Installation Guide

Interior Applications

An ideal substrate for interior applications, such as:

- Shower and tub enclosures
- Garden/whirlpool tubs
- Countertops
- Backsplashes
- Steamrooms and saunas
- Swimming pool and whirlpool decks and enclosures
- Floor underlayment
  - Entryways
  - Kitchens
  - Bathrooms
  - Foyers
  - Laundry rooms

Installation

General: All framing should comply with local building code requirements and be designed to provide support with a maximum allowable deflection of L/360 under all intended loads. Framing members should be spaced a maximum of 16" o.c.

Cut or score PermaBase on printed side of panel. Use a straightedge and pencil to mark line. Use utility knife to score/cut the glass mesh. Snap the board and cut through the now visible glass mesh on the other side. Install tile and tile setting materials in accordance with current ANSI specifications and Tile Council of North America (TCNA) guidelines.

Control Joints: For interior installations, allow a maximum of 30 lineal feet between control joints. A control joint must be installed but not limited to the following locations: where expansion joints occur in the framing or building (discontinue all cross furring members located behind

joint); when boards abut dissimilar materials; where framing material changes; at changes of building shape or structural system; at each story separation. Place control joints at corners of window and door openings, or follow specifications of architect. Control joint cavity shall not be filled with coating or other materials.

Walls And Ceilings

Wall Framing: Edges of PermaBase parallel to framing should be continuously supported. Provide additional blocking when necessary to permit proper PermaBase attachment.

Do not install PermaBase directly over protrusions from stud plane, such as heavy brackets and fastener heads. Studs above a shower floor should either be notched or furred to accommodate the thickness of the waterproof membrane or pan. The surround opening for a tub or precast shower receptor should not be more than 1/4" longer than unit to be installed.

Installation Accessories

For a seamless installation, we recommend PermaBase® Tape and PermaBase® Screws.

Fasteners
PermaBase corrosion resistant screws or equivalent, 1-1/4" or 1-5/8" long, for use with wood framing. Type S-12 screws or equivalent, 1-1/4" or 1-5/8" long, for use with 20 gauge or heavier steel framing.

Galvanized roofing nails, 1-1/2" long with hot dipped galvanized coating for use with wood framing. Nails should meet Federal Specification #FF-N105B/type 2 style 20.

Joint Reinforcement
PermaBase mesh tape must be used on all edges and cuts made to size. Use 2" wide polymer-coated (alkali resistant) mesh tape for interior applications and 4" wide polymer-coated (alkali resistant) mesh tape for exterior applications.

Bonding Materials
Treat joint and set facing material, preferably with latex-Portland cement mortar or with dry-set (thin-set) mortar. All mortars should comply with ANSI A118.1, A118.4 or A118.15 standards. Type 1 organic adhesive meeting ANSI A-136.1 may be utilized for interior use only.

