Georgia-Pacific Gypsum

TECHNICAL GUIDE

DENSDECK® PRIME ROOF BOARD

ABOUT US

Who is Georgia-Pacific?

Georgia-Pacific is part of Koch with a diverse set of businesses and industries across the world. Koch, based in Wichita, Kansas, is the second largest private company in America, employing approximately 130,000 people in 70+ countries.

From the time we were founded in 1927, Georgia-Pacific has never stopped growing. We started in a single building in Augusta, Georgia, and now have more than 300 Georgia-Pacific locations around the world.

Through all the ups and downs of the past century, we have kept one eye on tomorrow, watching for opportunities to grow with customers and expand into new industries and markets. Georgia-Pacific manufactures products with divisions such as:

- Consumer Products: Tissue, towel, napkin, professional cleansers, etc.
- Packaging: Linerboard, packaging, cellulose, kraft paper, etc.
- Building Products: Gypsum, wood, etc.

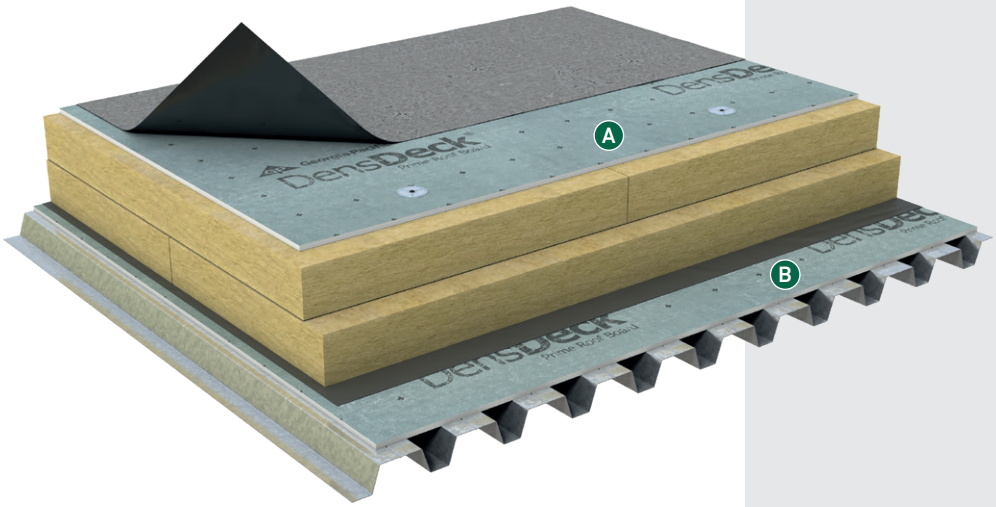
Georgia-Pacific has been manufacturing products for the low slope roofing industry for nearly 40 years. With millions of square metres installed in a wide range of roofing systems and climate extremes, DensDeck® Prime Roof Board has proven to be tough and versatile.

Including a high-performance roof board in your roofing system is essential to the protection of the building and the valuable contents inside. With its combination of fire resistance, strength and dimensional stability, industry professionals count on DensDeck® Roof Boards to enhance the performance of their roofing systems.

Click here or visit **kochinc.com**

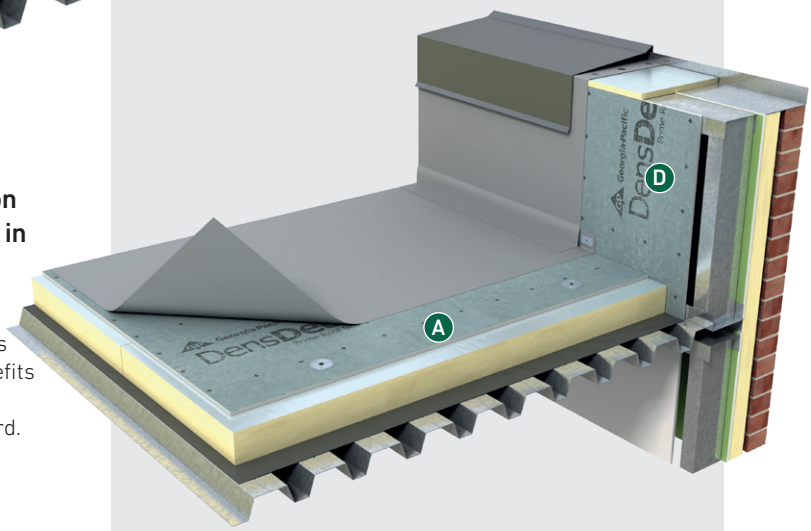
PRODUCT OVERVIEW

DensDeck® Prime Roof Board



Applications

A Cover board
B Substrate board
C Recovery board
D Parapet wall

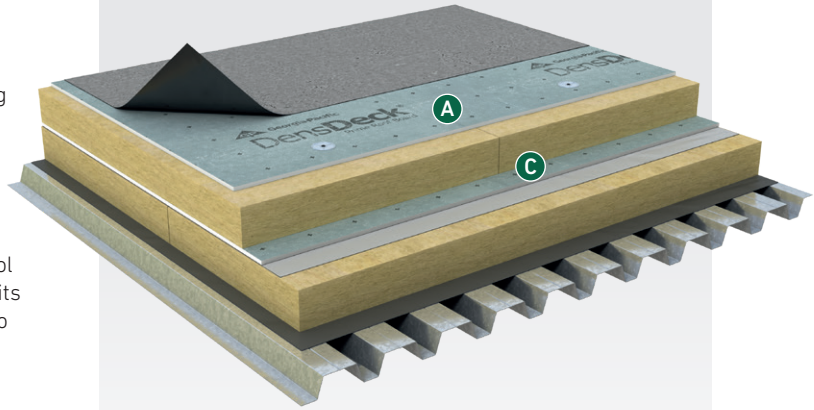


DensDeck® Prime Roof Board has an A1 reaction to fire classification when tested to EN 13501-1 in accordance with the harmonised European standard EN 15283-1: 2008 + A1: 2009.*

With its enhanced gypsum core, coated face and back glass mats, DensDeck® Prime Roof Board provides multiple benefits including increasing the force required to puncture the waterproofing layer vs. force required without a cover board.

DensDeck® Prime Roof Boards are included in more than 200,000 roof assemblies listed on FM RoofNav (see. p17)

* The A1 classification for DensDeck® Prime Roof Board is based on the assessment of Exova_Report No. 185630 - in 2010. GP Gypsum is currently in the process of reviewing and updating this classification.



Cover Board

A resilient layer installed directly between the waterproofing layer and the insulation bringing a multitude of benefits to improve the performance and longevity of flat roofs.

Substrate Board

A rigid layer installed directly over the structural deck that provides a flat smooth surface onto which the Vapour Control Layer (VCL) can be installed and brings a multitude of benefits to improve the performance of flat roofs. Can also be used to line parapets (≥12.7 mm).

Recovery Board

In refurbishment projects: A rigid layer installed directly over existing the insulation and waterproofing layers to provide a uniform surface on which to build a new roof system.

Parapet Wall

Installed before the substrate board to help reduce wind lift and potential wind lift accidents, parapet walls need to be lined with a sheathing before being dressed

APPLICATIONS AND BENEFITS

DensDeck® Prime Roof Board is a versatile product that can be used in a variety of new construction and refurbishment flat roof assemblies.

One product with four distinct applications;

- Cover board
- Substrate board
  - Parapet board*
- Recovery board

DensDeck® Prime Roof Board is used with the following roof systems;

- Fully mechanically attached
- Fully adhered
- Partially adhered (hybrid)

This innovative roof board with its coated face and back glass mats, is unlike regular paper faced gypsum board used for drylining. Glass mat faced core boards were developed as external sheathing to offer protection from the elements during construction.

Georgia-Pacific innovated the use of glass mat technology to make boards suitable for external use. DensDeck® Prime Roof Board is an evolution of this original innovation in 1987.

* **Note:** As a parapet board, DensDeck® Prime Roof Board should be installed prior to the substrate board on the roof (minimum thickness 12.7 mm).

For over 30 years, the DensDeck® Roof Board brand has continued to set new performance standards for roof board.

1987 — Launch of DensDeck® Roof Board
- First glass mat gypsum roof board
- Enhanced moisture, fire and wind resistance

1994 — ¼" DensDeck® Roof Board developed
- First ¼" glass mat gypsum roof board
- First board designed for use as a cover board
- Thinner product but still UL Class A rated

2001 — Launch of DensDeck® Prime Roof Board
- First ever coated glass mat gypsum roof board
- Improved adhesive coverage
- Torch substrate

2013 — DensDeck® Prime Roof Board Mat innovation
- Improved pre-coated mat
- may require less adhesive
- Stronger bond strength for low-rise adhesives
- Glass mat includes wrapped edges

2018 — Launch of EONIC™ Technology
- Doubled moisture resistance
- Improved mat to core bond: +20% face; ~ 3x back

APPLICATIONS AND BENEFITS

All-round performance benefits: Fire | Wind | Puncture | Acoustic

As the industry has evolved, so have DensDeck® Roof Boards, and we now offer DensDeck® Prime Roof Board – the USA industry's preferred choice of roof boards.

DensDeck® Prime Roof Board is manufactured with EONIC™ Technology, a patented system that provides enhanced moisture resistance and improved glass mat face to gypsum core bond strength. Manufacturing specifications include; maximum 5%[1] total water absorption by weight and 1-gram[2] surface water absorption on both faces of the board[3].

DensDeck® Prime Roof Board continues to provide a broad compatibility and high performance with many roofing adhesives, and in many cases no primer is needed when bonding directly to the coated face. Suitability for direct bonding to DensDeck® Prime Roof Board should be assessed by the system designer. Suitability for direct bonding to DensDeck® Prime Roof Board should be assessed by the system designer.

[1] Maximum value, per ASTM C1177, section 20.

[2] Nominal value, per ASTM C1177, section 21.

[3] Based on published manufacturing specifications as of June 1, 2020.

The coated face of DensDeck® Prime Roof Board may allow adhesives to be applied more uniformly and consistently, therefore potentially resulting in a stronger bond with the waterproofing in fully adhered and self-adhered roofing systems, as well as hot-mopped, cold-mastic and torch-applied.

In modified bitumen roofs or with liquid applied waterproofing, it may provide a stronger, more economical installation by reducing the amount of mastic or adhesive. Consult with system designer for actual priming requirements and coating weights.

