

W. R. Grace & Co.-Conn.

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Cambridge, MA 02140



**For Technical Assistance
Call toll free at 866-333-3SBM (3726).**

**Visit our web sites at
www.graceconstruction.com and www.graceathome.com**

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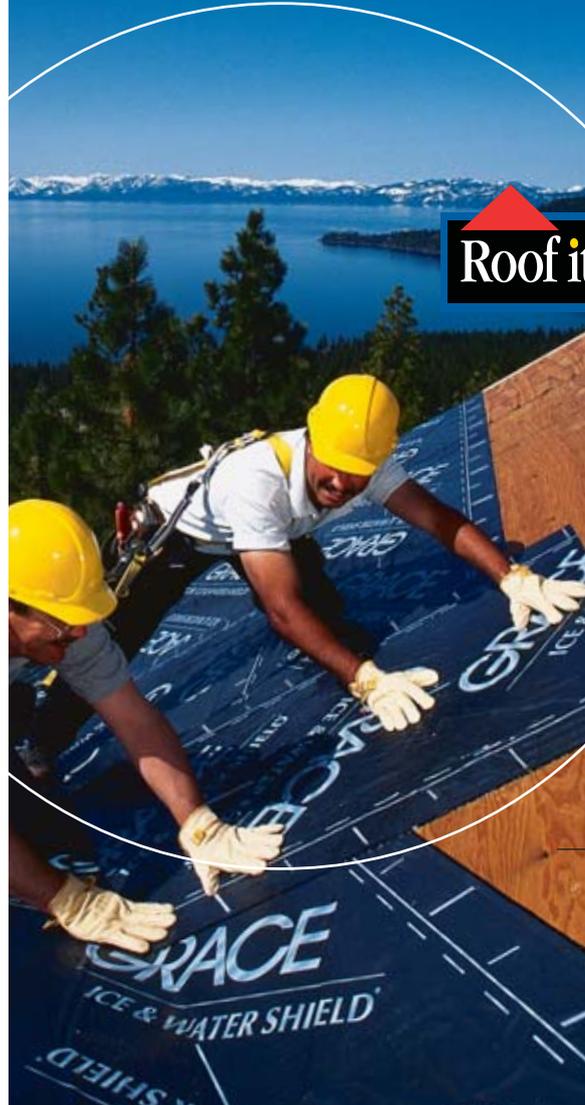
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GRACE
Construction Products

GRACE Ice & Water Shield®

Contractor's Guide

Roof it right.®



Where
to Use it.

How to
Install it.

Tips from
the Pros.

Grace Ice & Water Shield®

Easy measuring for fast, simple installation.

These convenient reference markings help make installing Grace Ice & Water Shield® easier than ever before...



1 Center Line Mark

- Use as a lap line guide for 2-ply applications
- Eliminates the need for chalk lines
- A guide for cutting the sheet into two 457 mm (18 in.) pieces and for locating the RIPCORDER® Split Release on Demand

2 Lap Lines

- A guide for overlapping additional sheets for membrane
- Achieve recommended 90 mm (3.5 in.) side laps (indicated by solid line) by lining up edge of release liner with dashed line during membrane application

3 Small Measurement Marks

- 152 mm (6 in.) marks for easy measurement; no tape needed

4 Large Measurement Marks

- Located every 305 mm (12 in.)

Grace Ice & Water Shield is Available in 2 Roll Sizes:

- 108 sq. ft (3 ft x 36 ft)
- 225 sq. ft (3 ft x 75 ft)

Membrane in each case is 1.02 mm (40 mil) in thickness as per ASTM D 3767, Method A.



What's in it for you

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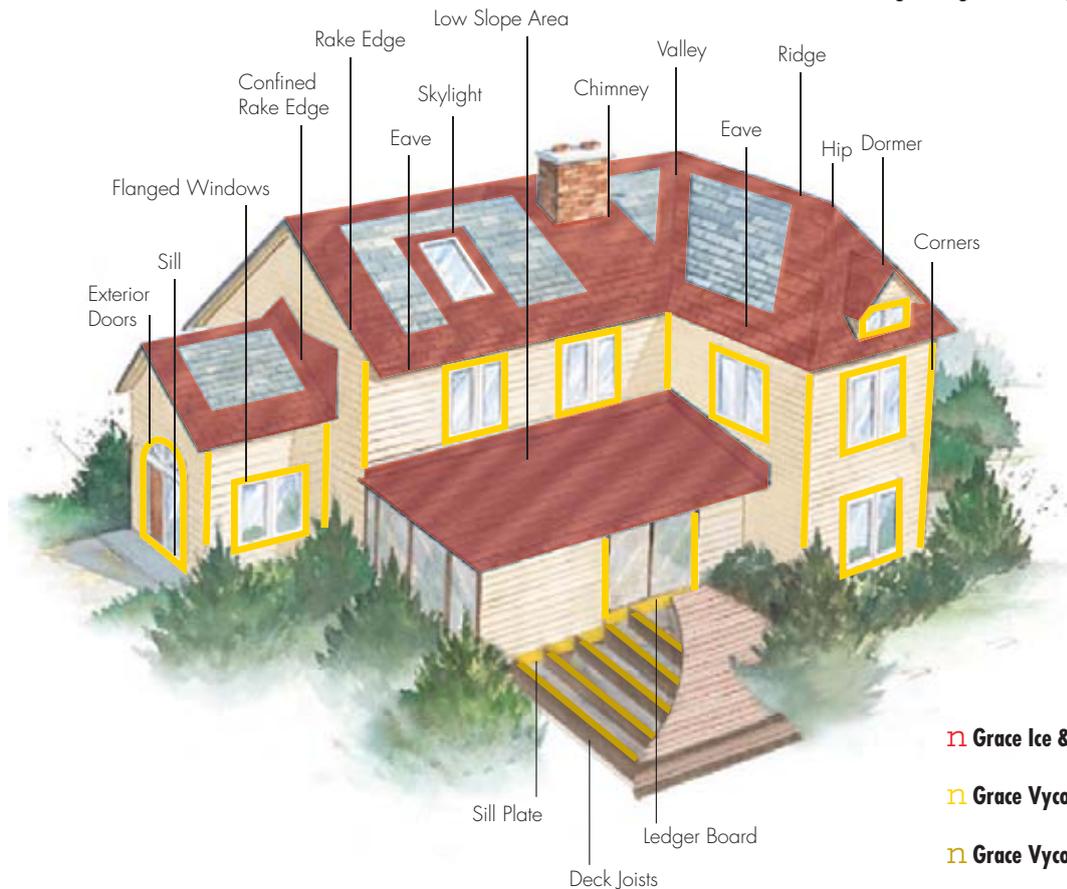
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CRITICAL ROOFING AREAS

Grace Ice & Water Shield applied in critical roofing areas can help prevent hard-to-correct leak problems caused by moisture penetration due to ice dams, wind-driven rain and more. The product offers superior adhesion to the deck, high quality laps, and the highest quality seal around roofing fasteners.

Grace underlayments add very little to the cost of the job – and nothing gives the professional roofer more peace of mind. Also, consider Grace Vycor® Self-Adhered Flashings for your critical non-roof flashing details (windows, doors, decks).