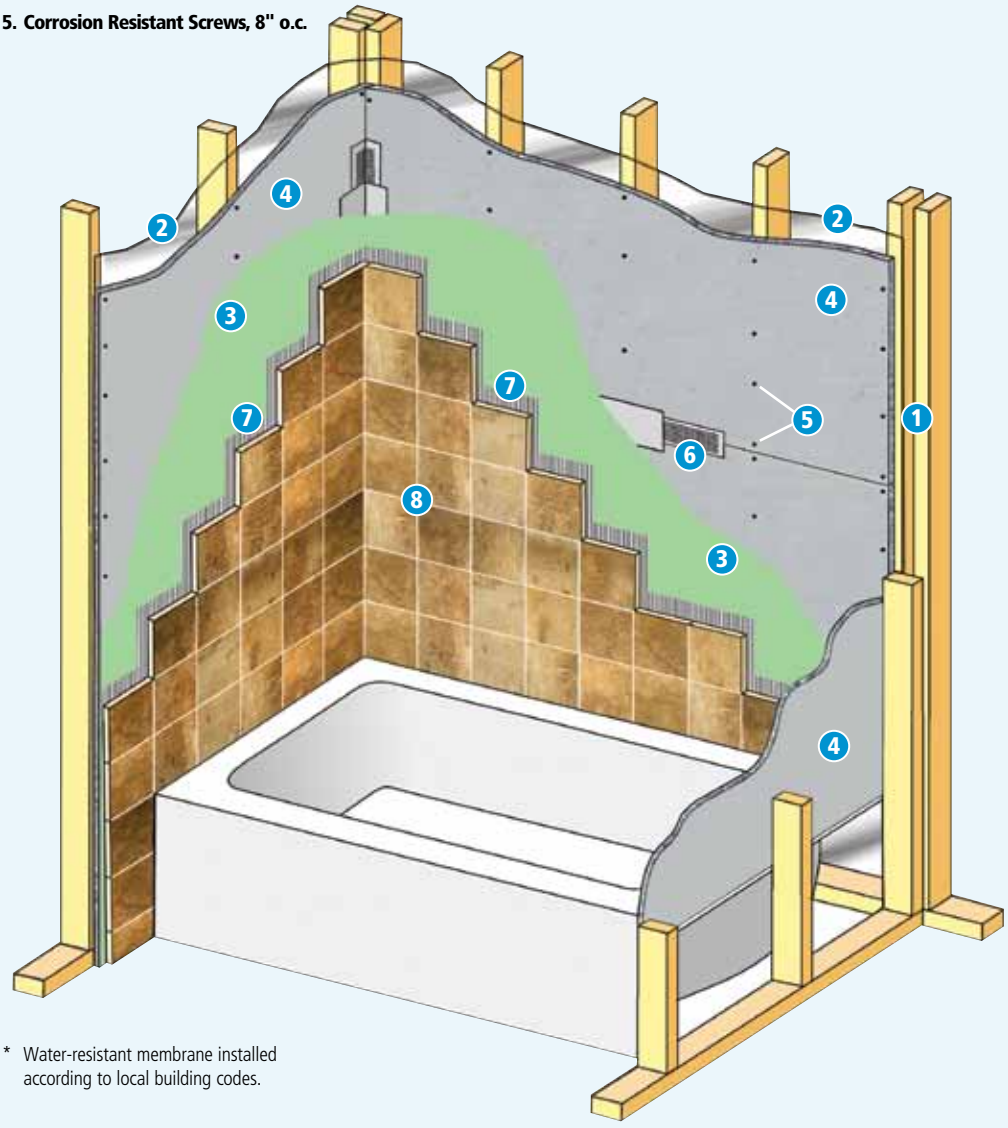
Ceiling Framing: The deflection of the complete ceiling assembly due to dead load (including insulation, PermaBase, bonding material and facing material) should not exceed L/360. The dead load applied to the ceiling frame should not exceed 10 psf. Ceiling joist or furring channel should not exceed 16" o.c. (Edges of PermaBase parallel to framing should be continuously supported.) Provide additional blocking when necessary to permit proper PermaBase attachment.

PermaBase Cement Board: Apply PermaBase with ends and edges closely butted but not forced together. Stagger ends joints in successive courses. Drive fasteners into field of cement board first, working toward ends and edges. Space fasteners maximum 8" o.c. for walls, 6" o.c. for ceilings with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges. Ensure PermaBase is tight to framing.

Joint Reinforcement: Trowel bonding material to completely fill the tapered recessed board joints and gaps between each panel. On non-tapered joints apply a 6" wide, approx. 1/16" thick coat of bonding material over entire joint. For all joints, immediately embed 2" alkali resistant fiberglass mesh tape fully into applied bonding material and allow it to cure. For outside corners, 4" wide mesh tape is recommended. Same bonding material should be applied to corners, control joints, trims and other accessories. Feather bonding material over fasteners to fully conceal.

Tub Installation

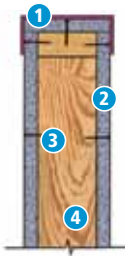
1. **Wood Studs, 16" o.c.**
2. **Waterproof Membrane (Plastic Film)* *or***
3. **Liquid-Applied Waterproofing Membrane***
4. **PermaBase Cement Board**
5. **Corrosion Resistant Screws, 8" o.c.**
6. **Fiberglass Mesh Tape (Alkali-Resistant)**
7. **Adhesive Or Latex-Portland Cement Mortar**
8. **Tile**



* Water-resistant membrane installed according to local building codes.

