

# PermaBase<sup>®</sup> BRAND Cement Board Construction Guide



Perma  
**BASE**<sup>®</sup>  
BRAND  
Cement Board

National   
Gypsum<sup>®</sup>



# PermaBase<sup>®</sup> BRAND Cement Board

## Description

PermaBase<sup>®</sup> BRAND Cement Board is a rigid substrate made of Portland cement, aggregate and glass mesh that provides an exceptionally hard, durable surface that is able to withstand prolonged exposure to moisture.

PermaBase offers a competitive advantage over similar products on the market with its patented EdgeTech<sup>®</sup> technology. The tapered, reinforced edge design allows for closer nail or screw application to the edge.

## Features/Benefits

- Reinforced edge with EdgeTech technology allows for closer fastener application of nails or screws at the edge without crumbling or spinnout.

- IRC and IBC 2006 Compliant – Meets ASTM C 1325.

- PermaBase resists the growth of mold achieving a panel score of 10, the highest score possible, per ASTM D 3273.\*

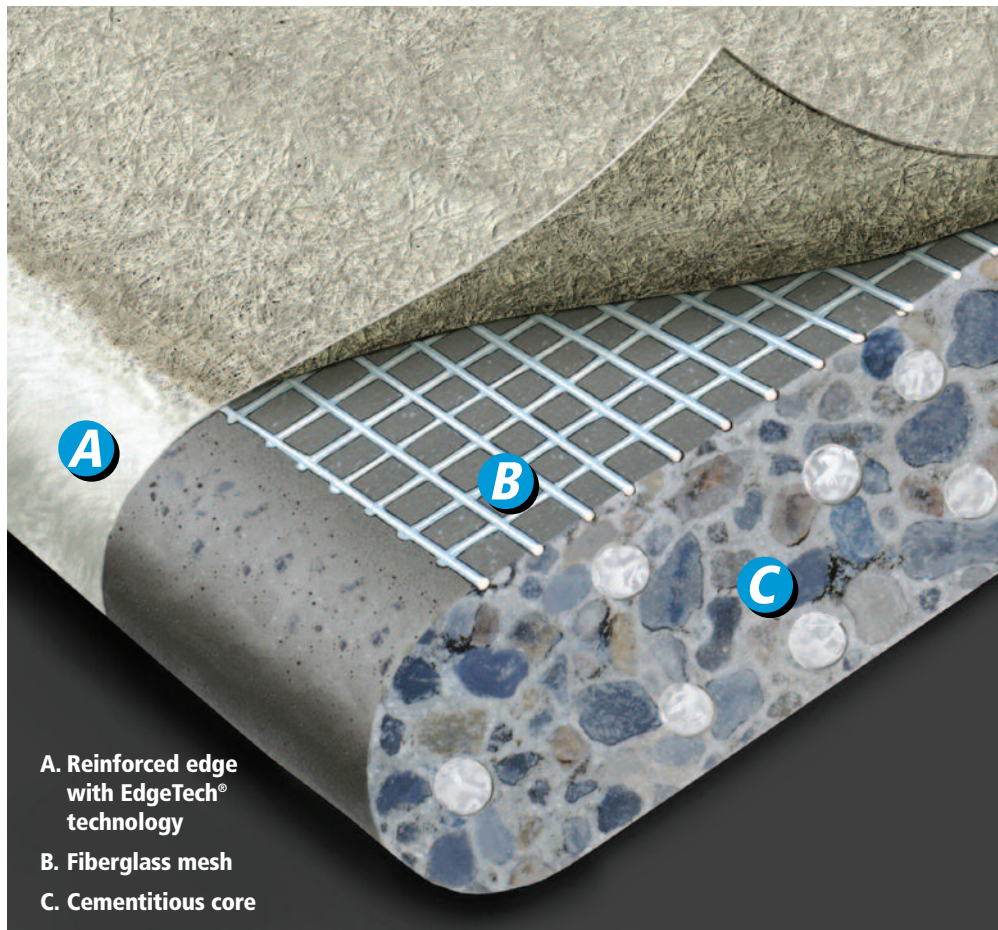
- PermaBase resists the growth of mold achieving a panel score of 0, the highest score possible, per ASTM G 21.

- PermaBase is GREENGUARD Indoor Air Quality Certified<sup>®</sup>.

- Homogeneous core has fewer voids and provides a very easy and clean score and snap.

- Can be cut utilizing a standard utility knife and straightedge. With PermaBase's unique core composition, little or no additional labor is needed to clean the edge after a cut.

- PermaBase is impact resistant, extremely durable and dimensionally stable. It has excellent overall flexural, compressive and tensile strength characteristics.



**A. Reinforced edge with EdgeTech<sup>®</sup> technology**

**B. Fiberglass mesh**

**C. Cementitious core**

- PermaBase is highly moisture resistant, and will not rot, disintegrate or swell when exposed to water.

- 1/2" PermaBase may be used in 1 hour and 2 hour rated assemblies and is UL Classified.

- 1/4" PermaBase is ideal for remodeling applications because it can be applied directly over a variety of existing countertop surfaces.

- As a floor underlayment 1/4" PermaBase eliminates the need to modify adjacent thresholds when abutting to carpeting, wood flooring and other common flooring materials.

- Lowest water absorption of any cement board per ASTM C 473.



- Available in various widths, lengths and thicknesses.

- Can be used in 24" o.c. floor truss construction, with specific requirements.

- Suitable for both interior and exterior applications.