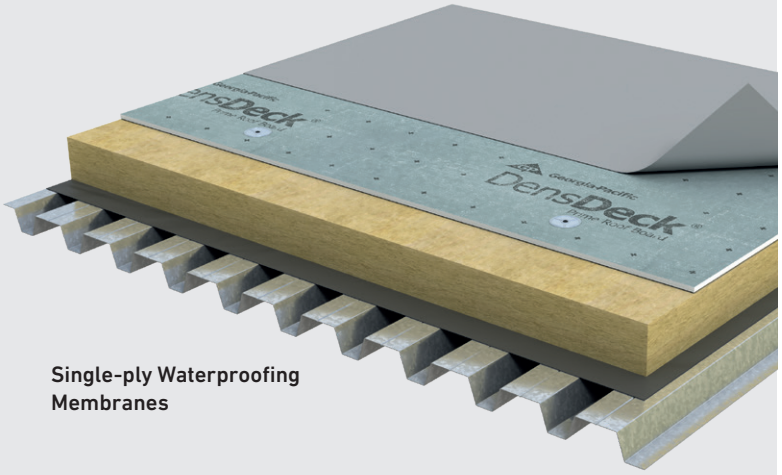
APPLICATIONS AND BENEFITS

New Building Applications: Cover Boards

Single-ply Waterproofing Membranes

Single-ply synthetic waterproofing membranes can be installed over DensDeck® Prime Roof Board in applications where the waterproofing is fully adhered, fully mechanically fixed back to the structural deck or where the cover board is fixed back to the structural deck and the waterproofing is subsequently bonded directly to the cover board (hybrid), or by induction welding to fastener heads using proprietary technologies.

Building designers should follow specific roof system guidance given by the system designer.



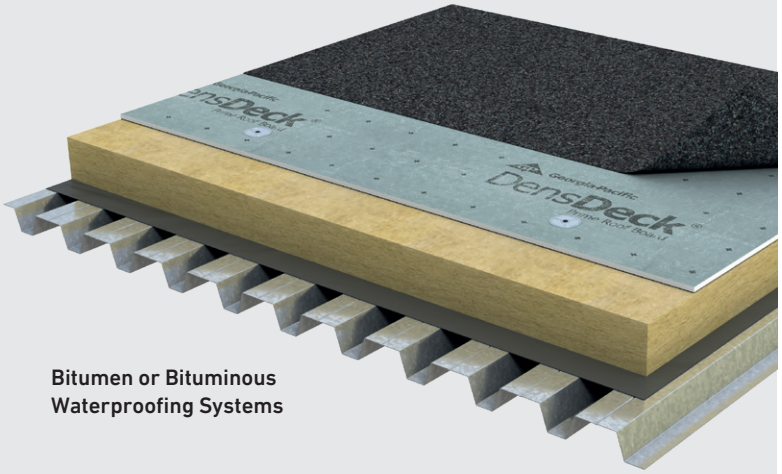
Single-ply Waterproofing Membranes

Bitumen or Bituminous Waterproofing Systems

Bitumen or bituminous waterproofing systems can be applied over DensDeck® Prime Roof Board in applications where the waterproofing is fully adhered, or where the cover board is fixed back to the structural deck and the waterproofing subsequently bonded directly to the cover board (hybrid).

This can be done with hot melt or torch applied products in accordance with specific roof system guidance given by the system designer.

Georgia-Pacific recommends maximum application temperatures between 218°C - 232°C. For hot applications follow the manufacturers recommendations for temperature and equiviscous temperature, exceeding those temperatures may result in blisters or loss of bond. When utilizing a torch, maintain the majority of the flame directly on the roll.



Bitumen or Bituminous Waterproofing Systems

Liquid-applied Waterproofing Systems

Liquid-applied waterproofing systems can be applied over DensDeck® Prime Roof Board in applications where the waterproofing is directly applied to the DensDeck® Prime Roof Board, the cover board is fixed back to the structural deck.

Building designers should follow specific roof system guidance given by the system designer.

Built-up and Standing Seam Systems

In a standing seam application, DensDeck® Prime Roof Board can be installed as an acoustically resilient layer directly under the external skin or as a substrate board directly over the structural deck.

APPLICATIONS AND BENEFITS

New Building Applications: Substrate and Parapet Boards

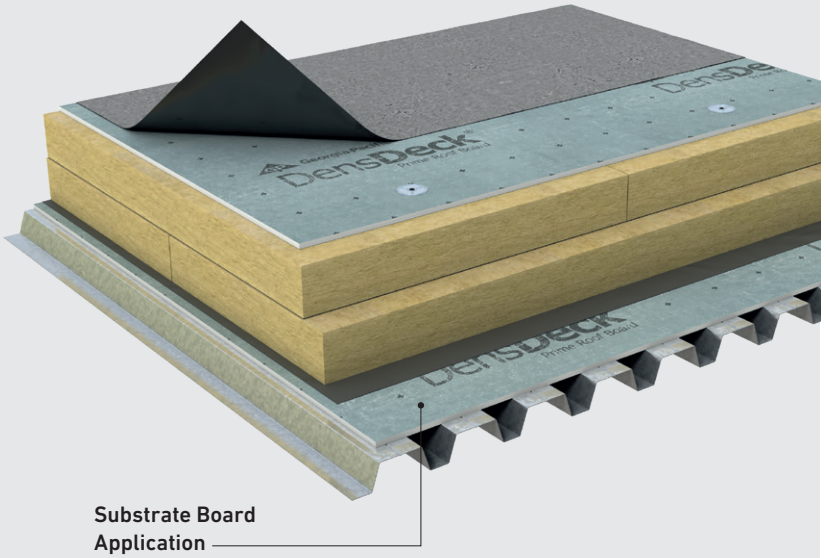
Substrate Board

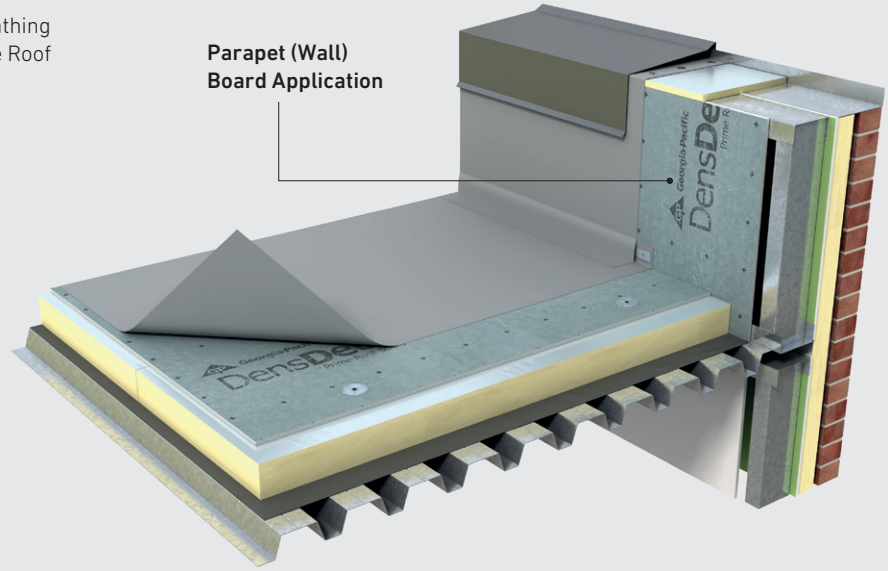
Installed as a substrate board over a profiled structural steel deck DensDeck® Prime Roof Board, adhered or mechanically fastened, offers a smooth flat surface that the Vapour Control Layer (VCL) can be installed over. The substrate board can also provide a safer working platform during construction and additional acoustic and fire resistance performance.

Parapet Wall

There is no need to change products if you have parapet walls that need to be lined with a sheathing board before being dressed. A minimum of 12.7 mm DensDeck® Prime Roof Board can be used vertically on parapets. Install DensDeck® Prime Roof Board before the substrate board so that the Vapour Control Layer (VCL) and waterproofing layers can be dressed up the parapet to form the closed roof envelope.

Note: For sloped parapet walls, a structural sheathing should be installed prior to the DensDeck® Prime Roof Boards.





APPLICATIONS AND BENEFITS

Existing Building Refurbishment Applications: Recovery Boards

Refurbishment of Roofs

If and when an existing flat roof reaches the end of its service life, or requires an upgrade, it can be fully removed to allow a new roof to be installed or new materials can be installed over the existing system to increase its performance.

Application Above New Insulation Layer as 'Cover Board'

Single-ply synthetic waterproofing membranes can be installed over DensDeck® Prime Roof Board in applications where the waterproofing is fully adhered, fully mechanically fixed back to the structural deck or where the cover board is fixed back to the structural deck and the waterproofing subsequently bonded directly to the cover board (hybrid) or by induction welding to fastener heads using proprietary technologies.

Building designers should follow specific roof system guidance given by the system designer.

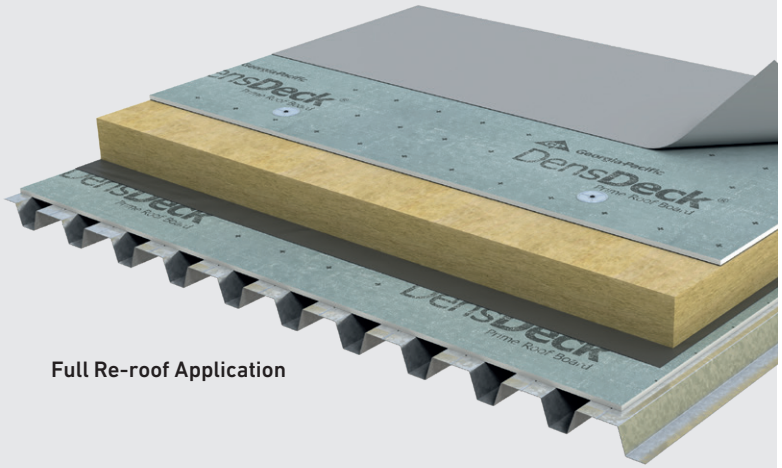
Full Re-Roof Application as Substrate and Parapet Board

Structural Deck: When installed (adhered or mechanically fixed) as a substrate board over a profiled structural steel deck, DensDeck® Prime Roof Board can provide additional acoustic and fire resistance performance whilst offering a smooth flat surface that the Vapour Control Layer (VCL) can be installed on.

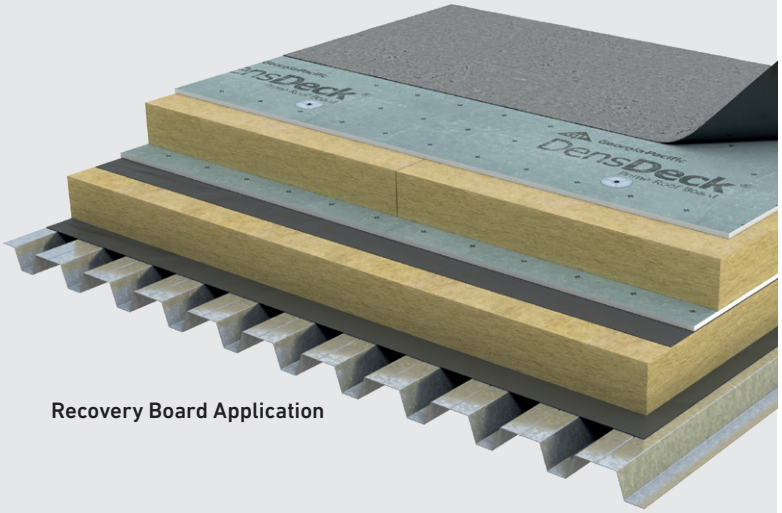
Parapet: Install DensDeck® Prime Roof Board before the substrate board so that the vapour control layer and waterproofing layers can be dressed up the parapet to form the closed roof envelope.