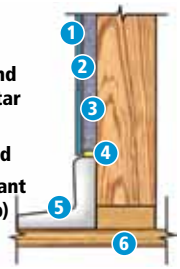
Knee Wall Detail

1. Waterproofing Membrane
2. PermaBase Cement Board
3. Corrosion Resistant Screws, 8" o.c.
4. Framing



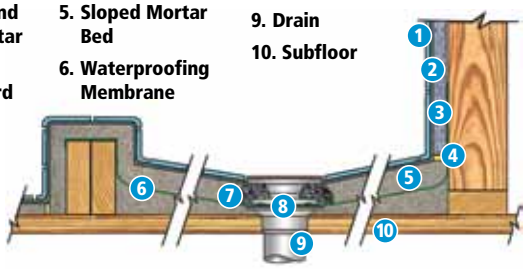
Shower Receptor Detail

1. Tile
2. Adhesive or Latex-Portland Cement Mortar
3. PermaBase Cement Board
4. Flexible Sealant (Min. 1/8" gap)
5. Shower Receptor
6. Subfloor



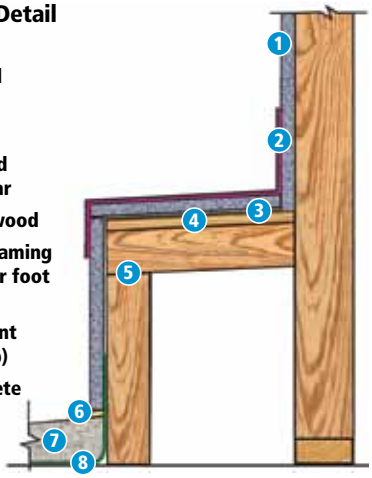
Shower Pan Detail

1. Tile
2. Adhesive or Latex-Portland Cement Mortar
3. PermaBase Cement Board
4. Flexible Sealant (Min. 1/8" gap)
5. Sloped Mortar Bed
6. Waterproofing Membrane
7. Crushed Stone
8. Weep Holes
9. Drain
10. Subfloor



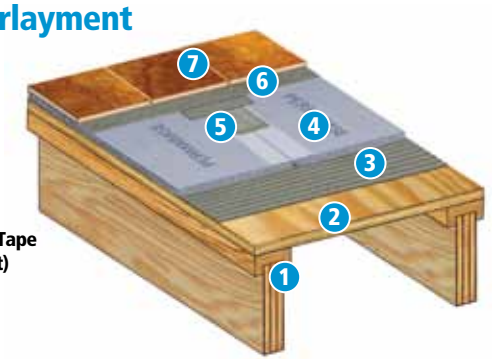
Shower Seat Detail

1. PermaBase Cement Board
2. Waterproofing Membrane
3. Latex-Portland Cement Mortar
4. Min. 1/2" Plywood
5. Supporting Framing (slope 1/4" per foot toward drain)
6. Flexible Sealant (Min. 1/8" gap)
7. Sloped Concrete
8. Membrane



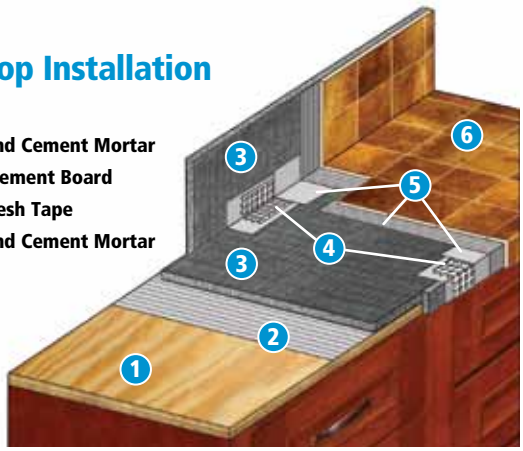
Floor Underlayment

1. I-Joists
2. Plywood
3. Latex-Portland Cement Mortar
4. PermaBase Cement Board
5. Fiberglass Mesh Tape (Alkalin Resistant)
6. Latex-Portland Cement Mortar
7. Tile