## GridMarX<sup>®</sup>

1/4" PermaBase Underlayment has GridMarX, a pre-printed fastening pattern that ensures the proper number of fasteners while taking the guesswork out of spacing, layout and trimming.

\* When tested by an independent laboratory per ASTM D 3273 ("Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"), PermaBase achieved a panel score of 10, the highest score possible, indicating no mold growth under the laboratory test conditions. 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 indefinitely.

## Warranty

- 30-year limited warranty for interior applications.
- 10-year limited warranty for exterior applications.

## Limitations

- Joints should be treated with alkali resistant fiberglass mesh tape set in a latex-Portland cement 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 wall framing must be 20 ga. (galvanized) or heavier – 16" o.c.
- 1/4" PermaBase should not be used on walls or ceilings.
- PermaBase Cement Board 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 direct to PermaBase, reinforcing mesh must be embedded in basecoat. Consult finish manufacturer for additional requirements.
- PermaBase Cement Board should not be exposed to temperatures over 220°F (105°C).

## Composition

**Cementitious Backer Unit (CBU):** PermaBase Cement Board is a nailable, screwable backerboard and underlayment panel which is composed of Portland cement, aggregates and reinforcements that has a significant ability to remain unaffected by prolonged exposure to moisture. PermaBase complies with ASTM C 1325 and ANSI A118.9.

## Accessories

**Joint Reinforcement:** PermaBase mesh tape or equivalent 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 or A118.4 standards. Type 1 organic adhesive meeting ANSI A-136.1 may be utilized for interior use only.

**Fasteners:** 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.

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 ga. or heavier steel framing.

## Tape & Screws

National Gypsum recommends the use of PermaBase Tape and PermaBase Screws to complete your installation.



## SIZES & PACKAGING

Size: Thickness, Width & Length	# of Pcs. Per Unit
<b>PermaBase Cement Board</b>	
1/2" x 32" x 5' (12.7 mm x 813 mm x 1524 mm)	50
1/2" x 36" x 4' (12.7 mm x 914 mm x 1219 mm)	50*
1/2" x 36" x 5' (12.7 mm x 914 mm x 1524 mm)	50
1/2" x 36" x 6' (12.7 mm x 914 mm x 1829 mm)	50*
1/2" x 36" x 8' (12.7 mm x 914 mm x 2438 mm)	30
1/2" x 48" x 8' (12.7 mm x 1219 mm x 2438 mm)	30
5/8" x 36" x 5' (15.9 mm x 914 mm x 1524 mm)	35
5/8" x 48" x 8' (15.9 mm x 1219 mm x 2438 mm)	24
3/8" x 48" x 8' (9.5 mm x 1219 mm x 2438 mm)	40*
3/8" x 36" x 5' (9.5 mm x 914 mm x 1524 mm)	50*
3/4" x 48" x 8' (19.0 mm x 1219 mm x 2438 mm)	20*
1" x 32" x 8' (25.4 mm x 813 mm x 2438 mm)	20*
<b>PermaBase Underlayment</b>	
1/4" x 48" x 4' (7.9 mm x 1219 mm x 1219 mm)	50
1/4" x 36" x 5' (7.9 mm x 914 mm x 1524 mm)	50

\* Special order

## COMPARISON CHART

Physical Feature Benefits	PermaBase	Other Cement Boards	Fiber Cement Boards
Low Weight Glass Mesh Cement Board	●	○	○
Reinforced Edge	●	○	○
Fastens Near Edge With No Breakout	●	○	○
Highest Damage Resistancy From Handling	●	○	○
Cleanest To Score And Snap	●	○	○
Lowest Water Absorption	●	○	○
Meets 40 psf Rating Wind Load Test Results (Stud spacing 16" o.c.)	●	○	○
Cuts With Utility Knife vs. Power Tools	●	●	○
Standard Fasteners Countersink Into Board	●	●	○
Can Be Used In Both Residential and Commercial Steam Rooms And Saunas	●	●	○
Inorganic vs. Organic Core	●	●	○
30-Year Warranty For Interior Use	●	●	○
10-Year Warranty For Exterior Use	●	●	○