Recovery Board Application

Over existing roof systems, a layer of DensDeck® Prime Roof Board mechanically fixed back to the structure offers a smooth flat surface that the Vapour Control Layer (VCL), thermal insulation or waterproofing layer can be installed over bringing added acoustic and fire resistance performance.



Full Re-roof Application



Recovery Board Application

PHYSICAL PROPERTIES

Physical Properties

Properties	Test Standard	6.4 mm (¼ inch)	12.7 mm (½ inch)	15.9 mm (⅝ inch)
Thickness, nominal (mm)	15283-1: 2008 + A1: 2009	6.4 ± 1.6	12.7 ± 0.8	15.9 ± 0.8
Width, standard (mm)	15283-1: 2008 + A1: 2009	1,219 ± 3	1,219 ± 3	1,219 ± 3
Length, standard (mm)	15283-1: 2008 + A1: 2009	2,438 ± 6.4	2,438 ± 6.4	2,438 ± 6.4
Weight[1], nominal (kg/m^2)	-	5.9	9.8	12.2
Coated Facing Type	-	glass mat	glass mat	glass mat
Reaction to Fire Classification[2]	EN 13501-1: 2007 + A1: 2009	A1	A1	A1
Flexural strength (Flexural breaking load) – Longitudinal (N)	15283-1: 2008 + A1: 2009	≥ 435	≥ 807	≥ 969
Flexural strength (Flexural breaking load) – Transverse (N)	15283-1: 2008 + A1: 2009	≥ 398	≥ 725	≥ 870
Flute spanability (mm)	ASTM E661.22	67	127	203
Permeance (ng/Pa.S.m^2)	ASTM E96.16	> 1710	> 1300	> 970
Thermal conductivity (W/m.K)	EN12664: 2001	0.12	0.16	0.17
Linear Variation with change in temperature (mm/mm/°C)	GA-235-2023	15.3 x 10^{-6}	15.3 x 10^{-6}	15.3 x 10^{-6}
Linear Variation with change in moisture (mm/mm/%RH)	GA-235-2023	11.7 x 10^{-6}	11.7 x 10^{-6}	11.7 x 10^{-6}
Water Absorption	15283-1: 2008 + A1: 2009	H1	H1	H1
Compressive Strength (kPa)	ASTM C473.19	6,205	6,205	6,205
Surface Water Absorption (g)	ASTM C473	1	1	1
Fire Classification	ASTM E136	Non-combustible	Non-combustible	Non-combustible
Bending Radius (mm)	-	1,219	1,829	2,438
Mould Resistance[3]	ASTM D3273.R2005	10 (highest possible)	10 (highest possible)	10 (highest possible)
Water vapour permeability (μ)	ISO 12572: 2016	14.6	10.0	8.1

1 Represents approximate weight for design and shipping purposes. Actual weight may vary based on manufacturing location and other factors.

2 The A1 classification for DensDeck® Prime Roof Boards is based on the assessment of Exova Report No. 185630 – in 2010. GP Gypsum is currently in the process of reviewing and updating this classification.

3 When tested, as manufactured, in accordance with ASTM D3273, DensDeck® Prime Roof Boards have scored a 10, the highest level of performance for mould resistance under the ASTM D3273 test method. The score of 10, in the ASTM D3273 test, indicates no mould growth in a 4-week controlled laboratory test. The mould resistance of any building product when used in actual job site conditions may not produce the same results as were achieved in the controlled, laboratory setting. No material can be considered mould proof. For additional information, go to **www.buildgp.com/safetyinfo**.

Product Data Sheet

The DensDeck® Prime Roof Board Product Data Sheet containing a summary of technical information can be found **here** or by scanning the QR code.

Environmental Product Declarations

Environmental Product Declarations (EPD) for DensDeck® Prime Roof Board can be found **here** or by scanning the QR code.

STANDARDS AND CLASSIFICATIONS

Fire

Reaction to Fire (R2F)

DensDeck® Prime Roof Board is classified as non-combustible[1], and achieves an A1[2] classification when tested in accordance with EN 15283-1: 2008 + A1: 2009. Classification is carried out in accordance with EN 13501-1: 2018.

Test shown is EN 13823.

The Declaration of Performance (DoP) is a legal document under the EU CPR 2024* and is created in accordance with EN 15283-1: 2008 + A1: 2009, it can be found **here** or by scanning the QR code.

Fire Resistance

From Above

In the UK and European Union, specific testing relating to the fire resistance of roof coverings is carried out in accordance with TS1187 - results are classified using EN 13501-5 and in some cases Extended Field of Application (EXAP) can apply when assessed against TS16459.

Direct Field of Application (DIAP) allowances are shown in the classification report to EN 13501-5. System designers will normally carry out tests to TS1187 and / or in line with local building codes and requirements such that compliance can be demonstrated.

Test shown is TS1187(t1).

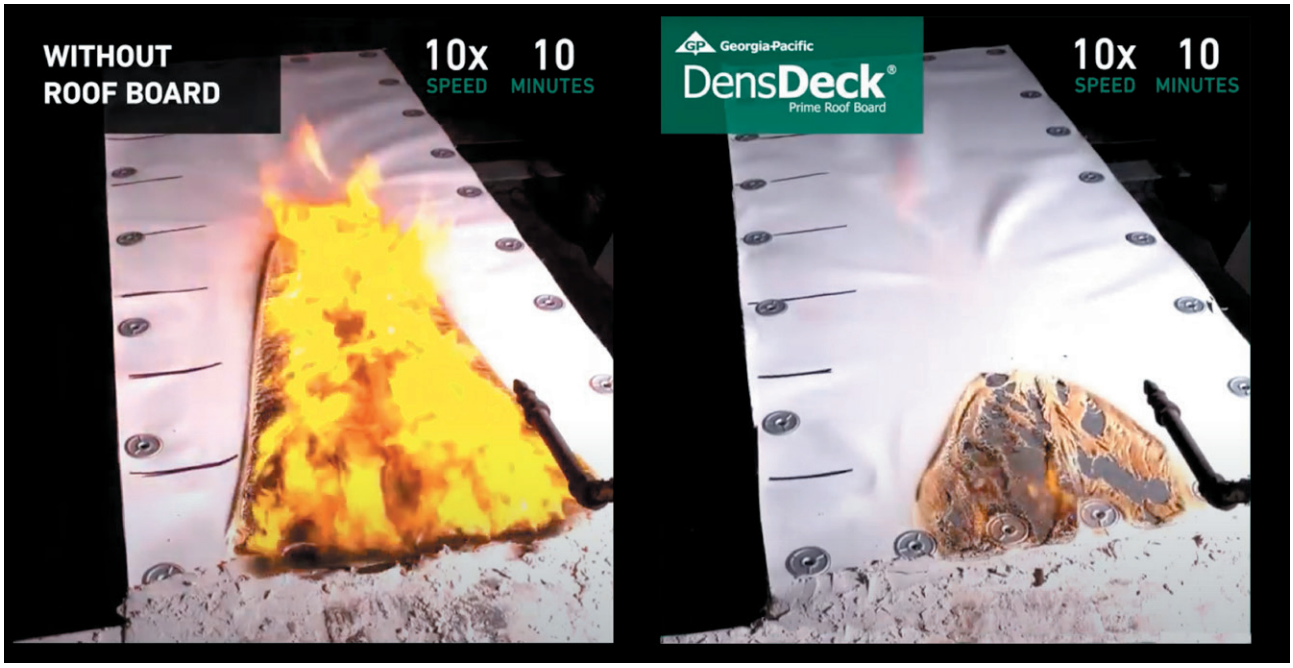
DensDeck® Prime Roof Board, in a cover board application, along with other benefits, acts as a non-combustible intermediate layer between waterproofing and insulation, this non-combustible layer with its crystalised water in the gypsum core adds an ablative property which can further help to reduce flame spread and penetration into lower layers of the roof construction through the chemical release and subsequent evapouration of embodied water.

* **Note:** The EU CPR 2024 contains phased updates to DoPs that are based on the review of the existing hEN which result in an hTS being issued that contains the exact requirements of the new DoP. Until such time that the new hTS exists, the DoP cannot be legally altered from the previous format.

(1) As described and tested in accordance with ASTM E136 or CAN/ULC S114.

(2) The A1 classification for DensDeck® Prime Roof Boards is based on the assessment of Exova_Report No. 185630 – in 2010. GP Gypsum is currently in the process of reviewing and updating this classification.

STANDARDS AND CLASSIFICATIONS



Test shown is ASTM E108.

In the USA, flame spread testing has been carried out in accordance with Factory Mutual (FM) requirements and standards.

FM Class 1 Approvals

¼ in. (6.4 mm) DensDeck® Roof Boards have passed testing under the FM Calorimeter Standard 4450 (Approval Standard for Class 1 Insulated Steel Deck Roofs) and have been approved by FM for insulated steel deck roofs when installed per FM guidelines. To achieve a Class 1 designation, the assembly must satisfy criteria for fire, wind uplift, foot traffic and hail damage resistance.

For more information about FM Approvals and Class 1 assemblies, consult FM or **RoofNav**.

FM APPROVED

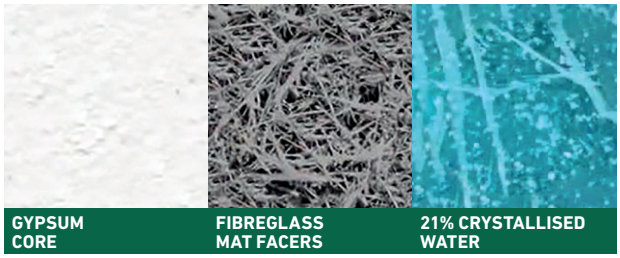
Please note, however, that the performance of a roof depends on all components used in the roofing assembly and how the components interact.

To watch the flame spread test comparison video, click **here** or scan the QR code.

From Below

Fire from below has the potential to 'break out' of the building creating the risk of spread to adjacent buildings or compartments. Break out time depends on the nature of the fire which is directly related to building use, local codes, guidance and regulation should be consulted in order to determine the period of fire resistance required.