Countertop Installation

1. Plywood
2. Latex-Portland Cement Mortar
3. PermaBase Cement Board
4. Fiberglass Mesh Tape
5. Latex-Portland Cement Mortar
6. Tile



Floors And Counters

Subfloor Or Base: For flooring applications with 16" o.c. floor joists, 5/8" tongue and groove exterior grade plywood or 3/4" tongue and groove exterior grade OSB may be used. For 19.2" o.c. and 24" o.c. floor joists, 3/4" tongue and groove exterior grade plywood or OSB must be used. Tile size for floors with 24" o.c. floor joists must be 12" x 12" or larger. The joist and subfloor assembly must meet L/360 as well as the appropriate code tables for live and dead loads.

Underlayment: Using a 1/4" square-notched trowel, apply a setting bed of polymer-modified mortar (or thin-set mortar) to the subfloor or counter base. Immediately laminate PermaBase to subfloor or base leaving a 1/8" space between boards at all joints and corners. Leave a 1/4" gap along walls. Stagger all joints so that they do not line up with underlying substrate joints. Fasten PermaBase every 8" o.c. throughout board field and around all edges while setting bed mortar is still workable. Around perimeter of each board, locate fasteners 2" from corners and not less than 3/8" from the edges. Fill all joints solid with bonding material. On non-tapered joints such as butt ends, apply a 6" wide, 1/16" thick coat over the entire joint. For all joints, immediately embed 2" fiberglass mesh tape fully into applied bonding material; ensure that tape is centered over joint. Apply bonding material over fasteners to fully conceal. Remove all excess bonding material and allow to cure.

Limitations

- Joints should be treated with alkali resistant fiberglass mesh tape set in a polymer modified mortar.
- Conventional paper drywall tape, joint compound and drywall nails or screws should not be used.
- Maximum wall framing spacing should not exceed 16" o.c. and must be designed to limit deflection to L/360 under all live and dead loads.
- Steel framing must be 20 gauge (galvanized) or heavier – 16" o.c.
- 1/4" PermaBase and 1/4" UltraBacker should not be used on walls or ceilings.
- PermaBase is not a water barrier. Consult local building code for moisture barrier requirements.
- Not recommended for use with vinyl flooring.
- For exterior and interior finishes applied directly to PermaBase, reinforcing mesh must be embedded in basecoat. Consult finish manufacturer for additional requirements.
- PermaBase should not be exposed to temperatures over 220°F (105°C).
- PermaBase is not a nailing base for other finishes.

Exterior Applications

An ideal substrate for exterior applications such as:

- Tile applications
- Stucco applications
- Cement board stucco
- Thin brick
- Adhered stone veneer
- Thin porcelain tile
- Ventilated rainscreen facade
- EIFS
- Soffit panels
- Sheathing panels
- Outdoor kitchens/grills

Installation

General: All framing should comply with local building code requirements and be designed to provide support with a maximum allowable deflection of L/360 under all intended live including wind) and dead loads.

Note: Cut or score PermaBase on rough side of panel.

Control Joints: For exterior installations, allow a maximum of 16 lineal feet between control joints. Consult finish manufacturer for other requirements. For exterior tile applications, control joints should be spaced a maximum of every 12'. A control joint must be installed but not limited to the following locations: where expansion joints occur in the framing or building (discontinue all cross furring members located behind joint); when boards abut dissimilar materials; where framing material changes; at changes of building shape or structural system; at each story separation. Place control joints at corners of window and door openings, or follow specifications of architect. Control joint cavity shall not be filled with coating or other materials.

Walls And Ceilings

Wall Framing: Studs should be spaced a maximum of 16" o.c. Edges/ends of PermaBase parallel to framing should be continuously supported. Provide additional blocking when necessary to permit proper PermaBase attachment. Do not install PermaBase directly over protrusions from stud plane such as heavy brackets or fastener heads.

Ceiling Framing: The deflection of the complete ceiling assembly due to dead load (including insulation, PermaBase, bonding material and facing material) should not exceed L/360. The dead load applied to the ceiling frame should not exceed 10 psf. Ceiling joist or furring channel should not exceed 16" o.c. (Edges of PermaBase parallel to framing should be continuously supported.) Provide additional blocking when necessary to permit proper PermaBase attachment.