Product Feature: ● Yes ○ No



# Interior Applications

## Applications

An ideal underlayment 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

## TUB & SHOWER SURROUND

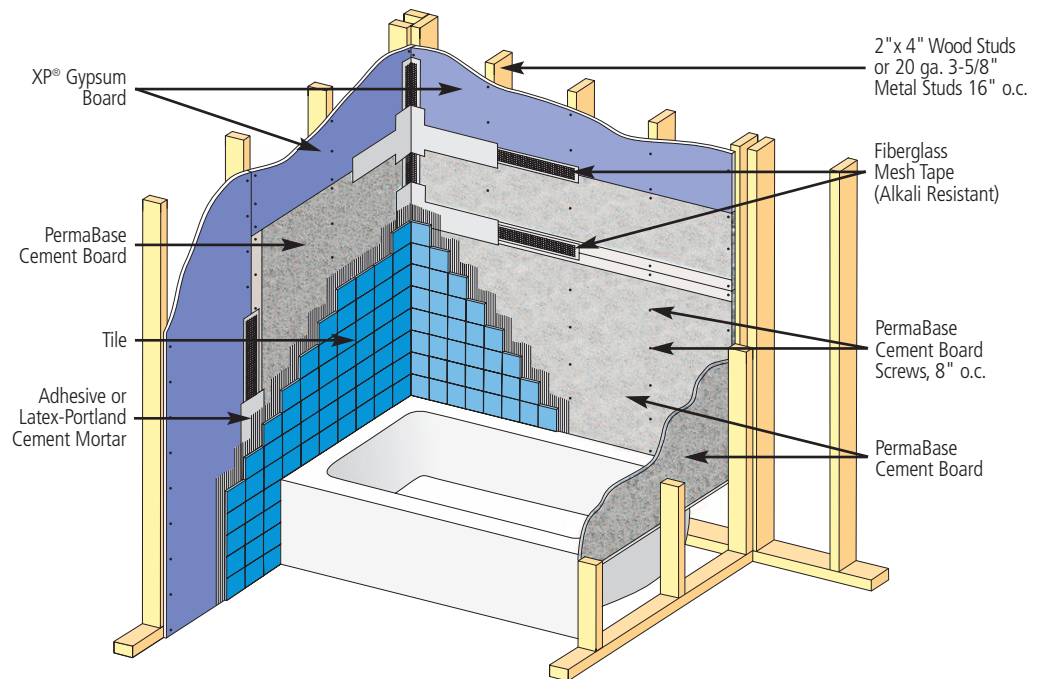


## Installation

**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.

**Note:** Cut or score PermaBase on printed side of panel. Install tile and tile setting materials in accordance with current ANSI specifications and Tile Council of America (TCA) 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 & 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

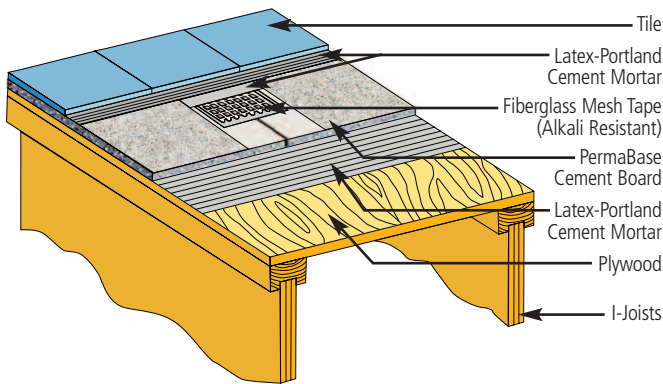
precast shower receptor should not be more than 1/4" longer than unit to be installed.

**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

## FLOOR UNDERLAYMENT



at least 3/8" and less than 5/8" from ends and edges. Ensure PermaBase is tight to framing.

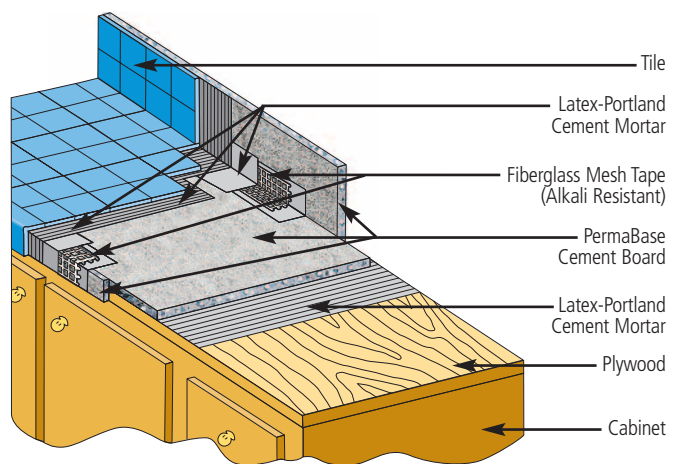
**Joint Reinforcement:** Trowel bonding material to completely fill the tapered recessed board joints and gaps between each panel. On non-tapered joints apply a 6" wide, approx. 1/16" thick coat of bonding material over entire joint. For all joints, immediately embed 2" alkali resistant fiberglass mesh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

## FLOORS & 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 latex-Portland cement mortar (or thin-set mortar)

## COUNTERTOP



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.



# Exterior Applications

## Applications

An ideal substrate for exterior applications such as:

- Tile applications
- Stucco applications
- Thin brick
- Adhered stone
- Countertops
- Soffit panels
- Sheathing panels
- Decks
- 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:** Score and cut PermaBase on the side of panel marked "Cut this side." Install tile and tile setting materials in accordance with current ANSI specifications and Tile Council of North America (TCNA) guidelines.

**Control Joints:** For exterior installations, allow a maximum of 16 lineal feet between control joints. (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.

## 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 PermaBase to subfloor, leaving a 1/8" space between boards at all joints and corners. Leave a 1/4" gap along walls. Stagger all joints so 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 the 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, immediately 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 to cure.

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

## WALLS & 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.



**Weather Barrier:** While PermaBase is unaffected by moisture, a water barrier must be installed to protect the cavity. It should be installed according to the manufacturer's specifications.

**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, approx. 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.

# Water-Managed, High-Impact Resistant Wall System

## CEMENT BOARD STUCCO WALL SYSTEM

### Description

Cement Board Stucco is a water-managed exterior wall system designed to provide increased high-impact and weather resistance and improved dimensional stability where exterior insulation value is not required. For the purposes of meeting structural racking or fire code requirements, it is applied over the following approved sheathings: Exposure 1 or exterior plywood (grade C-D or better); Exposure 1 OSB; glass mat gypsum substrate meeting ASTM C 1177; or water resistant core gypsum (ASTM C 1396).

It combines the strength and durability of PermaBase Cement Board with the performance and beauty of reinforced base coats and textured finishes. All finishes are available in a limitless color selection and offer performance enhancement options ranging from extra mildew resistance to added flexibility.