The introduction of a non-combustible layer such as DensDeck® Prime Roof Board with its ablative properties can help retard the penetration of heat and fire from below into the insulative materials and waterproofing layers above the deck that form the roof and thus improve the fire resistance of the built system. Crystallised water in the gypsum core of DensDeck® Prime Roof Board is released under intense heat, this phase change and the subsequent evapouration of released water offers some additional heat soak that helps resist the spread of fire to above layers from the effect of heat and fire so their decomposition is slowed down.



Crystallised gypsum.

STANDARDS AND CLASSIFICATIONS

UL Fire Resistance Ratings

5/8 in. (15.9 mm) DensDeck® Roof Boards are UL-classified; designated as Type DD by UL LLC; included in assembly designs investigated by UL for hourly fire resistance ratings; and may also replace any unclassified 5/8 in. (15.9 mm) gypsum board in an assembly in the UL Fire Resistance Directory under the prefix "P."

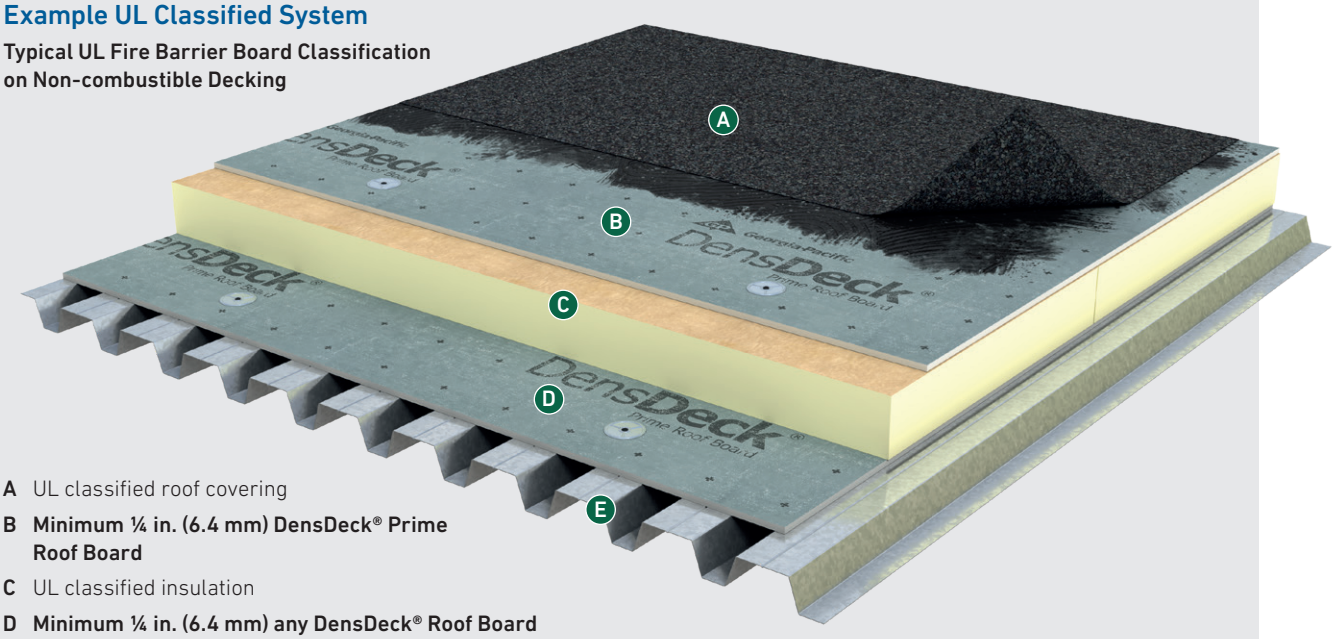
UL 790 Classification

DensDeck® Prime Roof Board has been certified by UL for use as a fire barrier over combustible and non-combustible decks in accordance with the ANSI/UL 790 and ULC CAN-S114 test standard. The UL classification includes a comprehensive Class A, B or C rating. This test method and resulting classification measures the external fire resistance of the roof system but does not include an investigation of fire resistance to internal sources directed at the underside of the roof system.

For additional information concerning the UL 790 classification for DensDeck® Prime Roof Boards, consult the UL certifications directory under categories TGFU.R15206 (Roofing Systems) and TGFU7.

Example UL Classified System

Typical UL Fire Barrier Board Classification on Non-combustible Decking



- **A** UL classified roof covering
- **B** **Minimum ¼ in. (6.4 mm) DensDeck® Prime Roof Board**
- **C** UL classified insulation
- **D** **Minimum ¼ in. (6.4 mm) any DensDeck® Roof Board serving as an insulation thermal barrier underlayment and an acceptable code alternative to a thermal barrier**
- **E** UL Classified Steel Deck

STANDARDS AND CLASSIFICATIONS

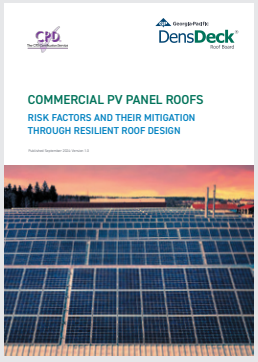
The Insurance Industry's View of Fire and Solar PV

The insurance industry has raised significant concerns about the increased fire risks associated with solar photovoltaic (PV) panels installed on commercial flat roofs.

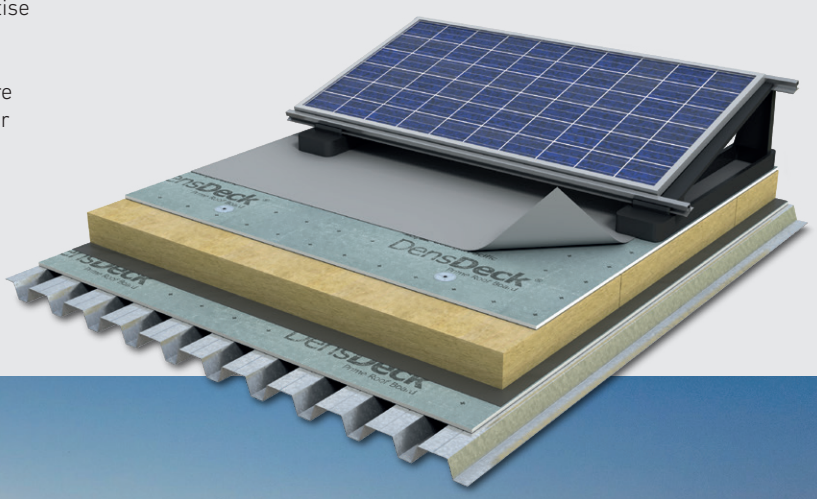
Electrical failures within solar PV systems, such as arcing, and the flammability of materials used in the roof assembly can contribute to fires that are difficult to extinguish and may spread rapidly. The geometry of solar PV panels often accelerates fire propagation, complicates firefighting efforts, and can hinder effective water application during fire suppression. Insurers are keenly aware of the financial and operational disruptions caused by such fires and now emphasize the importance of mitigating these risks through strategic choices in roof construction and maintenance.

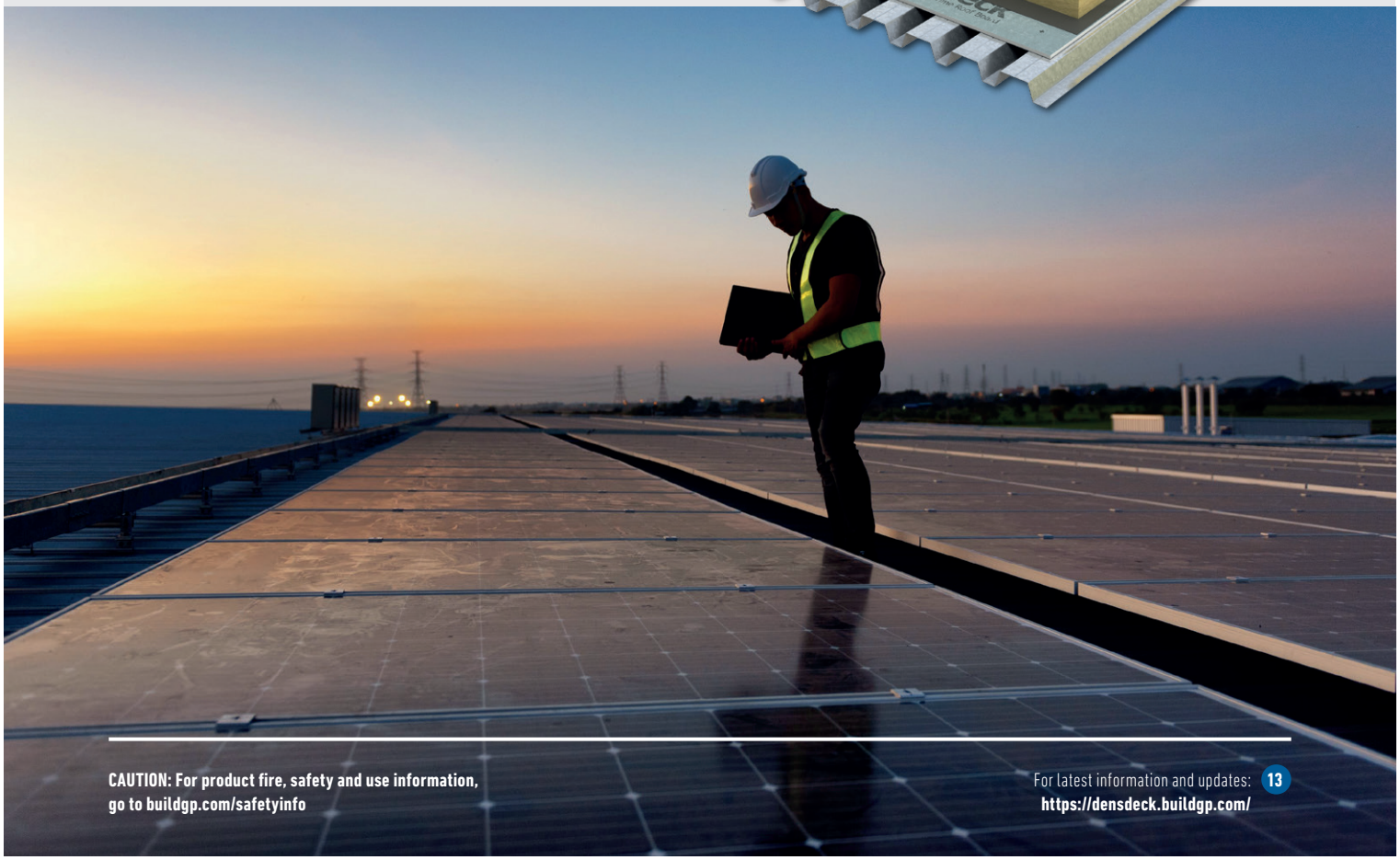
To address these concerns, the insurance industry has made it clear that roofs with solar PV installations should prioritise non-combustible characteristics to limit fire spread and enhance resilience. FM Approved roofing assemblies are highlighted as a best practice solution, ensuring robust fire performance and providing added protection against other risks such as wind uplift and water leakage.