Water Barrier: While PermaBase is unaffected by moisture, a Water/Air Resistive Barrier (WRB) must be installed to protect the cavity. The type and specific placement or location of the water barrier will vary based on local building codes and/or manufacturers warranties. Consult the WRB manufacturer's recommendations for specific installation guidelines.

PermaBase Cement Board: Apply PermaBase with ends and edges closely butted but not forced together. Stagger end joints in successive courses. Drive fasteners into field of cement board first, working toward ends and edges. Space fasteners maximum 8" o.c. for walls, 6" o.c. for ceilings with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges.

Joint Reinforcement: Trowel bonding material to completely fill the tapered recessed board joints and gaps between each panel. On non-tapered joints apply a 6" wide, approximately 1/16" thick coat of bonding material over entire joint. For all joints, immediately embed 4" alkali resistant fiberglass mesh tape fully into applied bonding material and allow to cure. Same bonding material should be applied to corners, control joints, trims or other accessories. Feather bonding material over fasteners to fully conceal.

Decks

Subfloor: Plywood should be securely glued and fastened to floor joists spaced a maximum of 16"o.c. Subfloor should be sloped at a minimum pitch of 1/4" per foot. The floor surface should be true to plane within 1/8" in 10'.

Underlayment: Using a 1/4" square-notched trowel, apply a setting bed of Latex-Portland cement mortar to the subfloor. Immediately laminate UltraBacker to subfloor leaving a 1/8" space between boards at all joints and corners. Leave a 1/4" gap along walls. Stagger joints so they do not line up with underlying substrate joints. Fasten UltraBacker every 8" o.c. throughout board field and around all edges while setting bed mortar is still workable. Around perimeter of each board, locate fasteners 2" from the corners and not less than 3/8" from the edges. Fill all joints solid with bonding material. On non-tapered joints such as butt ends, apply a 6" wide, 1/16" thick coat over the entire joint. For all joints, embed alkali-resistant fiberglass mesh tape fully into applied bonding material; ensure that tape is centered over joint. Apply bonding material over fasteners to fully conceal. Remove all excess bonding material and allow it to cure.

Waterproof Membrane: Trowel apply waterproof membrane to the entire surface of the cement board, following membrane manufacturer's installation instructions in detail.

Cement Board Stucco Wall System (CBSS)

For use in residential and low-rise commercial applications, CBSS provides a drainage system to help prevent water from penetrating behind cladding in framed construction. It complies with ASTM D 226, protecting approved sheathings/ structural components and helping to evacuate incidental water.

Benefits Include

- Appropriate for all climates and resists the growth of mold and mildew
- Extremely durable with increased resistance to impact and inclement weather
- Acrylic polymers provide more resistance to fading, cracking and peeling
- Engineered system that allows a faster installation while providing superior quality control (manufactured product that must comply with ASTM product specifications)
- Provides a 15-year exterior warranty – the industry's best

Limitations

- Follow finish material manufacturer's instructions for proper installation
- Treat joints in PermaBase with mesh tape and base coat
- Thin veneer construction can reveal planar irregularities in framing
- Minor cracking at joints may become visible in finished exterior surface
- Exterior finishes applied directly to PermaBase: Reinforcing mesh must be embedded in basecoat (consult exterior finish manufacturer for additional installation requirements)
- Conventional Portland Cement plaster systems: Self-furring metal lath must be used over PermaBase and fastened to studs
- Code-Approved Water/Air Resistive Barrier (WRB) must first be installed to protect the cavity (type and placement will vary per local building codes and/or manufacturer's specifications, installation guidelines and warranties)