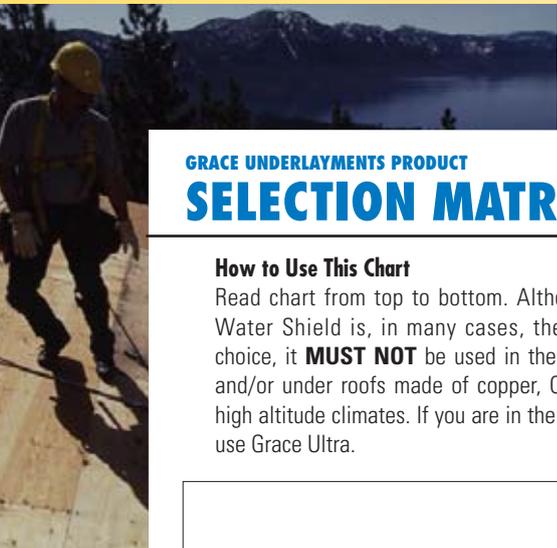
All of the shaded areas below can benefit from the application of Grace Underlayments and Grace Vycor Self-Adhered Flashings beneath the finished roofing, siding and decking materials.



1 Grace Ice & Water Shield®

2 Grace Vycor® Plus

Grace Vycor Deck Protector®



GRACE UNDERLAYMENTS PRODUCT

SELECTION MATRIX

How to Use This Chart

Read chart from top to bottom. Although Grace Ice & Water Shield is, in many cases, the best product of choice, it **MUST NOT** be used in the desert southwest and/or under roofs made of copper, Cor-Ten® or zinc in high altitude climates. If you are in the desert southwest, use Grace Ultra.

Application Guidelines	Grace Ultra	Grace Ice & Water Shield®	Grace Select	Grace Basik®
Desert Southwest United States	●	⊗	⊗	○*
Under Copper, Zinc or Cor-Ten® in High Altitude Climates	●	⊗	⊗	⊗
Under Architectural Metal Roofs	●	●	○	⊗
Roofing in High Altitude/Alpine Region	●	●	⊗	⊗
Premium Protection from Severe Ice Dams	●	●	⊗	⊗
As a Vapor Barrier	●	●	●	○
As a Temporary Roof (see product specific appropriate exposure guidelines)	●	●	○	○

- Best Choice
- Good Choice
- ⊗ Not Recommended For Use

*For application on wood substrates only

Why Grace Ice & Water Shield is the Best You Can Buy



WHAT MAKES IT BETTER?

Best Adhesion to the Roof Deck

The time-tested rubberized asphalt formulation in Grace Ice & Water Shield provides superior initial and long-term adhesion without primer or nails. This strong bond helps ensure the user of a watertight installation.

Forms Superior Laps

Unlike many fully-adhered membrane underlayments, Grace Ice & Water Shield requires NO special treatment of the laps, making it easy to get a watertight seal.

Highest Quality Seal Around Roofing Fasteners

Grace Ice & Water Shield helps deliver premium roof leak protection via an aggressive, rubberized asphalt formulation that seals around roof covering fasteners.

RIPCORDER Split Release on Demand

This thin cord (slightly embedded in the rubberized asphalt) allows the splitting of the release paper in half, making installations in detailed areas (chimneys, valleys, etc.) quick and easy.

Re-Roofable

Unlike some granular surfaced membranes, Grace Ice & Water Shield will not adhere to the underside of the exposed roof covering and can be applied over Grace underlayments (except over Grace Basik) in retrofit applications, making re-roofing easier, less costly, more durable and environmentally friendly.

Unique Non-Granular Slip Resistance

Offers superior foot traction without the granules or grit that inhibit watertight laps.

Lightweight

Grace Ice & Water Shield is easy to handle.

Can be Left Exposed Longer

Grace Ice & Water Shield can be left exposed for up to a full 30 days and can even be used as a temporary roof.

Won't Telegraph

Unlike many thicker membrane underlayments with laps that are visible through roof coverings, Grace Ice & Water Shield remains invisible.

Superior Tear Resistance

Grace Ice & Water Shield uses an extremely strong, cross-laminated, high density polyethylene carrier sheet that offers superior tear resistance, but is easy to cut and detail.

Most Comprehensive UL Fire Classifications and Ratings

Grace Ice & Water Shield is UL classified under all classified shingles for use in detail areas or for full roof coverage. Grace Ice & Water Shield is the only membrane underlayment with a fire rating for internal fire resistance.

Longest Performance History

Grace Ice & Water Shield offers the longest performance history and the highest confidence of performance for over 25 years.

THE Name Brand in Underlayments

Grace Ice & Water Shield is a registered trademark of Grace Construction Products. Don't be fooled by imitators.

GRACE ICE & WATER SHIELD IS AVAILABLE ONLY FROM GRACE CONSTRUCTION PRODUCTS.

How to Apply Grace Ice & Water Shield

Grace Ice & Water Shield roofing underlayment is a very user-friendly product. There are two easy ways to install it. We call the first The Conventional Method and the second The Back-Roll Method.

THE CONVENTIONAL METHOD

Contractors tell us that it's easy to install Grace Ice & Water Shield. Contractor Bob Stransky sums it up this way: "Aligning Grace Ice & Water Shield before pulling out the release paper makes an easy installation, free of wrinkles...this method is simple, fast and fool proof."

1



Step One:
Cut the membrane into 3-5 m (10-15 ft.) lengths and re-roll loosely. Peel back 300-600 mm (1-2 ft.) of release liner, align membrane.

2



Step Two:
Peel the release liner from the membrane. Press the membrane in place with heavy hand pressure.

3



Step Three:
Side laps must be a minimum of 90 mm (3.5 in.) and end laps a minimum of 150 mm (6 in.).

RIPCORD® Split Release on Demand

Use for ease of installation in detailed areas (dormers, valleys, chimneys, etc.)

1



Step One:
Locate RIPCORD at center of membrane.

2



Step Two:
Create a notch in release paper at mid-center. Pull back release paper and extract RIPCORD.

3



Step Three:
Pull RIPCORD, splitting release paper in half.

4

For Valleys:



Roll out membrane; cut to required lengths. Extract RIPCORD following instructions above. Position membrane at start up area aligning center on valley. Remove one side of the release paper. Press membrane into place with hand smoothing outward towards edge. Repeat on other side of valley.

THE BACK-ROLL METHOD

Some contractors prefer the back-roll method for applying Grace Ice & Water Shield. As contractor Bob Stransky explains, “The back-roll technique can be faster than the conventional method since you can lay down the membrane in just a few minutes! What’s more, you can get the hang of the back-roll technique in no time – it’s simple and it lays the membrane down evenly.” Here’s how the back-roll method works:

1



Step One:
Start by unrolling a 3-5 m (10-15 ft.) piece of membrane, leaving the release liner in place. Align the membrane and roll in the intended direction of the membrane application.

2



Step Two:
Carefully cut the release liner on top of the roll in the cross direction, being careful not to cut the membrane.

3



Step Three:
Peel back about 150 mm (6 in.) of the release liner in the opposite direction of the intended membrane application, exposing the black adhesive.

4



Step Four:
Hold the release liner with one hand and pull the roll along the deck with the release liner, leaving the applied membrane behind.

5



Step Five:
Stop frequently to press the membrane in place with heavy hand pressure, smoothing the membrane toward the outer edge.