By incorporating non-combustible 'mitigation layers' such as gypsum boards directly under the waterproofing and adhering to FM testing standards, businesses can not only safeguard their properties but also improve their risk profiles for insurers.



For a deeper understanding of these risks and actionable strategies, we encourage you to download the complete DensDeck® Prime Roof Board Solar PV White Paper **here**, or by scanning the QR code.





STANDARDS AND CLASSIFICATIONS

Loading and Resilience to Foot Traffic

Static Loading

Flat roofs are being evermore 'utilised' to house building services equipment and solar photovoltaic (PV) panels which required the roof assembly to offer some structural support by way of static loading.

Point load testing of various thermal insulations and DensDeck® Prime Roof Boards was conducted by a third party, Element Materials Technology (Canada), in accordance with EN 12430: 2013. A summary of the findings is as follows:

- The introduction of DensDeck® Prime Roof Board as a rigid layer over the insulation offers enhanced ability of the insulation to withstand static loads.
- The DensDeck® Prime Roof Board acts as a load spreading medium due to its rigid nature (*Figure 1*).

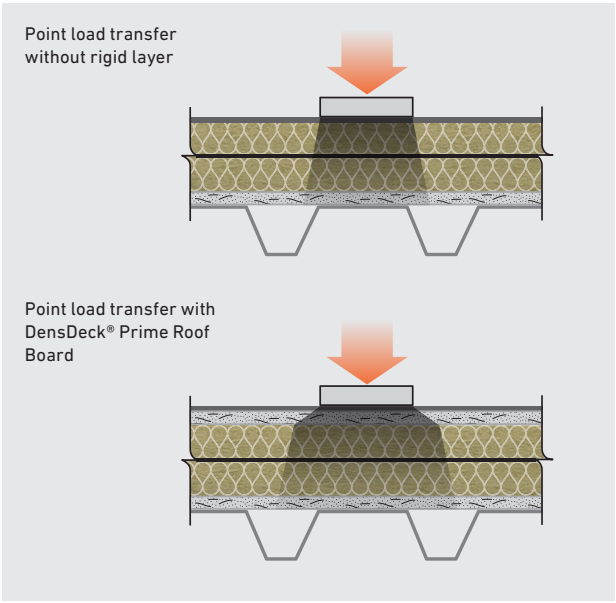


Figure 1: Indicative load distribution - DensDeck® Prime Roof Board helps to spread point loads.

Rigid PIR insulation of 150 kPa (CS10) and Dual Density Mineral wool of 70 kPa (CS10) were tested using various thicknesses of DensDeck® Prime Roof Board. The tests were run to the guidelines in EN 12430 and the resultant compressive force was measured at the critical point (end of elastic region) as per section 4.2 of EN 12430.

Please contact your local representative or our Technical Services Team if you would like more information on point loading.

Figures 2 and *3*, below, show how the materials behaved when DensDeck® Prime Roof Board was used a rigid load spreading layer.*

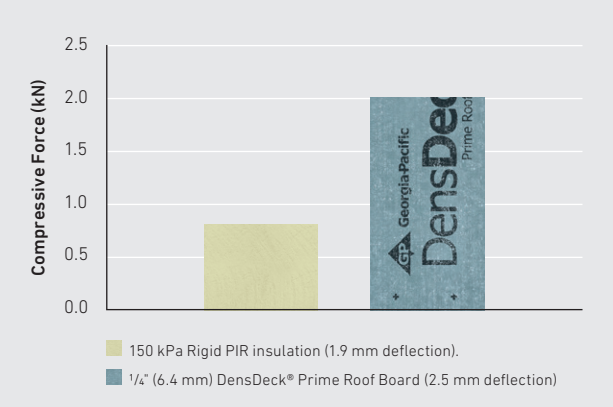


Figure 2: Rigid PIR insulation (150 kPa).

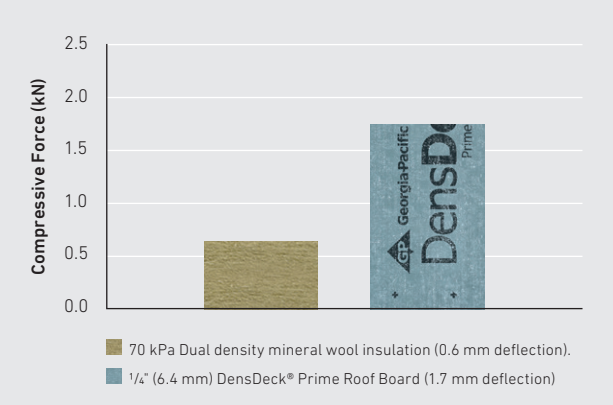


Figure 3: Dual density mineral wool insulation (70 kPa).

Georgia-Pacific makes no representations or warranties concerning the installation or performance of the overall assembly or other components in such assembly. Ultimately, the design and detailing of any project, assembly or system is the responsibility of a professional, and all projects must comply with applicable building codes and standards.

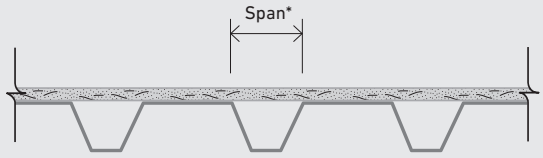
Note: Results and findings shown relate only to static point loads, no account has been made for wind, snow or other transient loading conditions or the use of equipment to transport building services over the roof.

* Insulation manufacturers should always be consulted to confirm final allowable static loads, and allowable static loads should be calculated by a competent structural engineer.

STANDARDS AND CLASSIFICATIONS

Flute Span-ability (span between crowns)

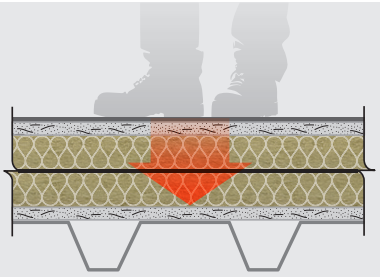
The *Physical Properties* table, page 9, gives the maximum unsupported distance that DensDeck® Prime Roof Board can withstand when installed over profiled deck. Testing is carried out to ASTM E661-22 using a load of 890 N.



* **67 mm** - DensDeck® Prime Roof Board 6.4 mm (¼ inch)
127 mm - DensDeck® Prime Roof Board 12.7 mm (½ inch)
203 mm - DensDeck® Prime Roof Board 15.9 mm (⅝ inch)

Walk-ability (cyclic loading)

The evolving role of flat roofs in urban environments, from mere protective covers to multifunctional platforms accommodating solar photovoltaic panels and essential building services equipment, has introduced more demanding resilience challenges, particularly due to increased human traffic.



Commercial solar photovoltaic panels, for example on flat roofs, typically need cleaning 2-4 times per year, with the exact frequency depending on location, weather, and surrounding environment. Regular maintenance, including cleaning and inspections, is crucial for optimal performance and longevity.

Green roofs, blue roofs, and roofs with solar photovoltaic panels all experience different levels of foot traffic. Green roofs typically require minimal foot traffic for maintenance, with professionals visiting a few times a year for inspections and upkeep. Blue roofs, which are designed to temporarily store rainwater, generally don't require foot traffic for their function, but may need occasional inspections. This activity impacts roof insulation, leading to potential thermal inefficiencies and structural issues like water ponding, as the insulation gets compressed under repetitive footfalls.

Recognising the need for relevant technical information, Kiwa BDA Testing, a leader in construction testing and certification, has pioneered a unique testing methodology known as the Marathon Man test. This innovative procedure simulates the mechanical stresses from pedestrian traffic to assess the impact on flat roof insulation. Notably, the modified test evaluates the efficacy of using DensDeck® Prime Roof Board as a protective layer to help mitigate compression damage.

Our study was conducted and concluded as follows:

The dual-density mineral wool insulation, with a compressive strength of 70 kPa, and polyisocyanurate (PIR) insulation, with a compressive strength of 160 kPa, were purchased, on Georgia-Pacific's behalf, by Kiwa for use in the test programme.

The dual-density mineral wool completed the 30 cycle tests.

Each Marathon Man test was completed three times and the results used are the mean of the three results.

Kiwa tested just the insulation, the insulation with 12.7 mm (½ inch) DensDeck® Prime Roof Board, and the insulation with 15.9 mm (⅝ inch) DensDeck® Prime Roof Board. The negative compressive strength impact on the dual-density mineral wool was reduced when tested with the DensDeck® Prime Roof Board.

The dual-density mineral wool results show that when overlaid and tested with a DensDeck® Prime Roof Board, to represent a cover board application, of 12.7 mm and 15.9 mm, the compressive strength degradation, as a result of the Marathon Man testing was reduced by an average of 47% and 89% respectively.

During Construction

Increased foot traffic, as a result of building maintenance, beyond what is traditionally required to maintain waterproofing and rainwater goods, is often due to the introduction of building services equipment or solar photovoltaic panels. The Marathon Man testing by Kiwa has proven that the introduction of DensDeck® Prime Roof Board can have a positive impact on the ability of the roof to maintain its as designed properties in the event of foot traffic. However, care should always be taken, and walkways should be used where required.

For situations that require moving heavy equipment or materials across the roof extra care should be taken to protect the roof assembly. A structural engineer or system designer should be consulted for guidance on how to protect the integrity of the roof assembly.

STANDARDS AND CLASSIFICATIONS

Wind Uplift

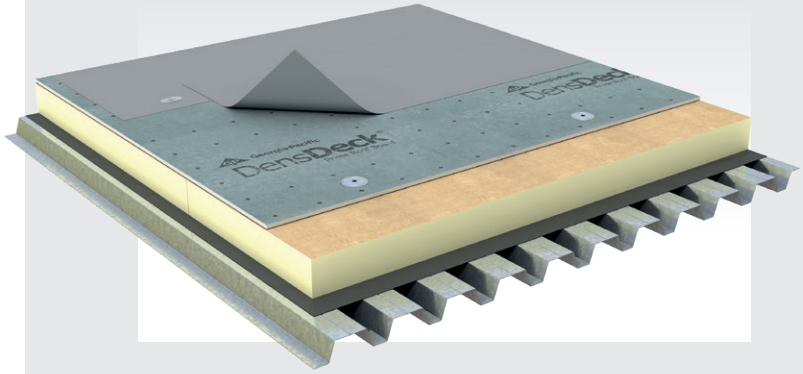
In the UK and the European Union, waterproofing systems and fasteners can be assessed to the relevant EAD and where required properties can be tested to the relevant EN standards. Predominantly full scale wind uplift testing is done in accordance with ETAG 006 (dynamic testing), results from full-scale tests are combined with results from the testing of fasteners and waterproofing to gather the required data that allows calculations to EN 1991-4 (with national annex data) to be carried out in order to assess the suitability of the system for its use. Suitability is based on combined performance of components in relation to the geographical location, building height, etc. In mechanically fixed systems the number of fasteners required in the field area of the roof is determined along with additional requirements in high load areas, such as the perimeter and corner of the roof.