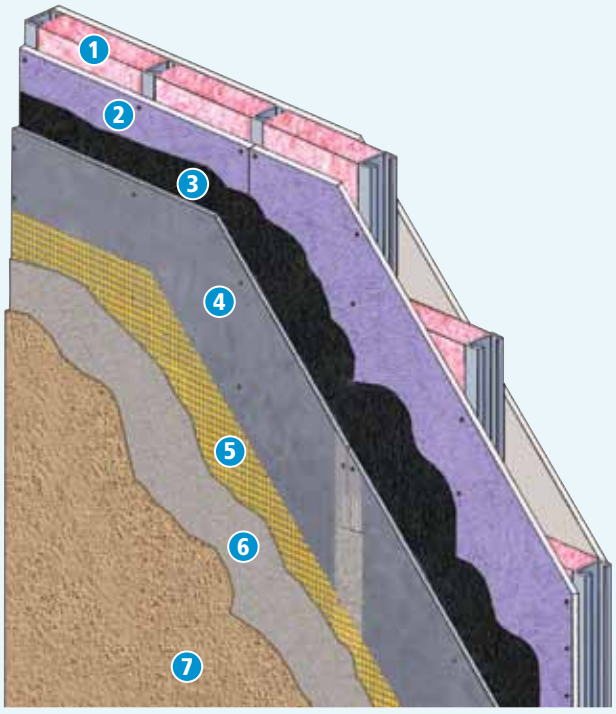
The following manufacturers have Evaluation Service Reports that list PermaBase Cement Board as a component:

STO: ESR-2536

Parex: ESR-2045

Senergy: ESR-2357, ESR-2358, ESR-2359, ESR-2022

Cement Board Stucco



1. **Insulation**
2. **EXP Sheathing**
3. **Water/Air Resistive Barrier**
4. **PermaBase Cement Board**
5. **Reinforcing Mesh**
6. **Base Coat**
7. **Finish Coat**

Cement Board Masonry Veneer Wall System (CBMV)

For use in residential and low-rise commercial applications, CBMV offers a complete, engineered solution for installation of adhered veneers. It provides the ability to incorporate an effective water-management system for a variety of building exteriors with manufactured or natural stone and thin brick veneers.

Benefits Include

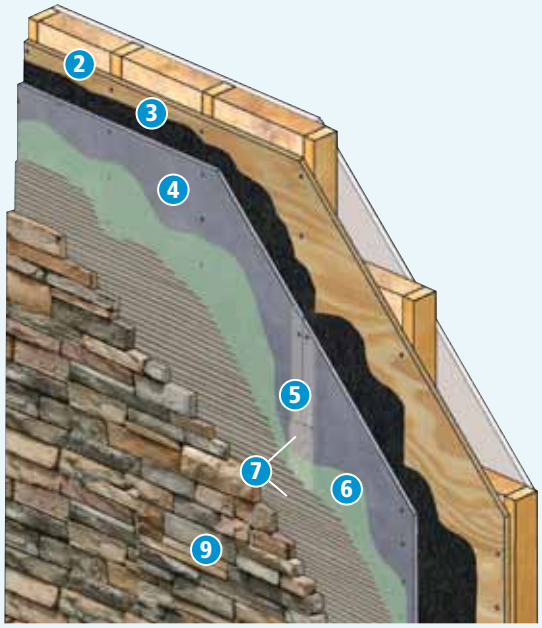
- Engineered system that allows a faster installation while providing superior quality control (manufactured product that must comply with ASTM product specifications)
- Increased performance by utilizing polymer modified adhesive mortars (designed for hanging materials) rather than type S&N mortars (developed for stacking materials)
- Extremely durable with increased resistance to impact and inclement weather
- Approved for use in ASTM C 1780, and cement board is cited as an approved substrate for this system by the Masonry Veneer Manufacturers Association (MVMA): *Installation Guide and Detailing Options for Compliance with ASTM C 1780*
- Easily allows for the inclusion of continuous installation into the assembly
- Appropriate for all climates and resists the growth of mold and mildew
- Speed up your schedule – faster, easier and cleaner than traditional metal lath/scratch coat method
- IBC/IRC Compliant. Meets ASTM C 1325.
- PermaBase is approved as a substrate for direct applied finishes, tile, stone and thin brick in exterior applications, as outlined in ICC-ES Evaluation Report ESR-1510.
- PermaBase is suitable for use in combustible and noncombustible construction under the IBC and IRC, as outlined in ICC-ES Evaluation Report ESR-1510.