6



Step Six:
When finished with the roll, go back and remove the remaining release liner. Smooth to the edge.



PRECAUTIONS AND LIMITATIONS

Slippery when wet or covered by frost.

Consistent with good roofing practice, always wear fall protection when working on a roof deck.

Release liners are slippery. Remove from work area immediately after membrane application.

Do not leave permanently exposed to sunlight. Maximum recommended exposure guidelines for Grace Ice & Water Shield is 30 days, Grace Select is 30 days, Grace Basik is 30 days, and Grace Ultra is 60 days.

Do not fold over the roof edge unless the edge is protected by a drip edge, gutter or other flashing material.

Do not install on the chamfered edges of wood plank.

Do not install directly on old roof coverings (refer to Technical Letter 5).

Certain product applications are prohibited in hot desert areas in the Southwestern United States. Check with your Grace representative.

Check with the manufacturer of the metal roofing system for any special requirements. Do not install Grace underlayments directly under roof coverings which are especially sensitive to corrosion (such as zinc) without providing proper ventilation.

Do not install Grace Ice & Water Shield, Grace Select or Grace Basik under copper, Cor-Ten®, or zinc metal roofing in high altitude climates. These roofs can reach

extremely high temperatures due to the low reflectivity, high absorption, and high conductivity of these metals. Use Grace Ultra for these roof types in this climate. Check with your Grace representative.

Provide proper roof insulation and ventilation to help reduce excessive ice dams and to minimize interior condensation. Grace underlayments are air and vapor barriers.

Repair holes, fishmouths, tears and damage with a round patch of membrane extending past the damaged area, 150 mm (6 in.) in all directions. If fasteners are removed leaving holes in the membrane, it MUST be patched. The membrane may not self-seal open fastener penetrations.

Do not install fasteners through the membrane over unsupported areas of the structural deck, such as over the joints between adjacent structural panels.

Due to its slight asphaltic odor, do not apply where membrane is exposed to interior living spaces.

Grace Ice & Water Shield, Grace Select and Grace Basik are not compatible with EPDM; use Grace Ultra for tie-ins (refer to Technical Letter 5).

Grace underlayments are not compatible with polysulfides, flexible PVC, high concentrations of resin (pitch), and other substances (for more information refer to Technical Letter 5).

SAFETY, STORAGE, AND HANDLING

Grace underlayments and accessory products must be handled properly. Read all product labels and Material Safety Data Sheets (MSDS) for proper handling and disposal. Deliver all materials in manufacturer's unopened packages and store all materials under cover. Do not double stack palletized material.



DO'S

**Bob Stransky, Executive Supervisor,
Doc Gelso Construction, Inc.**

"You should fill in any large gaps on the plywood deck before you install Grace Ice & Water Shield. If you don't have 100% backing for the membrane, nails or fasteners can go into a gap (air void) and cause leaks.

When you have a steep roof application, it is often faster and easier to apply the membrane vertically than side-to-side. Run your first piece of Grace Ice & Water Shield across the bottom edge of the roof and then run your strips up and down the roof, with one installer on the top of the roof and one on the bottom."

**Frank Lawson Jr., President,
The Lawson Roofing Co., Inc. and Past President of the NRCA**

"For extra protection against ice dams and water leaks, use Grace Ice & Water Shield with flashing when you're installing it in valleys...

If your jobs involve high-quality tile, slate and asphalt shingling systems with long-term life-cycle expectations, you should definitely use Grace Ice & Water Shield."

**Jim Kenyon, Project Manager and Superintendent,
Vermont Roofing Co., Inc.**

"In parts of the country where severe ice dams and wind-driven rain can cause leaks, use two layers of Grace Ice & Water Shield around the eaves – one directly on top of the other with the flashing or perimeter metal in between the two membrane layers."

**Jim Rothermel, Supervisor,
Cormack Builders**

"Make sure you take advantage of using the RIPCORDER split release feature to realize the full advantage of achieving the perfect fit, especially in the valleys. RIPCORDER certainly allows for a more efficient, quicker install."

DON'TS

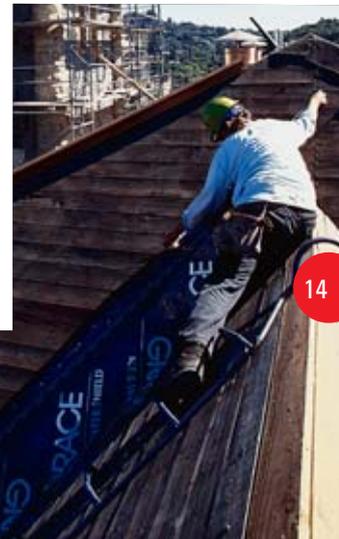
**Jim Kenyon, Project Manager and Superintendent,
Vermont Roofing Co., Inc.**

"Don't take chances with an untested underlayment. Call-backs are expensive. You don't want to have to go up there twice."

**Ted Toppan, President,
Quick Build Co., Inc.**

"I tell my men, 'Never lay down the first roll of Grace Ice & Water Shield without snapping a (chalk) line first.' Set the reference for the first roll so you can keep a perspective. Once the first roll is down, you can use the lines printed on the product to keep the roof line true.

Avoid creating leaks when you're cutting a pipe stack for a plumber. First, put down a 2 ft. x 2 ft. square of Grace Ice & Water Shield *before* you cut the hole in the roof. Drill the hole right through the Grace Ice & Water Shield and the plywood. When you're ready to poke the pipe through the rubber pipe flange and fasten the flange to the roof deck, the Grace Ice & Water Shield patch will immediately seal the nail holes."

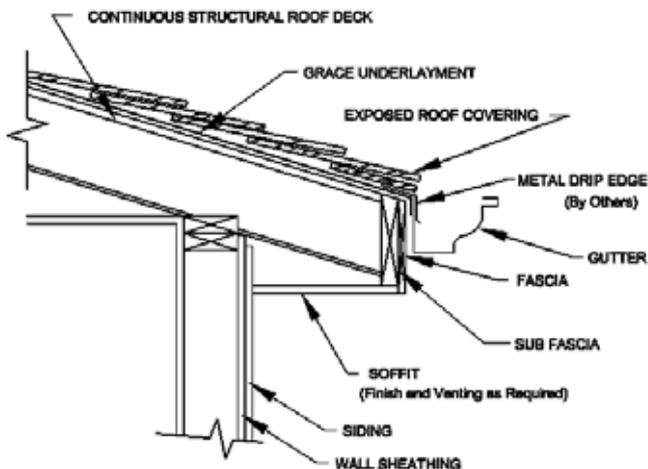


APPLICATION DETAILS

Visit www.graceconstruction.com for the most current details and installation video. Refer also to product data sheets on our web site for further information. We hope these will provide information that you'll find useful.