DensDeck® Prime Roof Board is used with the following roof systems:

1 Fully mechanically fixed
2 Fully adhered
3 Partially adhered (hybrid)

Where the waterproofing is adhered to the cover board, system manufacturers should assess the suitability of DensDeck® Prime Roof Board, as in many cases no primer is needed when bonding to the coated glass mat face.

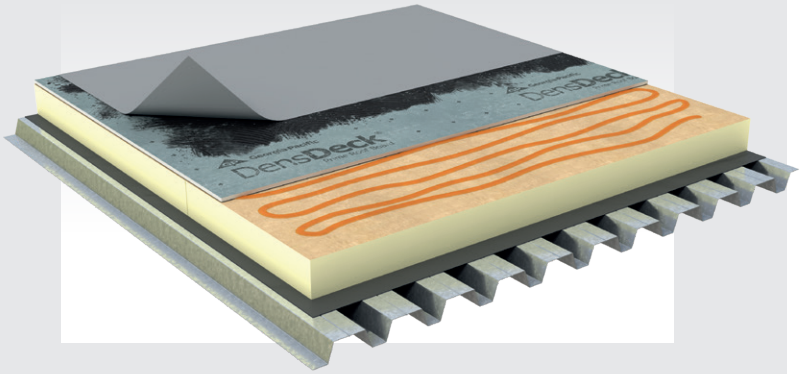
Designers should also take note of any local guidance on the application of adhered systems or restrictions that may exist in local codes or regulations.



1: Fully Mechanically Fixed Systems

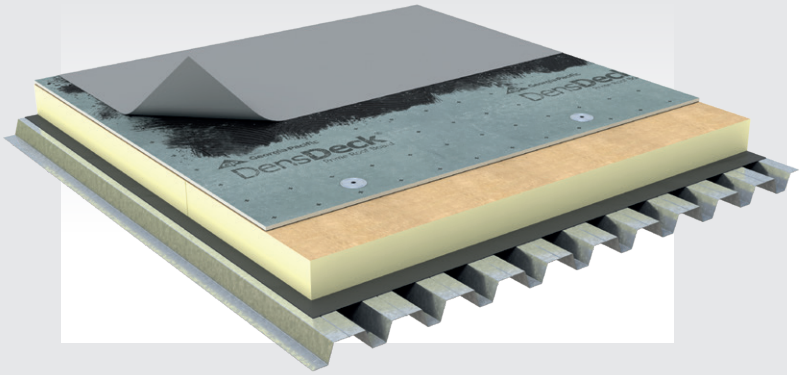
All layers are mechanically fixed back to the structure. Some layers are fixed independently, but ultimately the waterproofing layer is fixed back to the structure.

In all cases, a minimum of four fasteners per DensDeck® Prime Roof Board (2,440 mm x 1,220 mm) are required, exact fastener requirements should be verified with the system manufacturer and in accordance with local building codes.



2: Fully Adhered Systems

Each layer is bonded to the layer directly below using adhesive and method prescribed by the system designer. Peel testing or full system testing is carried out to determine the efficacy of the system.



3: Partially Adhered (Hybrid) Systems

The DensDeck® Prime Roof Board is fixed through subsequent (lower) layers back to the structure, the waterproofing layer is then adhered to the DensDeck® Prime Roof Board.

In all cases, a minimum of four fasteners per DensDeck® Prime Roof Board (2,440 mm x 1,220 mm) are required, exact fastener requirements should be verified with the system manufacturer and in accordance with local building codes.

STANDARDS AND CLASSIFICATIONS

In the USA FM testing is widely accepted. DensDeck® Prime Roof Board can be used in all the system types listed previously and is included > 200,000 assemblies[1] with various components. Assembly details can be found on **FM RoofNav** or via Georgia-Pacific's technical department.

FM's small scale 5 x 9 ft test rig will allow up to 90 psf (4.3 kPa) ratings – the minimum FM requirement is 60 psf (2.7 kPa). If higher ratings are required, testing is done on the large 12 ft x 24 ft FM rig which can give ratings to 900 psf (430 kPa).

FM wind uplift data can also be used to satisfy requirements in the UK and the European Union. Some industry wide calculation software packages have the ability to do this. Calculations are done by using a mix of FM and EU data to the methods highlighted in EN 1991-4.

System designers or fasteners manufacturers should be contacted to provide wind uplift calculations.

FM RoofNav: Performance Data (Wind Uplift – Steel Deck)

System Type	Minimum Rating		Maximum Rating	
	kPa	psf	kPa	psf
Fully Adhered - Single-ply	2.8	60	15	315
Fully Adhered - Bitumen	2.8	60	16	345
Partial Adhered (Hybrid) - Single-ply	2.8	60	15	315
Partial Adhered (Hybrid) - Bitumen	2.8	60	16	345
Fully Mechanically Fixed	2.8	60	22	465

Note: Search conducted 07/11/2025 for 'new roof' with DensDeck® Prime Roof Board as 'cover board' 6.4 mm - 15.9 mm.

STANDARDS AND CLASSIFICATIONS

Mechanical Fastening

A minimum of four fasteners per DensDeck® Prime Roof Board (2,440 mm x 1,220 mm) are required, the number, pattern and type of the fasteners is determined by the system designer and can depend on the wind uplift rating required and the substrate.

Fasteners must always be placed a minimum of 150 mm from the free edges of the DensDeck® Prime Roof Board.

Insulation can be laid unfastened prior to installing DensDeck® Prime Roof Board as a cover board, however, some system designers stipulate fastening the insulation to the structure first, to prevent movement during construction, after which the entire system is fastened through the DensDeck® Prime Roof Board to the structure, in all cases follow the guidance given by the system designer.

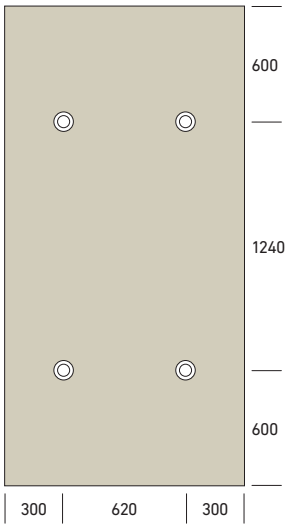
DensDeck® Prime Roof Board should always be fixed back to the structure.

Where thermally broken fasteners are used, typically a hole is pre-drilled in the DensDeck® Prime Roof Board which is 1-2 mm greater than the overall diameter of the thermally broken fastener being used. Advice should be obtained from the system manufacturer and/or the fastener supplier.

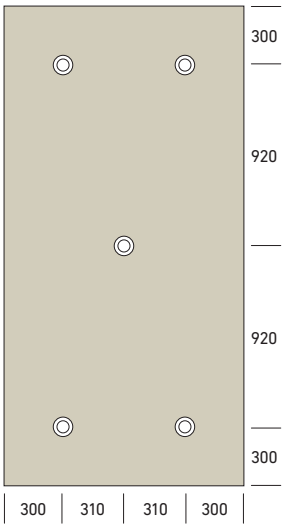
Fastener Patterns

The following diagrams show some example fastener patterns that are used. Other patterns are available from system manufacturers or testing agencies. Board size 1,220 mm x 2,440 mm. All dimensions in mm.

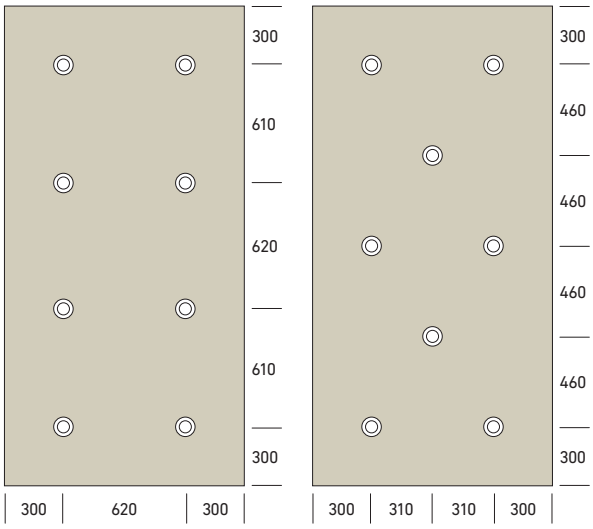
4 fasteners per board



5 fasteners per board

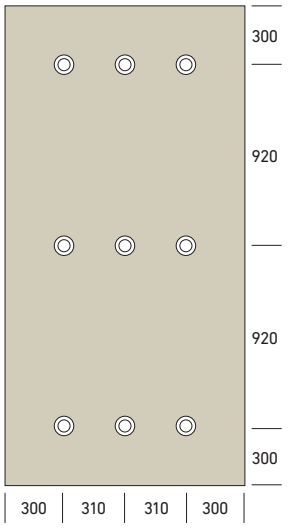


8 fasteners per board

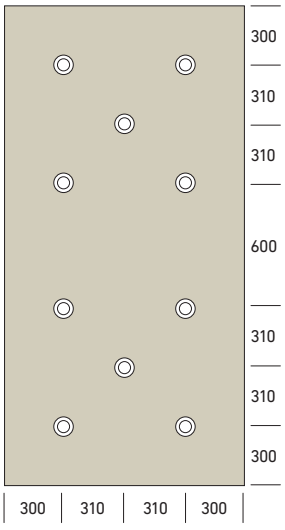


Please note: Preliminary insulation or mechanically attached roof covering requires a minimum of 4 fasteners per 1,220 mm x 2,440 mm board in FM assemblies.

