4497**

CANADA Canada Toll Free: **1-800-387-6823**
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CAUTION For product fire, safety and use information, go to www.gp.com/safetyinfo or call 1-800-225-6119.

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Use a dust mask or NIOSH/MSHA approved respirator as appropriate in dusty or poorly ventilated areas.

FIRE SAFETY CAUTION Passing a fire test in a controlled laboratory setting and/or certifying or labeling a product as having a one-hour, two-hour, or any other fire resistance or protection rating and, therefore, as acceptable for use in certain fire rated assemblies/systems, does not mean that either a particular assembly/system incorporating the product, or any given piece of the product itself, will necessarily provide one-hour fire resistance, two-hour fire resistance, or any other specified fire resistance or protection in an actual fire. In the event of an actual fire, you should immediately take any and all actions necessary for your safety and the safety of others without regard for any fire rating of any product or assembly/system.