Eave – Option 1 IWSDET-101

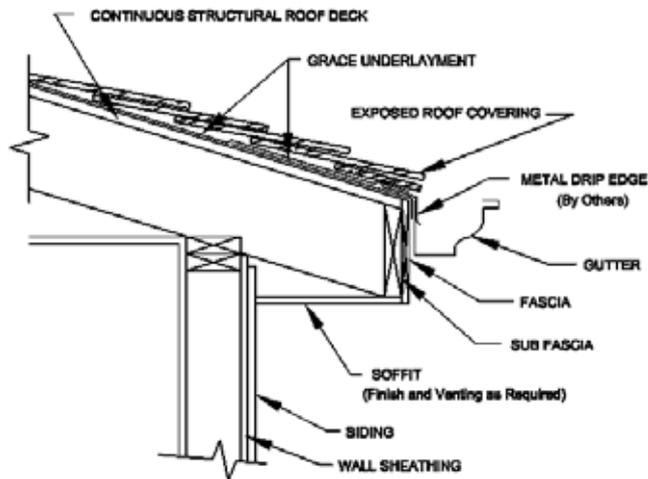
Without Drip Edge Stripped In



1. The drip edge is installed over the Grace underlayment
2. Install Grace underlayment to form water shedding laps
3. Repair all holes left from removal of toe boards, roof jacks, etc.

Eave – Option 2 IWSDET-102

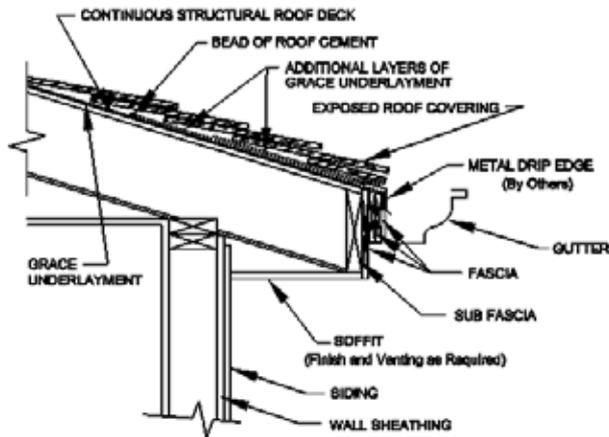
With Drip Edge Stripped In



1. The drip edge is installed over the first layer of Grace underlayment
2. A second layer of Grace underlayment is installed over the drip edge
3. Install Grace underlayment to form water shedding laps
4. Repair all holes left from removal of toe boards, roof jacks, etc.

Eave – Option 3: IWSDET-103

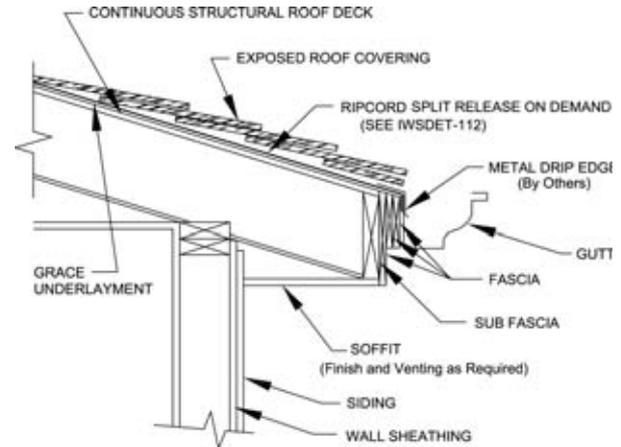
Extended Perimeter for Existing Roof



1. The drip edge is installed over the first layer of Grace underlayment
2. A second layer of Grace underlayment is installed over the drip edge
3. Seal non-water shedding lap with a bead of roof cement
4. Install remaining Grace underlayment to form water shedding laps
5. Repair all holes left from removal of toe boards, roof jacks, etc.

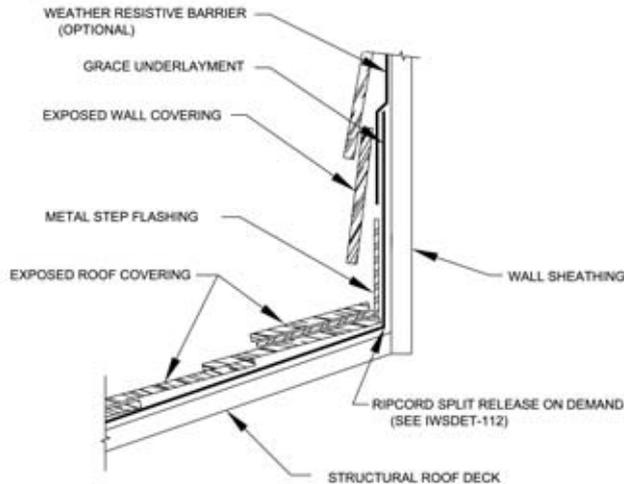
Eave – Option 4: IWSDET-104

Extended Perimeter for New Construction



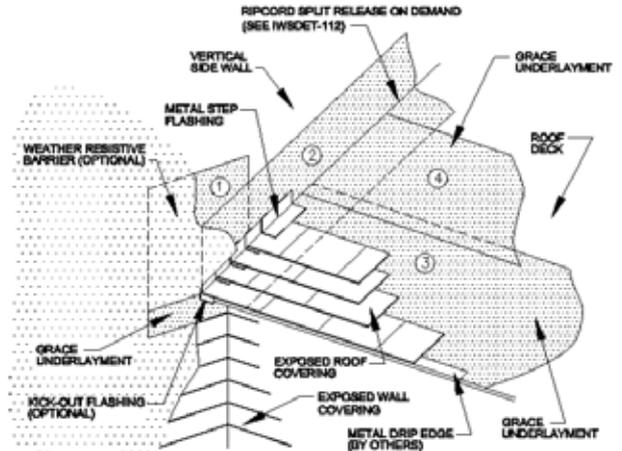
1. RIPCORD Split Release on Demand has been removed along edge of roof for ease of installation of extended fascia board(s)
2. The drip edge is installed over the first layer of Grace underlayment
3. Install Grace underlayment to form water shedding laps
4. Repair all holes left from removal of toe boards, roof jacks, etc.

Vertical Front Wall IWSDET-105



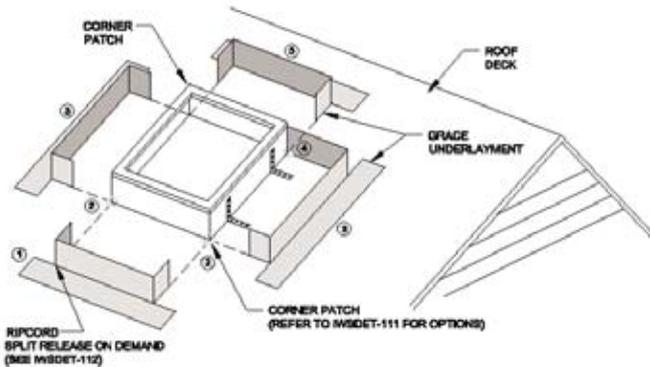
1. RIPCORD Split Release on Demand has been removed along joint between roof and wall for ease of installation
2. Extend Grace underlayment on the wall sheathing above the highest expected level of snow and ice
3. The metal flashing is installed over the Grace underlayment
4. Install Grace underlayment to form water shedding laps