Behind the system, a weather-resistant barrier complying with ASTM D-226 protects approved sheathings and other structural components and serves as a component to evacuate incidental water. Cement Board Stucco allows you to enclose and finish a project in as little as two days, speeding occupancy.

### Uses

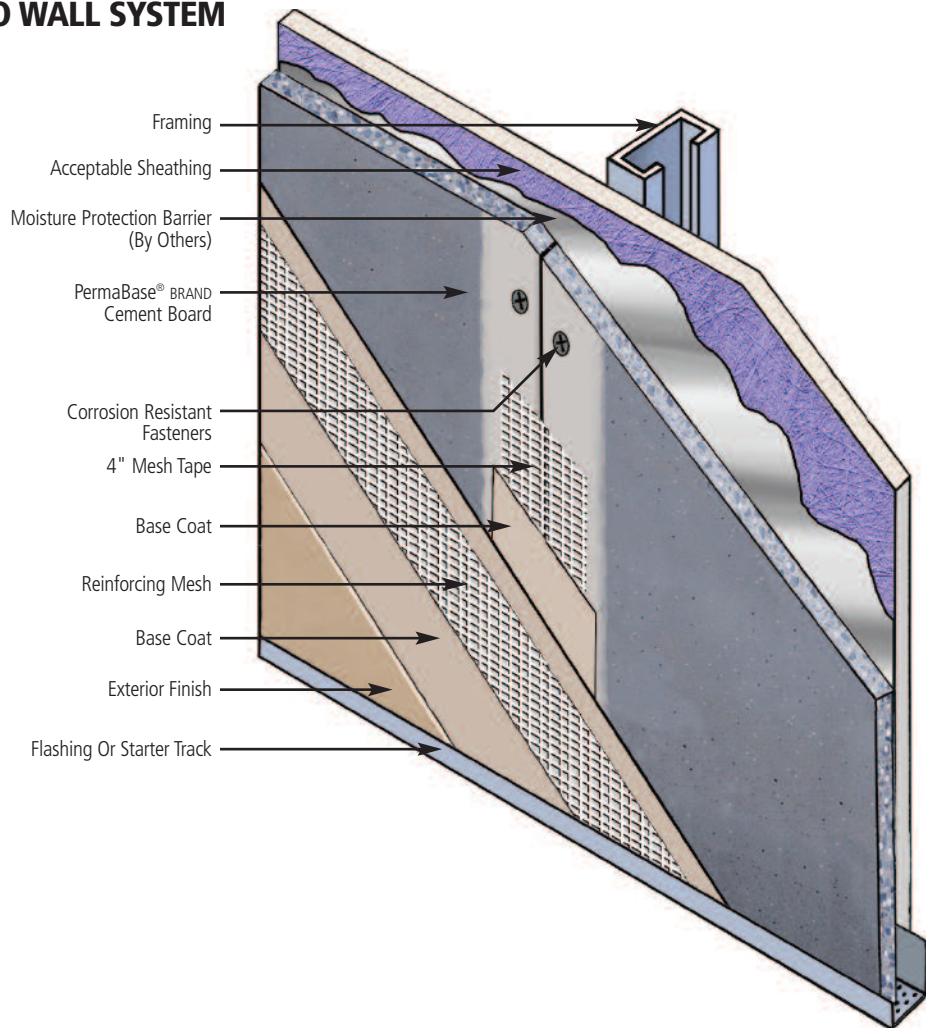
For high-impact and weather-resistant exterior wall in residential and low-rise commercial applications.

**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



### Advantages

**Durability/Strength:** Moisture resistant, durable PermaBase Cement Board substrates applied over a primary sheathing provide extraordinary impact and puncture resistance to the system.

**Weather Resistance:** 100% Acrylic base coats and finishes repel weather at the system's surface.

**Water-Managed Design:** The water-managed design of the system provides drainage to the exterior of incidental water that might enter around or through window or door openings and penetrate behind the cladding in frame construction.

**Design Options:** Cement Board Stucco provides the popular stucco look, including the attachment of special pre-molded shapes and a wide variety of finish texture and color options in standard colors and custom colors.

Contact exterior coatings manufacturer for color and installation instructions.

### Limitations

- Use is limited to residential and low-rise commercial applications.
- Thin veneer construction will tend to reveal planar irregularities in the frame construction.
- Minor cracking at joints might become visible in the finished exterior surface.
- For exterior finishes applied direct to PermaBase, reinforcing mesh must be embedded in basecoat. Consult exterior manufacturer for additional installation requirements.
- For conventional Portland Cement plaster systems, self-furring metal lath must be used over PermaBase and adhered to studs.



# Masonry Veneer Installation Systems (MVIS)

## PermaBase as a component of MVIS Systems

The use of adhered manufactured stone and thin brick masonry veneers is increasing in popularity. Masonry Veneer Installation Systems (MVIS) have been designed to offer complete, engineered solutions for the installation of manufactured and natural stone masonry veneer, as well as thin brick veneers.

These systems have been developed and are marketed by various manufacturers of the adhering materials used to install them as well as the veneer manufacturers themselves. MVIS Systems offer increased performance by utilizing polymer modified adhesive mortars which have been designed for hanging materials versus type S and N mortars that were primarily designed for stacking materials. In some cases these systems offer warranties.

Several of these systems call for the use of an ASTM C 1325 cement board. In addition to meeting this requirement, the features and benefits of PermaBase Cement Board make it an ideal component for use in these systems.

## Advantages

**Durability/Strength:** Moisture resistant, durable PermaBase Cement Board substrates are applied over a primary sheathing to provide a durable, dimensionally stable surface to adhere veneers to.