Limitations

- Sheathing selection and installation varies according to type of wall construction
- Code-approved Water/Air Resistive Barrier (WRB) must be installed to protect the cavity (type and placement will vary per local building codes and/or manufacturer's specifications, installation guidelines and warranties)

Thin Brick Exterior Metal Stud Assembly

Manufactured Stone Exterior Wood Stud Assembly



1. **eXP Sheathing**
2. **Plywood Or Other Structural Sheathing**
3. **Water/Air Resistive Barrier**
4. **PermaBase Cement Board**
5. **4" Alkali-Resistant Mesh Tape**
6. **Liquid Water/Air Resistive Barrier (WRB) Alternate Location**
7. **Polymer Modified Adhesive Mortar**
8. **Thin Brick**
9. **Manufactured Stone**

Continuous Insulation

For use in residential and low-rise commercial applications, Continuous Insulation offers a complete, engineered solution for required structural performance. Including PermaBase as a component in this system reinforces the building and provides the ability to incorporate an effective water-management system.

Benefits Include

- Engineered system that allows a faster installation while providing superior quality control (manufactured product that must comply with ASTM product specifications)
- Helps mitigate the loss of heat/air conditioning by insulating the studs (reduces thermal bridging)
- Helps eliminate air and moisture leakage
- Appropriate for all climates, resists the growth of mold and mildew and offers fire protection
- Provides added dimensional stability
- Helps prevent the Water/Air Resistive Barrier (WRB) from being compromised as assembly components shift
- Provides a 15-year exterior warranty – the industry's best

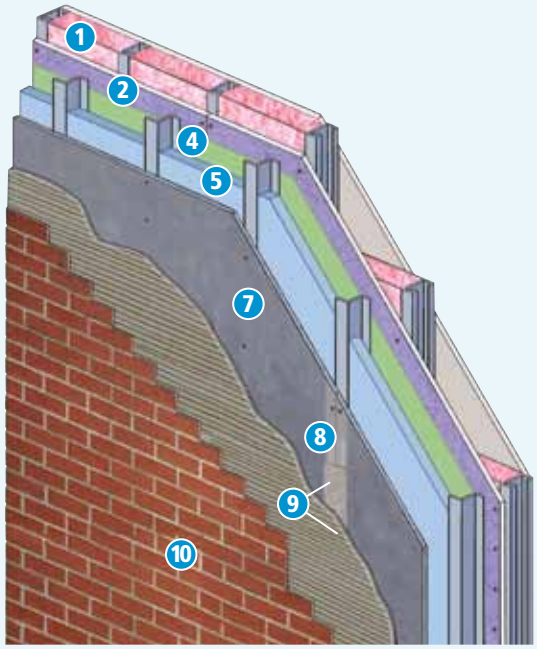
Limitations

- Sheathing selection and installation varies according to type of wall construction
- Code-approved Water/Air Resistive Barrier (WRB) must first be installed (type and placement will vary per local building codes and/or manufacturer's specifications, installation guidelines and warranties)

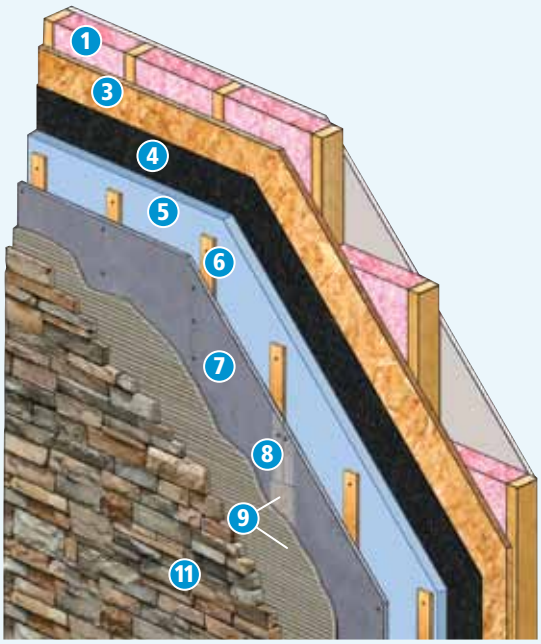
This section of the PermaBase Construction Guide provides information on how to utilize PermaBase within both a CBMV System and a Continuous Insulation System. While some typical examples are shown (right) for reference purposes, the specifications and details on how to design and construct individual systems should be obtained from the adhering material or veneer manufacturer of the materials that are being used to complete the system.