Vertical Side Wall IWSDET-106



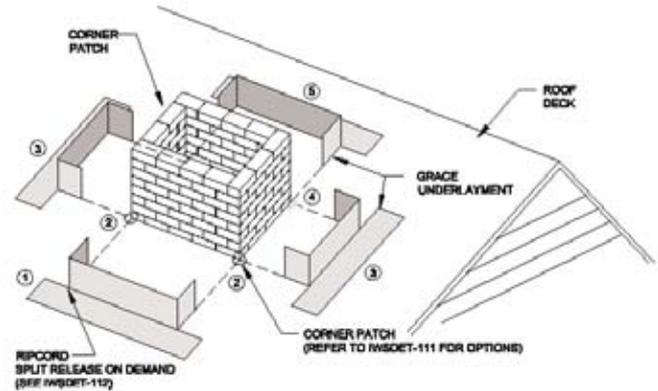
1. Extend Grace underlayment on the wall sheathing above the highest expected level of snow and ice
2. Extend Grace underlayment on the roof deck above the highest expected level of water back-up from ice dams
3. Extend Grace underlayment beyond eave onto vertical side wall for protection against run-off from roof
4. The metal flashing is installed over the Grace underlayment
5. Install Grace underlayment in order as shown by numbers
6. Install Grace underlayment and weather resistive barrier to form water shedding laps

Skylight IWSDET-107



1. RIPCORD Split Release on Demand has been removed along joint between roof and skylight for ease of installation
2. Install Grace underlayment in order as shown by numbers
3. Extend Grace underlayment from eave to below skylight and from above skylight to ridge
4. Install Grace underlayment to form water shedding laps
5. Install skylight, flashing and roof covering as per manufacturers' recommendation
6. Determine if skylight materials (gasket, flashing, etc.) are compatible with Grace underlayments – refer to Technical Letter 5

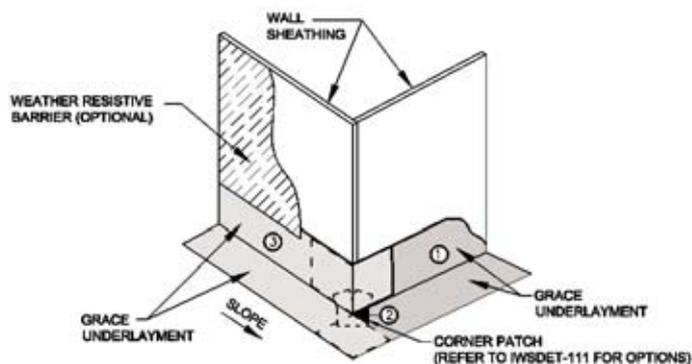
Chimney IWSDET-108



1. Prime masonry chimney with Perm-A-Barrier® WB Primer as necessary
2. RIPCORD Split Release on Demand has been removed along roof and chimney for ease of installation
3. Install Grace underlayment in order as shown by numbers
4. Extend Grace underlayment from eave to below chimney and from above chimney to ridge
5. Install Grace underlayment to form water shedding laps
6. Refer to NRCA or SMACNA for metal counterflashing and roofing options at chimney
7. For wooden chimney, refer to details IWSDET-105 and IWSDET-106

Outside Corner IWSDET-109

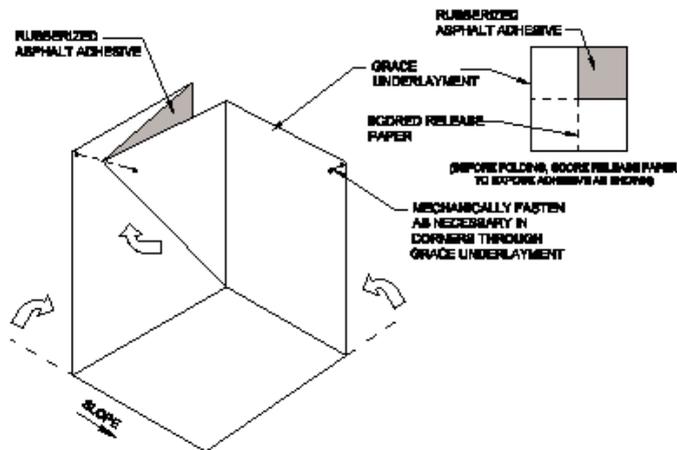
Wall to Deck



1. Install Grace underlayment in order as shown by numbers
2. Install Grace underlayment to form water shedding laps
3. Refer to Grace flexible flashings for wall sheathing corner details
4. Install flashing and roofing as per manufacturers' recommendation

Inside Corner IWSDET-110

Wall to Deck

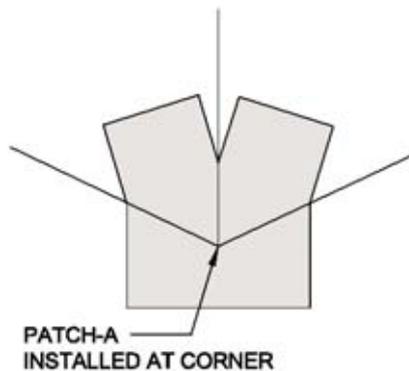
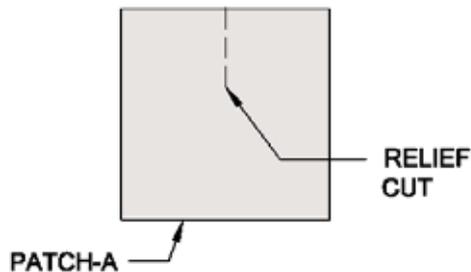


1. Use a square piece of membrane (12 in. x 12 in. minimum) for inside corner
2. Use RIPCORD Split Release on Demand for ease of installation and to minimize scoring release paper
3. Fold as shown by arrows
4. Angle of corner may vary, adjust folding of the membrane accordingly to fit tightly to corner
5. Install Grace underlayment to form water shedding laps
6. Install flashing and roofing as per manufacturers' recommendation

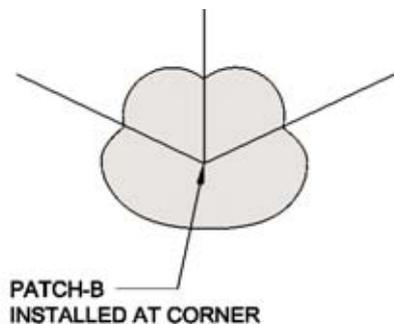
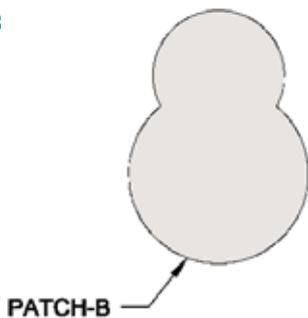
Corner Detailing Patch Options IWSDET-111

1. Remove release paper at time of installation of corner patch
2. Nominal patch size is 6 in. x 6 in.
3. For severe weather climates, patch size is 12 in. x 12 in. minimum

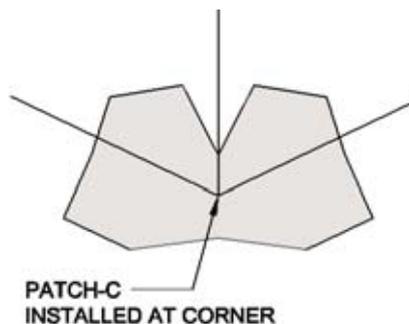
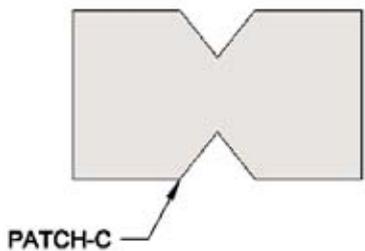
Option-A