**Consistency:** PermaBase is produced in a factory controlled environment which provides for a consistent product produced within tighter tolerances than can be achieved with field fabricated substrates.

## Cutting and handling:

PermaBase is produced with its patented EdgeTech technology. The tapered, reinforced edge design allows for fastening of nails or screws closer to the edge without crumbling or spinout. The homogeneous core provides a very clean score and snap using a standard drywall knife.

## Low Water Absorption:

PermaBase has the lowest water absorption of any cement board which provides greater open time and increased workability of the adhering materials used in the application of veneer products.

## Limitations

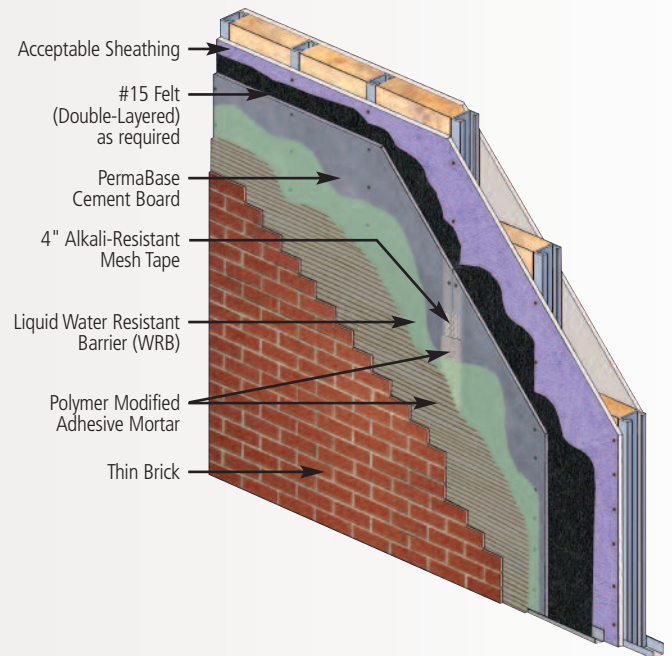
Use is limited to residential and low-rise commercial applications. MVIS Systems utilize a primary sheathing beneath the PermaBase cement board to provide required structural performance. The selection and installation of this sheathing varies according to the type of wall construction.

The details below are provided to give a general sense of representative MVIS Systems only.

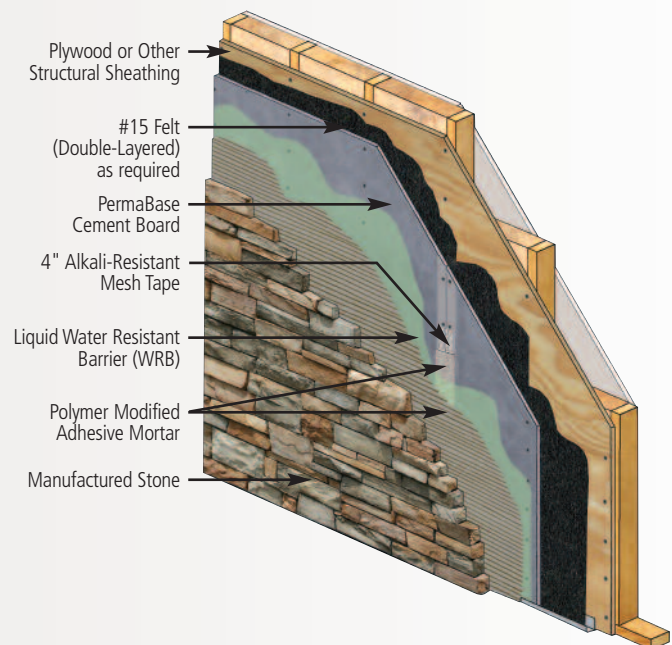
## Water Resistant Barriers (WRB)

While PermaBase is unaffected by moisture, a water resistant barrier (WRB) must be installed to protect the cavity. One of the advantages of MVIS is the ability to incorporate an effective, accountable water management system. The type and specific placement 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.

## Thin Brick Exterior Metal Stud Assembly



## Manufactured Stone Exterior Wood Stud Assembly



The information in this section of the PermaBase Exterior Applications Guide provides information on how to utilize PermaBase within an MVIS System. While some typical examples are shown below 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/MVIS](http://permabase.com/MVIS).

## PermaBase Exterior Advantages

- Factory produced substrate consistently manufactured to strict ASTM C 1325 standards
- Time and labor saving alternative to field applied metal lath, brown and scratch coat substrates
- Reduced dependence on jobsite weather conditions
- Qualifies for systems warranty



# PermaBase BRAND Flex<sup>®</sup> Cement Board

## Description

PermaBase BRAND Flex<sup>®</sup> Cement Board is a polymer-modified cement board reinforced with an alkali-resistant fiber mesh ideal for use around ceilings, beams, columns, arches and archways, walls and anywhere an evenly curved surface is required.

## Applications

- Radius wall and ceiling construction
- Exterior and interior columns
- Radius shower walls
- Radius tub step-ups
- Saunas and steamrooms

## Features/Benefits

- 6" (150 mm) minimum radius for 90° corners.
- Bends immediately, easily and evenly without kerf cuts.
- Easy installation, reduces skilled labor costs.
- Can be used for interior or exterior applications.
- Creates uniform curved surfaces.