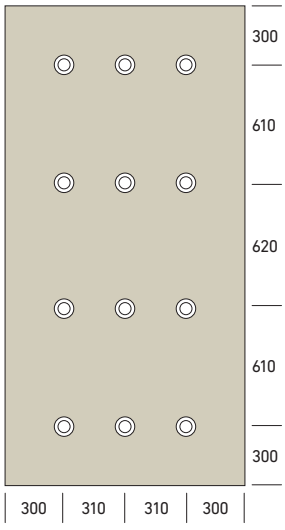
9 fasteners per board



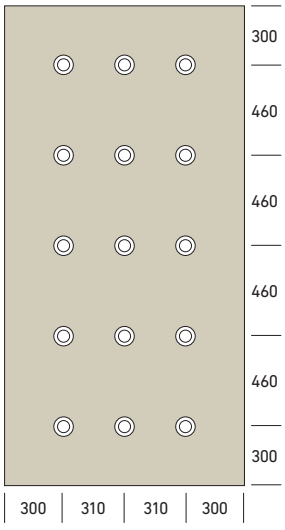
10 fasteners per board



12 fasteners per board



15 fasteners per board



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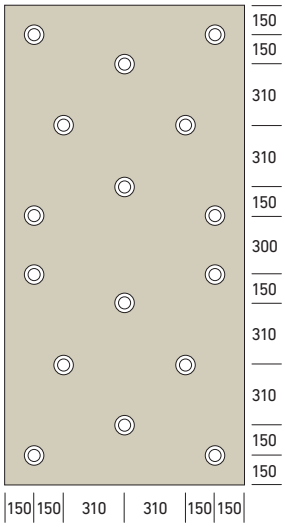
STANDARDS AND CLASSIFICATIONS

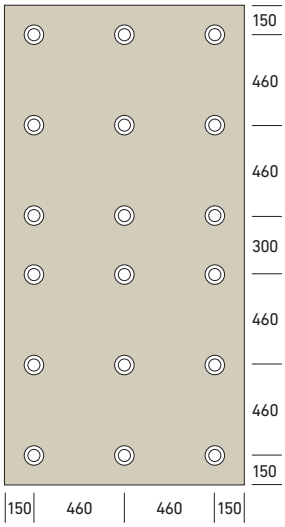
Fastener Patterns (cont.)

Other patterns are available from system manufacturers or testing agencies. Board size 1,220 mm x 2,440 mm.
All dimensions in mm.

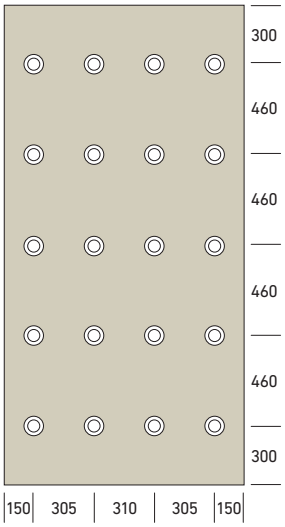
16 fasteners per board



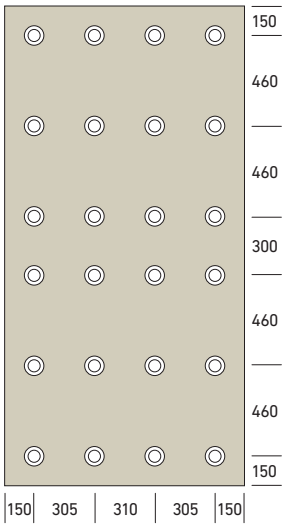
18 fasteners per board



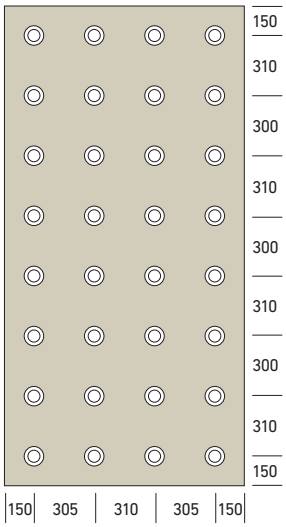
20 fasteners per board



24 fasteners per board



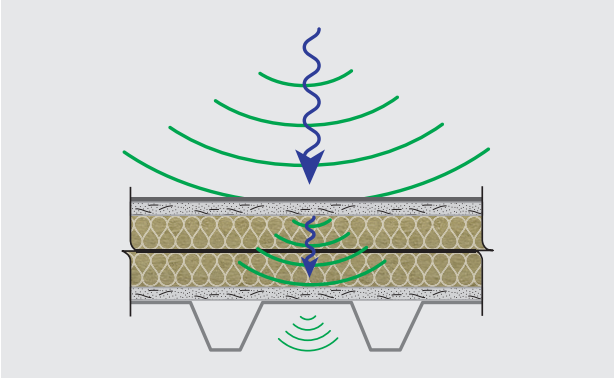
32 fasteners per board



STANDARDS AND CLASSIFICATIONS

Acoustics

The introduction of a substrate or cover board into a lightweight flat roof construction using a structural steel deck can improve the built systems ability to inhibit the passage of airborne sound from outside to in. In some countries, specific standards and regulations exist that detail minimum performance criteria, e.g. in sensitive public buildings such as schools or hospitals.



In many other scenarios where unwanted sound (noise) needs to be supressed, large projects will employ an acoustic consultant to measure ambient noise at the design stage. This data is then used to design the acoustic requirements of the building including the roof. Structural borne vibrations from plant and traffic on the roof are also taken into consideration.

DensDeck® Prime Roof Board can be introduced to improve the resilience of your flat roof in many ways one of which is acoustic performance.

DensDeck® Prime Roof Board introduces a rigid 'mass' layer that can help improve the acoustic performance of your roof. The table below shows some typical values of airborne sound reduction in roof systems with DensDeck® Prime Roof Board.

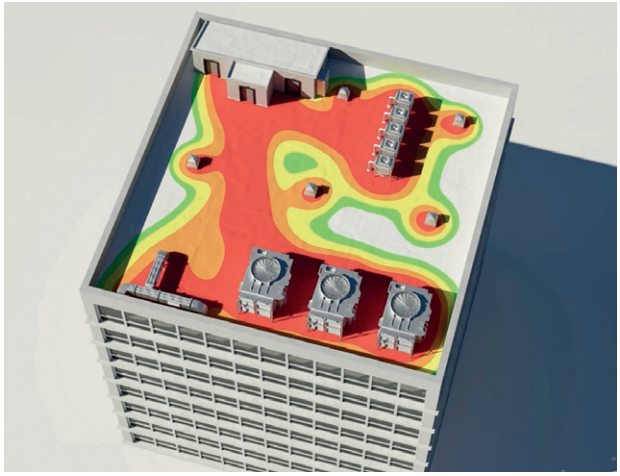
Roof Build-up	dB R_w
100 mm PIR thermal insulation Steel deck	23
6.4 mm DensDeck® Prime Roof Board (cover board) 100 mm PIR thermal insulation 0.8 mm trapezoidal steel deck	29
12.7 mm DensDeck® Prime Roof Board (cover board) 100 mm PIR thermal insulation 0.8 mm trapezoidal steel deck	30
15.9 mm DensDeck® Prime Roof Board (cover board) 100 mm PIR thermal insulation 0.8 mm trapezoidal steel deck	31

The tests were conducted in 2019 at Intertek in York, PA, and the specimens were evaluated in accordance with the following: ASTM E90-09 (2016), ASTM E413-16, ASTM E1332-16, and ASTM E2235-04 (2012).

Added Resistance to Puncture

DensDeck® Prime Roof Board when used as a cover board directly affects the ability of the waterproofing to resist puncture.

Puncture can occur during construction for many reasons including dropped tools and heavy foot traffic. During the lifecycle of the roof inclement weather events such as hail strike can also cause punctures in severe cases.



Hail and puncture analysis and testing.

Factory Mutual test method FM 4470 describes a test to determine the hail resistance of flat roof waterproofing. The addition of DensDeck® Prime Roof Board increases the ability of the membrane to resist puncture when subjected to the impact of a 1 kg ball dropped from height in various places of the roof assembly. Roof systems with DensDeck® Prime Roof Board as a cover board can achieve 'Very Severe' hail ratings in FM rated assemblies.

A video demonstrating how DensDeck® Prime Roof Board can increase the ability of your roof to resist puncture is available **here** or by scanning the QR code.

STANDARDS AND CLASSIFICATIONS

Water & Moisture

A building's primary purpose is to offer shelter from the elements, and the proper design, construction, maintenance and moisture management plan of the roofing system must be considered. The entry of water or moisture in any form and its subsequent condensation can be detrimental to a roof's performance. Uncontrolled moisture accumulation within the building and roof assembly may adversely affect the structural stability or bond of roofing system components and may decrease the wind uplift and vertical pull resistance of the assembly. Care should be taken to avoid accumulation of moisture in the roof system prior to, during and after installation.

The storage and handling of materials prior to and during construction is important so that moisture is not inadvertently trapped in a roof from saturated materials. Proper storage and handling recommendations for DensDeck® Prime Roof Boards can be found on page 25. DensDeck® Prime Roof Boards should be kept dry prior to installation. Avoid installation during rain, heavy fog, and any other conditions that may deposit moisture on the surface of the boards and only install as many boards that can be covered in the same day or prior to inclement weather.

While the waterproofing layers protect the system from weather it is also important to manage moisture from inside the building. A Vapour Control Layer (VCL) may be utilized to prevent moisture drive from the inside of the building or in situations where excessive moisture may be introduced such as newly poured concrete. Consult the system designer when determining the need, choosing the appropriate VCL, placement within the assembly and the details of the VCL installation.

INSTALLATION

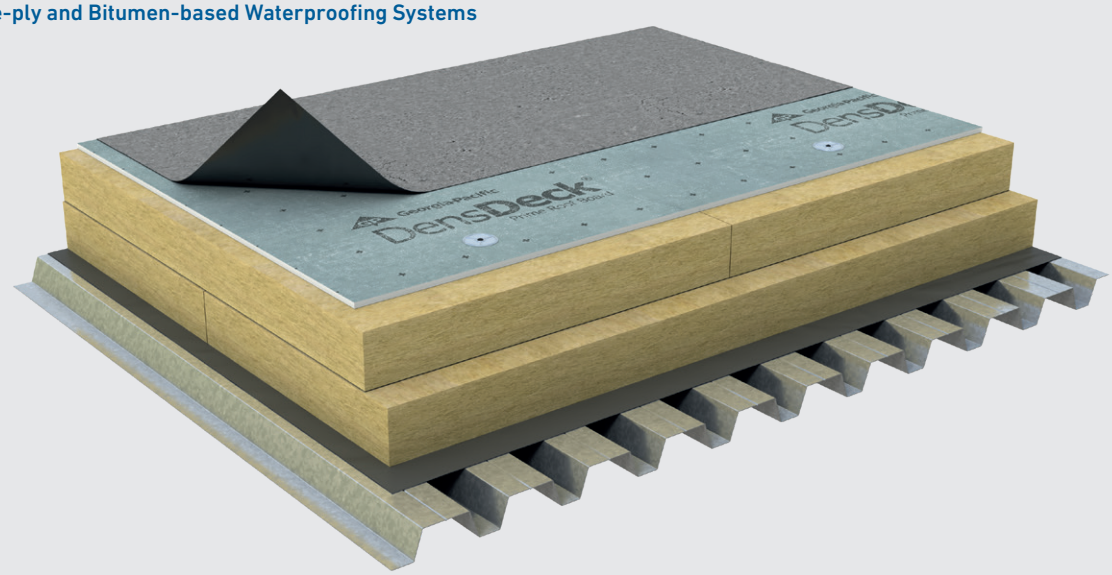
Installation Outline

DensDeck® Prime Roof Board is lightweight in comparison to other technologies, such as cementitious boards, and its low linear expansion means it can be installed tightly butted with staggered joints directly over or under the insulation layer.