Option-B

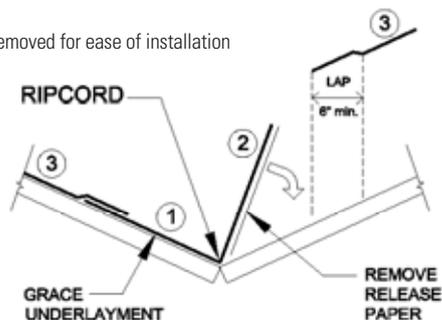


Option-C

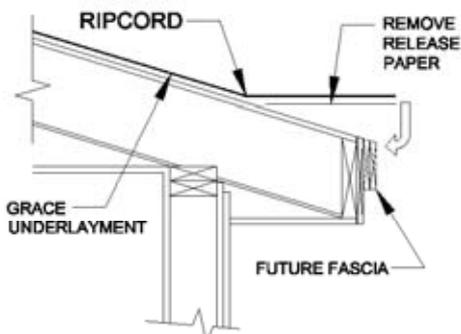


RIPCORD IWSDET-112**Split Release on Demand**

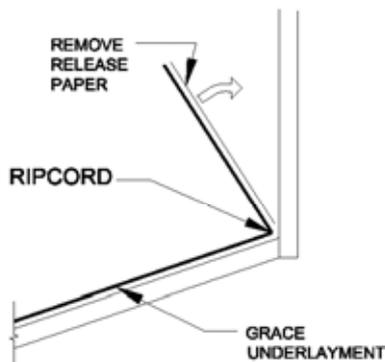
RIPCORD has been removed for ease of installation

Vally Application**Instructions:**

1. Install in order as shown by numbers
2. Engage RIPCORD to split release paper
3. Align and install Grace underlayment over valley
4. Refer to NRCA or SMACNA for valley metal flashing and roof covering options

Eave Application**Instructions:**

1. Engage RIPCORD to split release paper
2. Align Grace underlayment along eave
3. Remove release paper from upper half of Grace underlayment and apply to roof deck
4. Remove release paper along eave after fascia is installed or for future tie-in

Wall Application**Instructions:**

1. Engage RIPCORD to split release paper
2. Remove release paper from Grace underlayment and apply to roof deck
3. Remove remaining release paper and apply to wall
4. Extend Grace underlayment on the wall sheathing above the highest expected level of snow and ice

Technical Letter 1

Insulation and Ventilation to Limit Ice Dam Formation

Design of roof structures should incorporate building materials to limit the formation of ice dams and use materials that help prevent leakage caused by ice dams. Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) provide protection to roof structures from leaks caused by ice dams but do not prevent ice dams from forming. Ice dams can cause devastating results if the standing water behind the dam gets underneath the roof coverings and into the attic and walls. The damage can be severe, as well as difficult and expensive to repair. In addition to water leakage, ice dams can severely damage roof coverings and other roof components.

Roofs designed with proper insulation and ventilation will help limit the formation of ice dams by minimizing the heat transfer from the building interior to the air in the attic space and removing any warmed air efficiently. The combination of insulation and ventilation is critical since ice dams can form even in buildings that are well insulated. Even small amounts of warmed air in the attic space may cause snow on the roof to melt. The water flows down the slope of the roof toward the eave where it re-freezes, since the eave overhangs unheated space. As the process continues, ice builds up at the eave forming a dam. Standing water becomes trapped behind the ice dam, usually right over the interior wall.

In a properly ventilated attic space, ventilation occurs when air in the attic space is warmed from heat that escapes from the building through the attic insulation. Warmed air rises toward the ridge vent where it can escape to the outside. Cold air is pulled into the attic space through the soffit vents, replacing the air that leaves through the ridge vent. The flow of cold air, that moves upward toward the ridge along the underside of the roof deck, is called a convection current. The convection current helps keep the roof deck cool and slows the melting process on the roof surface.

Proper roof ventilation and insulation design should be left to a qualified design professional and care should be taken to comply with local building codes. However, standard roofing practice is to use 0.093 m² (1 ft²) of net free ventilation area per 14 m² (150 ft²) of attic space, split evenly between the ridge and soffit vents. Soffit, ridge, gable, or roof deck vents may be used alone or in combination depending on the specific roof design. Soffit and ridge vents used together provide the most complete ventilation and is the

preferred ventilation configuration. Gable vents are sometimes used but are not usually as effective as ridge vents.

It is easy to tell which buildings have well insulated and ventilated roofs. After a snowfall, if the snow is melted from only the top half of the roof, and an ice dam is forming, it is likely that the roof is poorly insulated or ventilated. If the snow does not melt, or melts evenly over the entire slope of the roof, the roof likely has adequate insulation and ventilation to limit ice dam formation.

Technical Letter 2

Use as an Air and Vapor Barrier*

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are excellent air and vapor barriers*. When used in full roof coverage applications, adequate ventilation must be provided in the roof design to avoid condensation problems within the roof structure or the attic space. Ventilation is necessary in all climates and is critical in warm, humid areas.

Proper roof ventilation and insulation design should be left to a qualified design professional and care should be taken to comply with local building codes. However, standard roofing practice is to use 0.093 m² (1 ft²) of net free ventilation area per 14 m² (150 ft²) of attic space, split evenly between the ridge and soffit vents. Soffit, ridge, gable or roof deck vents may be used alone or in combination depending on the specific roof design. Soffit and ridge vents used together provide the most complete ventilation and is the preferred ventilation configuration. Gable vents are sometimes used but are not usually as effective as ridge vents.

Failure to properly vent roof structures can cause water vapor from building interiors to condense within the roof structure or in the attic. This occurs most readily in warm, humid climates. Condensation can wet the insulation reducing its effectiveness, dampen wooden structural components, and can actually cause the roof to appear as though it is leaking even when there is no precipitation. In the worst case, neglecting ventilation issues can cause premature failure of structural components and can void various building component warranties.

**Note: Grace underlayments are not intended for use as an air and vapor barrier in above grade wall assemblies.*

(Refer to Perm-A-Barrier® Wall Membrane or Perm-A-Barrier Liquid)

Technical Letter 3

Exposure Guidelines

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are not meant to be left permanently exposed to the sun. In general, the membrane should be covered with the final roof covering as soon as possible. However, Grace underlayments may be left exposed (as described in the general exposure guidelines below) if necessary, to accommodate construction scheduling or weather problems.

Grace Underlayments	Maximum Exposure Guidelines (Days)
Grace Ultra	60
Grace Ice & Water Shield®	30
Grace Basik®	30
Grace Select	30

During the time period the product is left exposed there are two primary factors at work on the membrane: heat and ultraviolet (UV) radiation. UV radiation will not affect the membrane in any significant way during its maximum exposure limit. Heat will not likely affect the performance of the product either, but there may be some changes in appearance depending on the climate and length of exposure.

After the maximum exposure period, it is normal for the membrane to appear slightly wrinkled. It is also normal to see a slight color change in the non-slip coating on the membrane surface. There may be a small amount of curling at the edges of the membrane as well. None of these issues will affect the performance of Grace underlayments once covered.

Before covering the membrane after a long exposure, it should be inspected to ensure that any wrinkling or other movement that has taken place has not affected any of the lap areas. If a wrinkle forms that extends to the edge of a lap, it must be cut, pressed down, and patched before the roof is covered. Use a round patch of membrane extending past the damaged area 150 mm (6 in.) in all directions. Any curling at the edges or corners must be cut and patched if the affected area is more than 13 mm (1/2 in.) wide.