## Limitations

- For convex surfaces, PermaBase Flex must be applied with the rough surface and tapered edges exposed.
- For concave surfaces, PermaBase Flex must be applied with the smooth surface exposed.
- PermaBase Flex Cement Board should not be used for fire-rated assemblies.
- Maximum framing spacing should not exceed 8" o.c. and must be designed to limit deflection to less than L/360 under all live and dead loads.
- Steel framing must be 20 gauge or heavier.

■ PermaBase Flex Cement Board is vapor permeable and unaffected by water but is not a water barrier. Consult local building code for moisture barrier requirements.

■ Do not use drywall nails, screws or fiberglass mesh tape.

## Installation

**Wall Framing:** Studs should be spaced a maximum of 8" o.c. Edges/ends of PermaBase Flex parallel to framing should be continuously supported. Provide additional blocking when necessary to permit proper PermaBase Flex attachment. Do not install PermaBase Flex directly over protrusions from stud plane such as heavy brackets or fastener heads.

Studs above a shower floor should be either 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.

**Ceiling Framing:** The deflection of the complete ceiling assembly due to dead load (including insulation, PermaBase Flex, 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 8" o.c. Edges of PermaBase Flex parallel to framing should be continuously supported. Provide additional blocking when necessary to permit proper PermaBase attachment.

### PermaBase Flex Cement

**Board:** Apply PermaBase Flex 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. Ensure PermaBase Flex 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 to cure. Same bonding material should be applied to corners, control joints, trims or other accessories. Feather bonding material over fasteners to fully conceal.

**Control Joints:** For interior installations, allow a maximum of 30 lineal feet between control joints. For exterior installations, allow a maximum of 16 lineal feet between control joints. (For exterior tile applications, control joints should be used 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 at building shape or structural system; at each story separation. Place control joints at corners of window and door openings, or follow specifications of architect.

**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.

## Sizes/Packaging

Thickness: 1/2" (12.7 mm)

Width: 4' (1219 mm)

Length: 8' (2438 mm)

Mass: 3.0 lb./ft. (14.6 kg/m)

Packaging: 30 boards per package.

# PermaBase® BRAND Cement Board Technical Data

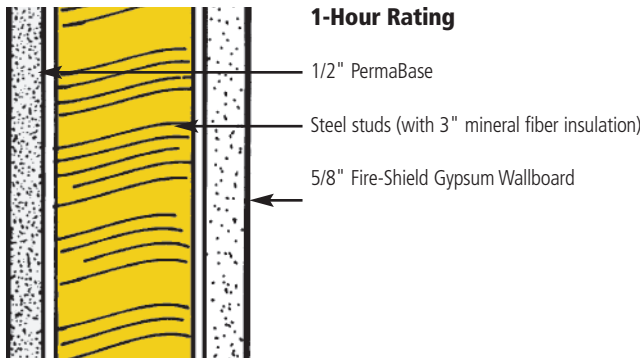
## Technical Data

### Fire-Rated Wall Assemblies

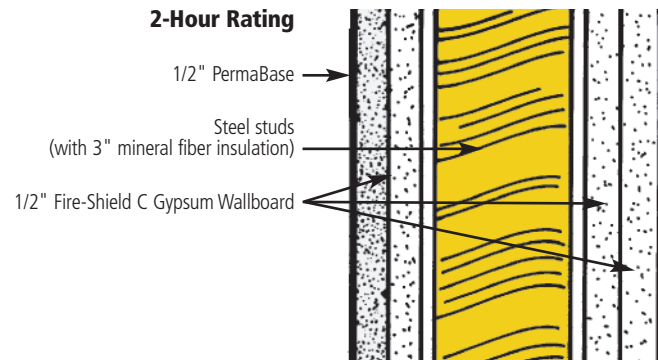
PermaBase Cement Board has been tested and/or approved for use in a variety of fire-rated wall systems.

**1-Hour Rating** – The 1-hour wall assembly consists of 3-5/8" steel studs, 16" o.c., one layer of 1/2" PermaBase attached horizontally or vertically with 1-1/4" long cement board screws 8" o.c. in the field and perimeter on one side and one layer of 5/8" Fire-Shield® wallboard attached vertically on opposite side with joints staggered to those of opposite side, with 1-1/4" long drywall screws 8" o.c. in the field and perimeter with 3" thick mineral fiber insulation batts in the stud cavities. UL V452, ITS/WHI Report No. J99-4001.

**2-Hour Fire Rating** – The 2-hour wall assembly consists of 3-5/8" steel studs, 16" o.c. on one side, base layer of 1/2" Fire-Shield C wallboard attached vertically with 1" drywall screws 24" o.c. in the field and perimeter and face layer of 1/2" PermaBase attached vertically with 1-5/8" cement board screws, 8" o.c. in the field and perimeter. Two layers of 1/2" Fire-Shield C wallboard applied vertically to the opposite side, base layer attached with 1" drywall screws 24" o.c. in the field and perimeter and face layer attached with 1-5/8" drywall screws 12" o.c. in the field and perimeter, with 3" thick mineral fiber insulation batts in the stud cavities. All joints staggered between face and base layer. UL V452, ITS/WHI Report No. J98-32931.