To be cut it can be simply scored with a sharp knife and snapped. Always ensure that boards are dry upon installation and avoid installation in periods of inclement weather.

Cover Board Installation

Single-ply and Bitumen-based Waterproofing Systems



1 Install the vapour control layer in accordance with the manufacturer's recommendations and specified fastening method over the substrate.

2 Install insulation over the vapour control layer to the designed thickness and in accordance with manufacturer's recommendations and specified fastening method. **Note:** In fully mechanically fixed or hybrid fixed systems the insulation may not need to be prefixed back to the structural deck before cover board cover board application. Consult with a system designer for fixing requirements.

3 Install the DensDeck® Prime Roof Board directly over the insulation layer taking care to stagger joints and avoid coincidental joints as installation progresses. Fix the DensDeck® Prime Roof Board using specified fastening method.

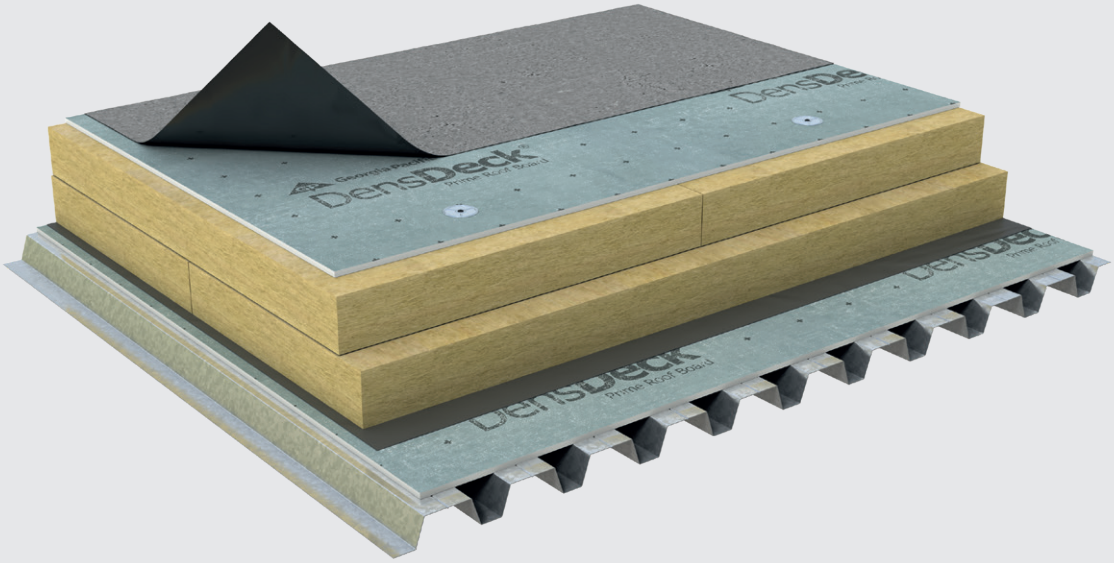
- **a** If using mechanical fasteners the cover board should always be fixed back to the substrate.
- **b** Using the fastener pattern provided by the system designer, arrange mechanical fasteners to the amount specified by the wind loading calculations. Some example patterns are shown on pages 18 and 19.
- **c** If using thermally broken fasteners the DensDeck® Prime Roof Board can be pre-drilled with a hole 1-2 mm greater than the outside diameter of the thermally broken fastener.

4 Install waterproofing layer to manufacturer's recommendations.

INSTALLATION

Substrate Board Installation

Single-ply and Bitumen-based Waterproofing Systems



1 If using DensDeck® Prime Roof Board on the parapet install prior to the substrate board. See section *'Transition from Roof to Wall'* page 25.

2 Install DensDeck® Prime Roof Board directly over the substrate and fix using the specified fastening method.

- **a** If mechanical fastening, fastener centres should be no greater than 400 mm.
- **b** Fasteners should be a minimum of 150 mm from free edges.
- **c** If mechanically fastening over a profiled steel deck ensure that:
  - **i** Boards are supported by the crowns, i.e. no edges are left free to cantilever, and where possible joints sit in the centre of the crown; and
  - **ii** Fasteners are placed into crowns of the profiled deck to a minimum depth specified by the fastener manufacturer.

3 Install the vapour control layer in accordance with the manufacturer's recommendations over the DensDeck® Prime Roof Board.

4 Install insulation over the vapour control layer to the designed thickness and in accordance with manufacturer's recommendations and if required, specified fastening method. Fastening should always be done back to the structural deck.

5 If using in conjunction with cover board (if no cover board is being used, go to step 6).

- **a** Install the DensDeck® Prime Roof Board directly over the insulation layer taking care to stagger joints and avoid coincidental joints as installation progresses. Fix the cover board using specified fastening method.
  - **i** If using mechanical fasteners the cover board should always be fixed back to the substrate.
  - **ii** Using the fastener pattern provided by the system designer arrange mechanical fasteners to the amount specified by the wind loading calculations. Some example patterns are shown above.
  - **iii** If using thermally broken fastener washers the DensDeck® Prime Roof Board can be pre-drilled with a hole 1-2 mm greater than the outside diameter of the thermally broken fastener.

6 Install waterproofing layer to manufacturer's recommendations.

INSTALLATION

Recommended Tools

- Knife.
- Safety gloves
- Measuring tape.
- Straight edge or T-square and / or chalk line.
- Appropriate equipment to apply adhesive or install fasteners, per design and system manufacturer specification.

Laying the Board

1 For a cover board application, lay the board down in a running bond pattern, offsetting the DensDeck® Prime Roof Board joints from the underlying insulation or board joints in multi-layered applications.

2 Butt all board edges and ends tightly together. DensDeck® Prime Roof Boards of any thickness do not require gapping.

3 When added to a structural metal deck in a substrate board application, support the edges by installing the edge joints on and parallel to the crown of the profile and lay the board on a running bond pattern.

Fastening

1 See pages 18 and 19 for guidance on fastening patterns.

2 Grid marks on the board are printed at 150 mm centres as a reference guide for the installer when using mechanical fasteners. For adhered applications, follow the system designer's guidelines.

Note: Where thermally broken fasteners are used, the DensDeck® Prime Roof Board should be pre-drilled to accommodate the fastener with a hole 1-2 mm greater than the outside diameter of the thermally broken fastener.

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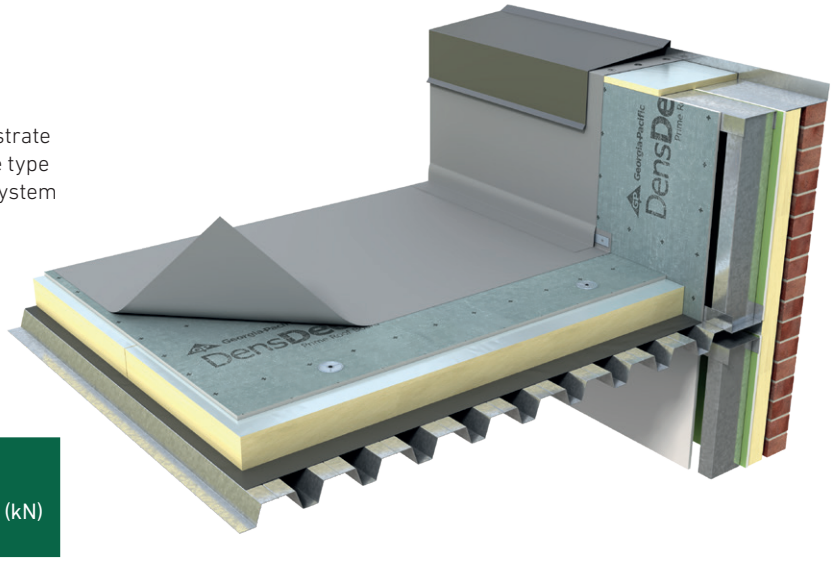
INSTALLATION

Transition from Roof to Wall

For a parapet wall, install minimum 12.7 mm DensDeck® Prime Roof Board directly to the framing or to a solid substrate using appropriate fastenings at max 600 mm centres. The type and suitability of fasteners should be determined by the system designer.

The parapet should be lined before the substrate board is laid so that the insulation layer offers support where it butts the parapet, this also allows the vapour control layer to be dressed up the parapet to meet the waterproofing layer to give a closed roof envelope.



DensDeck® Prime Roof Board Thickness	Orientation	Minimum Stud Spacing	Load Capacity (kN)
12.7 mm	Vertical	400 mm	Consult fastener manufacturer
15.9 mm	vertical	600 mm	

Storage and Handling

Storage

- DensDeck® Prime Roof Boards should be stored level and off the ground or roof deck and protected from rain, snow, or other high moisture conditions.
- Use a waterproof ventilated covering that allows for air flow to prevent moisture build up.
- Use adequate supports to keep the bundles flat, level and the boards dry.
- If pallets are to be stored on the roof structure during construction, ensure the supporting surface can carry the weight of the boards. Space out the units across the deck appropriately.

Handling

- When moving boards carry upright to prevent flexing and cracking. Care should be taken to protect edges and ends from damage when laying down.
- Measure and mark the board to size as needed. Score along mark and snap to break clean, then use a sharp knife to cut the back mat.

Packaging

- Packed on ISPM15 heat treated wood pallets in compliance with IPPC / APHIS / ALSC.

Disposal

- Disposing of any waste material must be carried out in accordance with local regulations.

Health and Safety

- Please refer to www.buildgp.com/safetyinfo.

Eye / Face Protection

Safety glasses or goggles are recommended when using this product. Eye wash fountain is recommended.

Skin Protection

Hand protection: Protective gloves are recommended.

Other: Impervious protective clothing and gloves recommended to prevent drying or irritation of skin. Long sleeves. Safety shower / eye wash fountain is recommended in the workplace area.

Respiratory Protection

An appropriate dust mask or filtering facepiece is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded.

Other PPE

Hard hat, safety boots and high visibility vest.

INSTALLATION

Pallet Quantities

Name of Product	Nominal Thickness (mm)	Width (mm)	Length (mm)	Board Weight (kg)	Number of Boards per Pallet	Pallet Weight (kg) (Product + Pallet)
DensDeck® Prime Roof Board 20000057	6.4	1,220	2,440	17.6	84	1,584 + 31
DensDeck® Prime Roof Board 133150	12.7	1,220	2,440	29.2	50	1,469 + 31
DensDeck® Prime Roof Board 133160	15.9	1,220	2,440	36.3	40	1,495 + 31
Tolerance	± 1.6 mm	± 3 mm	± 6.4 mm	-	-	-

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Gypsum

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FM Class 1

UL Class A
UL 790 Classification
UL 1256 Classification

2010
EN 15283-1 / GM-H1

CSA 123.21

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