If exposures longer than the maximum exposure period are anticipated, please contact your local Grace representative.

Technical Letter 4

Slope Requirements

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are intended for use on sloped roofs and are not intended to be used as waterproofing on flat roofs.

A good rule of thumb is that the product is appropriate at whatever slope is normally acceptable for the specific sloped roof covering. For example, if the roof covering on a specific project is designed for slopes of 7 cm in 30 cm (3 in. in 12 in.) or higher, then Grace underlayments under that roof covering are also appropriate at slopes of 7 cm in 30 cm (3 in. in 12 in.) or higher.

Grace underlayments should not generally be used at slopes less than 5 cm in 30 cm (2 in. in 12 in.).

Technical Letter 5

Chemical Compatibility

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are chemically compatible with most substances and products that are normally present in roof top environments. Grace underlayments are compatible with acids, bases, and salts. They are also compatible with asphalts and dried, fully cured coal tar.

Grace underlayments are not compatible with the following substances:

- Creosote
- Diesel Fuel
- Gasoline/Oil
- Hydrocarbon Solvents
- Pentachlorophenol
- Polysulfides
- EPDM* (see note below)
- Flexible (plasticized) Polyvinyl Chloride (PVC)*
- Uncured Neoprene*

Grace underlayments are recommended for use over wood substrates but are not compatible with high concentrations of resin or "pitch" that may bleed out of resin canals in softwoods such as pine, spruce, larch, or Douglas fir. Pitch contains materials such as turpentine, rosin, and pine tar oil. Concentrations of pitch may be higher in freshly sawn wood or at the knot locations. Kiln drying schedules that include final temperatures above 80°C (175°F) are recommended to adequately set the pitch in freshly sawn wood and minimize bleed out.

For compatibilities of other substances and products not listed above, please consult your local Grace representative.

**Note: EPDM, flexible (plasticized) polyvinyl chloride (PVC), and uncured neoprene are not compatible with rubberized asphalt. Grace Ice & Water Shield, Grace Select and Grace Basik are manufactured with a rubberized asphalt adhesive and should not be applied directly to these materials. A barrier such as 1.0 mm to 1.5 mm (0.040 in. to 0.060 in.) flat sheet metal is required to keep the material separated. Grace Ultra may be applied directly to EPDM only.*

Technical Letter 6 In-Place Performance Temperatures

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are formulated to withstand roof top temperatures. The temperature that a roof assembly reaches can vary significantly depending on the time of year, the local climate, the color and composition of the roof covering material, and the construction of the roof assembly. (Refer to Grace Underlayments Product Selection Matrix)

Based on actual in-place temperature measurements and mathematical models using climatic data from the National Oceanic and Atmospheric Agency, Grace understands the temperatures that roofs are likely to experience. Based on these measured and calculated roof temperatures, Grace underlayments are formulated for performance for the life of the roof.

Grace Ultra has been formulated to provide the highest factor of safety when used under extreme climatic and roof construction conditions. An example of extreme roof construction temperature conditions may be a black metal roof installed over the Grace underlayment applied to rigid insulation boards with no roof ventilation. Extreme climatic conditions may be defined as the 30 year hourly extreme temperature, and on the summer solstice when solar radiation is maximum.

While Grace Ultra is formulated to provide the highest factor of safety under extreme temperatures, in many roof constructions temperature of the underlayment would be less than the case above. Lighter roof colors, an air space or insulation over the Grace underlayment, and roof ventilation will all significantly mitigate the temperature the membrane will experience. Also, the roof may be subjected to extreme climatic conditions for only a small fraction of its useful life. Therefore, in most cases Grace Ice & Water Shield and Grace Select exceed the in-place performance temperature requirements and provide an appropriate factor of safety.

Not all self-adhered underlayments are designed and manufactured to work in hot climates or in high temperature roof

constructions. Grace Ultra, Grace Ice & Water Shield, and Grace Select have been formulated specifically for performance at roof top temperatures.

Technical Letter 7 Use Under Architectural Metal Roofing

Grace Ice & Water Shield®, Grace Ultra and Grace Select are recommended for use under architectural metal roofs of all colors and compositions. (Refer to Grace Underlayments Product Selection Matrix) Grace Basik® is a granular surfaced membrane and should not be used without consulting the metal roofing manufacturer or your Grace sales representative. The membrane should be applied directly to a clean, dry, continuous structural deck. Some suitable deck materials include plywood, wood composition, wood plank, metal, concrete, or gypsum sheathing. Decks shall have no voids, damaged, or unsupported areas. Repair deck areas before installing membrane.

Mechanically fastened rigid insulation may be applied over the membrane. All types of rigid insulation boards are acceptable for use in this manner. Rigid insulation should not be hot mopped onto the membrane.

Use under Copper, Cor-Ten® and Zinc Metal Roofing

Copper, Cor-Ten® and zinc metal roofing have inherent properties that cause roofs constructed with these materials to become exceptionally hotter than other roofs. These metals absorb most of the energy reaching them from the sun (high thermal absorption), reflect little energy (low reflectivity), and conduct heat very rapidly (high thermal conductivity). Therefore, there are special design considerations for underlayments used under these metal roofs, due to the high in-service temperatures that these roof assemblies can reach.

Grace Ultra is recommended for use under copper, Cor-Ten and zinc in high altitude climates (see Grace Ultra brochure UL-026). Grace Ultra is formulated with an adhesive based on butyl technology and is designed to withstand even the highest in-service roof temperatures. This membrane provides the highest factor of safety in high temperature roof applications. Check with your Grace representative.

In addition to the high temperature on zinc roofs, the designer should also be aware that an air space is needed between the Grace underlayment and the zinc roof to prevent corrosion of the zinc.

Welded Architectural Metal Seams

Some architectural metal roofing systems require that the seams between panels be welded. If the architectural metal is applied

directly over the membrane it is possible that the heat from the welding operation could cause damage. The Grace underlayment should be adequately protected from the heat of the welding process. What constitutes protection will depend on the type of metal, the type of torch, and the seam system being used. In some cases, contractors have found that two layers of 6.8 kg (15 lbs) roofing felt, placed only in the metal seam area, offered sufficient thermal protection from a welding operation.

Technical Letter 8

Use Over Fluted Metal Decks

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are to be used as air and vapor barriers only, when installed on a clean, dry fluted metal deck where permitted by local building and fire codes. Care should be taken to make sure that all side laps are made over the tops of the flutes so they can be sufficiently pressed together for a good seal. It is recommended that sheet metal or some other smooth structural substrate be fastened to the metal in the areas where end laps will fall. This will allow the end laps to be pressed together.

Special care should be taken that foot traffic on the roof does not damage the membrane since it is especially susceptible to damage over the troughs of the flutes where it is unsupported.

Roof fasteners driven through the Grace underlayment should be placed only over the crests of the flutes where the membrane is supported.

Technical Letter 9

Fastener Sealability

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are formulated to provide a quality seal around fastener penetrations. However, the quality of that seal can be significantly affected by the type of fastener used and the manner in which they are installed.