**1-Hour Rating**



**2-Hour Rating**

## PHYSICAL PROPERTIES

Property	Test Method	1/2" PermaBase
Water Absorption % by Weight/24 Hours	ASTM C 473	<8
Flexural Strength (psi)	ASTM C 947	750
Fastener Holding (Wet and Dry, lbs.)	ASTM D 1037 (0.400" head diameter)	90
Weight (psf)	ASTM C 473	3
Freeze/Thaw (cycles) per ANSI A118.9	ASTM C 666 Procedure B	100
Flame Spread/Smoke Developed	ASTM E 84	0/0
Compressive Strength (psi) (Indentation)	ASTM D 2394	2250
Wind Load (psf, studs 16" o.c.)	ASTM E 330	40
Thermal "R"/k Value	Property of Material	0.2/2.7
Bending Radius (ft.)	Property of Material	5
Standard Method for evaluating ceramic floor installation system	ASTM C 627	Light Commercial
Falling Ball Impact (12" drop)	ASTM D 1037	pass
Shear Bond Strength 7 days (psi)	Dry-Set Portland Cement Mortar	204
	Latex-Portland Cement Mortar	241
	Organic Adhesives Type 1	159
Linear Variation (Due to change in moisture content)	ASTM D 1037	0.05%
Fungus Resistance	ASTM G 21	(No growth)
Mold Growth on Surface	ASTM D 3273*	10

\* When tested by an independent laboratory per ASTM D 3273 ("Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"), PermaBase achieved a panel score of 10, the highest score possible, indicating no mold growth under the laboratory test conditions. 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 indefinitely.

### PermaBase meets the following codes and standards:


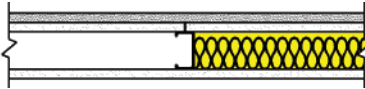
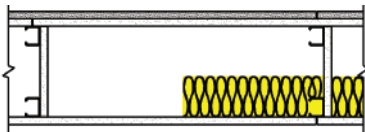
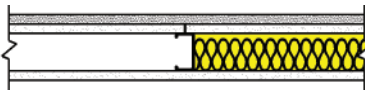
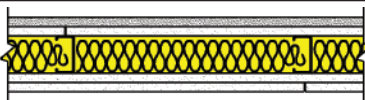
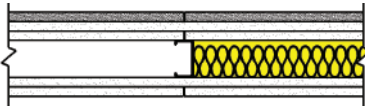
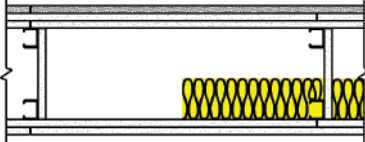
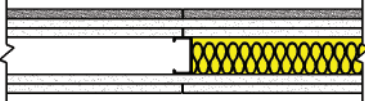
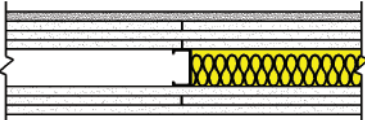


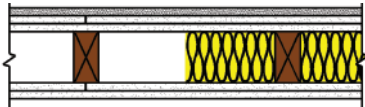
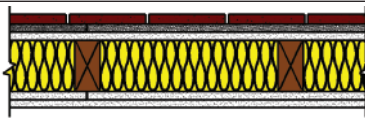
2006 International Residential Code  
2006 International Building Code  
ASTM C 1325  
ANSI A118.9  
ICC Acceptance Criteria 59 (AC59)

### Code Report References

ICBO ES Inc. ER-5731  
PermaBase Cement Board  
National Evaluation Service Inc.  
Report No. NER-578  
PermaBase Cement Board



# Fire-Rated Assemblies

UL LISTED PERMABASE® CEMENT BOARD PARTITIONS – STEEL FRAMING		
Fire Rating	UL Design No.	Description
1 hr.	V452	 <p>1/2" PermaBase applied vertically or horizontally to one side of 3-5/8" steel studs 16" o.c. 5/8" Fire-Shield Gypsum Board applied vertically to opposite side. 3" mineral wool insulation in stud cavities.</p>
1 hr.	V438	 <p>1/2" PermaBase applied vertically or horizontally over 5/8" Fire-Shield Gypsum Board applied vertically to each side of 3-5/8" steel studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
1 hr.	U420	 <p>1/2" PermaBase applied vertically or horizontally over 5/8" Fire-Shield Gypsum Board applied vertically to each side double row of 1-5/8" steel studs 16" o.c. spaced 6" apart. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
1 hr. Load Bearing	U425	 <p>1/2" PermaBase applied vertically or horizontally over 5/8" Fire-Shield Gypsum Board applied vertically to each side of 3-1/2", 20 gage steel studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
2 hr.	V452	 <p>1/2" PermaBase applied vertically over 1/2" Fire-Shield C Gypsum Board, applied vertically to one side of 3-5/8" steel studs 16" o.c. 2 layers 1/2" Fire-Shield C Gypsum Board applied vertically to opposite side. 3" mineral wool insulation in stud cavities.</p>
2 hr.	V438	 <p>1/2" PermaBase applied vertically or horizontally over two layers 5/8" Fire-Shield Gypsum Board applied vertically to each side of 2-1/2" steel studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
2 hr.	U420	 <p>1/2" PermaBase applied vertically or horizontally over two layers 5/8" Fire-Shield Gypsum Board applied vertically to each side double row of 1-5/8" steel studs 16" o.c. spaced 6" apart. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
2 hr. Load Bearing	U425	 <p>1/2" PermaBase applied vertically or horizontally over two layers 5/8" Fire-Shield Gypsum Board applied vertically to each side of 3-1/2", 20 gauge steel studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
3 hr.	V438	 <p>1/2" PermaBase applied vertically or horizontally over three layers 5/8" Fire-Shield Gypsum Board applied vertically to each side of 2-1/2" steel studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/8" spaced 8" o.c.</p>
UL LISTED PERMABASE® CEMENT BOARD PARTITIONS – WOOD FRAMING		
Fire Rating	UL Design No.	Description
1 hr.	U392	 <p>1/2" PermaBase applied vertically or horizontally to one side of 2x4 wood studs 16" o.c. with 1-1/4" cement board screws spaced 8" o.c. Ceramic tile installed over PermaBase. 5/8" Fire-Shield Gypsum Board applied vertically or horizontally to opposite side with 6d nails spaced 7" o.c. 3-1/2" mineral wool insulation in stud cavities.</p>
1 hr.	U392	 <p>1/2" PermaBase applied vertically or horizontally to each side of 2x4 wood studs 16" o.c. with 1-1/4" cement board screws spaced 8" o.c. Ceramic tile installed over PermaBase. 3-1/2" mineral wool insulation in stud cavities.</p>
2 hr.	U301	 <p>1/2" PermaBase applied vertically over two layers 5/8" Fire-Shield Gypsum Board, applied either horizontally or vertically to each side of 2x4 wood studs 16" o.c. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/4" spaced 8" o.c.</p>
2 hr.	U371	 <p>1/2" PermaBase applied vertically over either two layers 5/8" Gypsum Board, applied either horizontally or vertically to the interior side of 2x4 wood studs 16" o.c., or over 5/8" Gypsum Sheathing applied to exterior side with portland cement stucco, brick veneer, thin brick finishes. PermaBase secured to studs with cement board screws of adequate length to penetrate studs 3/4" spaced 8" o.c.</p>