For more information go to: **permabase.com/exteriors**

Continuous Insulation – Z-Furring Installation



Continuous Insulation – Wood Batten Installation



1. **Insulation**
2. **eXP Sheathing**
3. **Sheathing**
4. **Water/Air Resistive Barrier**
5. **Rigid Insulation**
6. **Wood Batten**
7. **PermaBase Cement Board**
8. **Reinforcing Mesh**
9. **Mortar**
10. **Thin Brick**
11. **Manufactured Stone**

LIMITED WARRANTY AND REMEDIES

Products manufactured and sold by National Gypsum Company are warranted by National Gypsum Company to its customers to be free from defects in materials and workmanship at the time of shipment. THIS EXPRESS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO SUCH PRODUCTS, AND IS IN LIEU OF AND EXCLUDES ALL OTHER EXPRESS ORAL OR WRITTEN WARRANTIES AND ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

National Gypsum Company will not be liable for any incidental, indirect or consequential losses, damages or expenses. The customer's exclusive remedy for any type of claim or action for defective products will be limited to the replacement of the products (in the form originally shipped) or, at National Gypsum's option, to a payment or credit not greater than the original purchase price of the products.

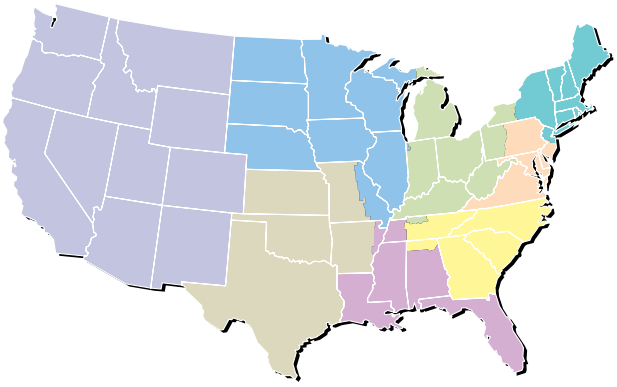
National Gypsum Company will not be liable for products claimed to be defective where the defect resulted from causes not within National Gypsum's control, or which arose or occurred after shipment, including but not limited to accidents, misuse, mishandling, improper installation, contamination or adulteration by other materials or goods, or abnormal conditions of temperature, moisture, dirt or corrosive matter.

Any claim that products sold by National Gypsum Company were defective or otherwise did not conform to the contract of sale is waived unless the customer submits it in writing to National Gypsum within thirty (30) days from the date the customer discovered or should have discovered the defect or nonconformance. No legal action or proceeding complaining of goods sold by National Gypsum may be brought by the customer more than one year after the date the customer discovered or should have discovered the defect or problem of which it complains.

Mold And Mildew Resistance

PermaBase was designed to provide extra protection against mold and mildew. When tested by an independent laboratory, PermaBase received the highest possible ratings on ASTM G 21 and D 3273. The use of PermaBase in actual installations may not produce the same results as were achieved in controlled laboratory conditions. No material can be considered "mold-proof," nor is it certain that any material will resist mold or mildew indefinitely. When used in conjunction with good design, handling and construction practices, PermaBase can provide increased mold resistance. As with any building material, avoiding water exposure during handling, storage and installation, and after installation is complete, is the best way to avoid the formation of mold or mildew.

CUSTOMER SERVICE SALES AREAS



Atlantic Area
Phone: (800) 237-9167
Fax: (877) 252-0430

Central Area
Phone: (800) 252-1065
Fax: (866) 232-0440

Gulf Area
Phone: (800) 343-4893
Fax: (866) 482-8940

Midwest Area
Phone: (800) 323-1447
Fax: (866) 692-8590

Northeast Area
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Southeast Area
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Southwest Area
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Western Area
Phone: (800) 824-4227
Fax: (800) 438-6266

National Accounts
Phone: (800) 440-1230
Fax: (866) 622-3590

Manufactured Housing
Phone: (800) 455-3185
Fax: (800) 639-1714

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PermaBASE BRAND Cement Board

permabase.info

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS: UL.COM/GG UL 2818

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