For best results, use smooth shank electroplated galvanized fasteners. Hand nailing generally provides a better seal than power activated nailing. Do not install the fasteners through the Grace underlayment over unsupported areas of the structural deck, such as over the joints between adjacent structural panels. In addition, the fasteners should be installed as straight as possible so the membrane is not torn. It is important that the temperature at the time the fasteners are installed through membrane is 5°C (40°F) or

higher for optimum sealability. If fasteners are removed leaving holes in the Grace underlayment, the membrane must be patched with a round piece of membrane extending past the damaged area 150 mm (6 in.) in all directions. Grace underlayments may not self-seal open fastener penetrations.

Technical Letter 10

Use Over Georgia-Pacific Dens-Deck® and Dens-Deck® Prime

Dens-Deck® and Dens-Deck Prime are fiberglass-faced gypsum roof boards manufactured by Georgia-Pacific as nonstructural thermal barriers and membrane substrates for commercial roofing applications.

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) may be applied to Georgia-Pacific Dens-Deck and Dens-Deck Prime. There is no chemical incompatibility. However, because of the nature of the fiberglass surface, the level of membrane adhesion may not be as high as when it is applied to a monolithic surface like plywood.

- When Grace underlayments are applied to **Dens-Deck**, they adhere very well to the fiberglass fabric surface. However, when the adhesion is tested, the fiberglass fails cohesively. This means that part of the fiberglass remains adhered to the membrane and part of the fiberglass remains bonded to the Dens-Deck.

The adhesive bond strength of the Grace underlayment is greater than the internal cohesive strength of the fiberglass fabric surface of the Dens-Deck. Therefore, the bond between the Dens-Deck and Grace underlayment is limited by the fiberglass fabric. This is expected to be an issue only while the membrane remains uncovered before the metal roof is installed.

It is not expected that the use of primers will significantly improve the bond strength between Grace underlayments and the fiberglass fabric surface of Dens-Deck.

- When Grace underlayments are applied to **Dens-Deck Prime**, they adhere well to the "treated" surface. If adhesion is marginal, the use of Perm-A-Barrier® WB Primer will improve the adhesion. Apply the primer at a rate of 6-8 m²/L (250-350 ft²/gal). Perm-A-Barrier WB Primer is slippery when wet. Allow primer to dry before walking on the Dens-Deck Prime substrate. Cover the membrane with the exposed roofing material as soon as possible.

Technical Letter 11 Shelf Life

The shelf life of Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) is highly dependent on storage conditions. In general, these products should be stored in their original, unopened packaging at ambient temperatures between 5-32°C (40-90°F) under dry conditions.

Grace underlayments have optimum initial adhesion to the roof deck if used within one year from the date of manufacture.

Technical Letter 12 Use on Oriented Strand Board (OSB) Roof Sheathing

Oriented Strand Board (OSB) has become a common material used as structural roof sheathing. OSB is a structural panel made of wood strands sliced in the long direction and bonded together with a binder under heat and pressure. The product is manufactured with a textured surface for use in roofing applications to improve surface traction and a wax is added to the binder formulation to enhance the moisture resistance.

Grace underlayments (Grace Ice & Water Shield®, Grace Ultra, Grace Select, Grace Basik®) are recommended for use over OSB substrates. However, in some instances the ability of the membrane to adhere to the substrate may be compromised by the level of surface texture, the amount of wax added to the panel, and job site wind conditions.

In applications where membrane adhesion to the OSB is found to be marginal, or windy conditions are likely prior to covering with the exposed roofing materials, nail off the perimeter of the membrane with roofing or cap nails at intervals of 300 mm (12 in.) on center. If moderate or high wind conditions are likely, additional nailing in the field of the sheet may be necessary. Staples should not be used in place of nails. As an alternative to using nails, apply Perm-A-Barrier® WB Primer to the roof deck at a coverage rate of 6-8 m²/L (250-350 ft²/gal). Perm-A-Barrier WB Primer is slippery when wet. Allow the Perm-A-Barrier WB Primer to dry thoroughly before walking on the OSB surface. Cover the membrane with the exposed roofing material as soon as possible.

The long-term adhesion of Grace underlayments to the textured surface of OSB is excellent and membrane performance is not affected.



Technical Letter 13 Rigid Roof Insulation Boards and Grace Underlayments

In recent years construction schedules and building assemblies have become more complicated. This has resulted in more projects being built during cold weather months and more complex roof/insulation assemblies.

Common applications of Grace underlayments to rigid roof insulation include vapor barriers and as a temporary roof covering, while waiting for delivery of metal roof systems.

When a Grace underlayment is applied to a structural roof deck, the deck acts as a heat sink. Excess heat build-up in the membrane is transferred to the structural roof deck. On the contrary, when a Grace underlayment (Grace Ice & Water Shield®, Grace Select or Grace Ultra) is installed directly to rigid roof insulation (under a metal roof covering), there is little or no heat sink effect and, therefore, excess heat is not transmitted through the membrane. Under such conditions, which usually occur in warmer climates such as the desert Southwest or at high altitudes, it is recommended that Grace Ultra be used for improved thermal stability.

Grace Ultra is the only Grace underlayment recommended for installation directly to rigid roof insulation in the desert Southwest United States or at high altitudes.

Adhesion to rigid roof insulation boards varies. Porous and dusty surfaces such as Perlite Board, wood fiberboard and some of the glass scrims, provide poor initial adhesion. The use of a primer, such as Perm-A-Barrier® WB Primer will help adhesion to these surfaces. If the primer is necessary, it should be applied at the rate of 6-8 m²/L (250-350 ft²/gal). Perm-A-Barrier WB Primer is slippery when wet. Allow the primer to dry thoroughly before walking on the insulation surface. Dust free, smooth insulation facers, such as foil asphalt impregnated glass scrims and some of the papers, provide the best initial adhesion. *The choice of the insulation board or use of a primer is the responsibility of the specifiers.* Grace recommends using an insulation board that provides the stability and an I-60 wind uplift.

Cover the exposed membrane with roofing material as soon as possible. When the underlayment is adhered to roof insulation, exposure times may shorten and minimum application temperatures may become more critical.

Grace Ice & Water Shield...

Nothing *sticks* like it.

Nothing *seals* like it.

Nothing *protects* like it.

Nothing *lasts* like it.

Grace Ice & Water Shield underlayment helps prevent moisture penetration from ice dams and wind-driven rain.

We have some real pros too at our Technical Support Center.

Many of our technical assistants have spent years in the field, just like you. If you ever need assistance or just have questions about using Grace Underlayments and Grace Vycor Self-Adhered Flashing, give us a call.

**For Technical Assistance
call toll free at 866-333-3SBM (3726).**



Insist on **GRACE Ice & Water Shield**

Visit our web sites at

www.graceconstruction.com and www.graceathome.com

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Our Thanks to Some Real Pros...

We talked with professional roofing contractors to hear, first-hand, their comments on using Grace Ice & Water Shield's self-adhered underlayment. As you've just seen, we shared some of their handy tips in the pages of this *Contractor's Guide*. You may be using some of these techniques yourself, or you might give them a try on your next job – to save time, money and call-backs.



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Doc Gelso Construction, Inc.
Lake Tahoe, NV*



*Frank Lawson, Jr., President,
The Lawson Roofing Co., Inc.
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*Jim Kenyon, Project Manager
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*Our thanks to Bob, Frank,
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