## Specifications

### Section 09 28 00 Cement Board

**A.** This section is written in CSI 3-part format and it assumes that the general conditions of the contract will be AIA A201. This section is proprietary and includes only National Gypsum products.

#### PART 1 GENERAL

##### 1.01 Summary

**A.** Section includes:

1. Cement backerboard for ceramic tile, other interior and exterior applications for walls and ceilings.
2. Underlayment for ceramic tile installations for interior and exterior floors.
3. Substrate for ceramic tile installation for interior and exterior countertops.

##### 1.02 Submittals

**A.** Product Data: Manufacturers' specifications and installation instructions for each product specified.

##### 1.03 Delivery, Storage, and Handling

- A.** Packaging and Shipping: Have materials shipped in manufacturer's original packages showing manufacturer's name and product brand name.
- B.** Storage and Protection: Store materials inside and protected from damage by the elements. Protect ends, edges, and faces of cement boards from damage.

#### PART 2 PRODUCTS

##### 2.01 Manufacturer

**A.** National Gypsum Company

##### 2.02 Materials

**A.** Cement Board

**1.** Backer Board: Cementitious, water-durable board; surfaced with fiberglass reinforcing mesh on front and back; long edges wrapped; and complying with ANSI A118.9 and ASTM C 1325 (PermaBase BRAND Cement Board).

- a. Thickness: 1/2" or 5/8"
- b. Width: 2' 8", 3', or 4'
- c. Length: 4', 5', 6', or 8'
- d. Edges: Tapered
- e. Density: 72 lbs. per cu. ft.
- f. Water Absorption: Not greater than 8% when tested for 24 hours in accordance with ASTM C 473.

**2.** Bendable Backer Board: Cementitious, water-durable board; surfaced with fiberglass reinforcing mesh on front and back; long edges wrapped; and complying with ANSI A118.9 (PermaBase Flex BRAND Cement Board).

- a. Thickness: 1/2"
- b. Width: 4'
- c. Length: 8'
- d. Edges: Tapered
- e. Density: 72 lbs. per cu. ft.
- f. Water Absorption: Not greater than 8% when tested for 24 hours in accordance with ASTM C 473.

**3.** Underlayment: Cementitious, water-durable board; surfaced with fiberglass reinforcing mesh on front and back; long edges wrapped; and complying with ANSI A118.9 and ASTM C 1325 (PermaBase BRAND Cement Board).

- a. Thickness: 1/4"
- b. Width: 3' or 4'
- c. Length: 5'
- d. Edges: Tapered
- e. Density: 72 lbs. per cu. ft.
- f. Water Absorption: Not greater than 8% when tested for 24 hours in accordance with ASTM C 473.

**B.** Fasteners:

**1.** Nails: 1-1/2" long, hot dipped galvanized, for use with wood framing and complying with Federal Specification FF-N-105B, Type 2, Style 20.

**2.** Screws: PermaBase Cement Board Hi-Lo thread screws (No. 8), wafer head, corrosion-resistant, 1-1/4" or 1-5/8" long, for use with wood framing and complying with ASTM C 1002.

**3.** Screws: PermaBase Cement Board drill point screws (No. 8) wafer head, corrosion-resistant, 1-1/4" or 1-5/8" long, for use with 20 to 14 ga. steel framing and complying with ASTM C 1002.

**C.** Joint Treatment:

**1.** Tape: Alkali-resistant fiberglass mesh tape for joint reinforcement, 2" wide mesh tape for interior applications and 4" wide mesh tape for exterior applications.

**2.** Bonding Materials: Latex-Portland cement mortar or Dry-Set (thin-set) mortar, for joint treatment and setting face material, complying with ANSI A118.1 or A118.4 standards. Type 1 organic adhesive meeting ANSI A136.1 may be utilized for interior use only.

#### PART 3 EXECUTION

##### 3.01 Installation

**A.** General: In accordance with manufacturer's recommendations. National Gypsum Company "PermaBase Cement Board Construction Guide" and the following standard:

**1.** Installation of cementitious backer units: ANSI A108.11.

##### 3.02 Protection

**A.** Protect cement board installations from damage and deterioration until the date of substantial completion.

#### 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.*



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