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EVALUATION REPORT

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ER-5731

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Filing Category: ROOF, WALL AND FLOOR PANELS—Cement and Fiber Slab Units (216)

PERMABASE™ CEMENT BOARD
NATIONAL GYPSUM COMPANY
1650 MILITARY ROAD
BUFFALO, NEW YORK 14217-1198

1.0 SUBJECT

PermaBase™ Cement Board.

2.0 DESCRIPTION

2.1 General:

PermaBase Cement Board is used as an interior nonstructural backer board and underlayment for ceramic tile, slate, marble, stone and thin brick. The panels are composed of a core of cement, polystyrene beads and sand; and a cement facing on one side. The unexposed face has a smooth finish with a fiberglass mesh embedded in the cement facing, and the exposed face has a rough finish with a fiberglass mesh embedded in the core.

The panels are supplied in $1/2$ - and $5/8$ -inch (12.7 and 15.9 mm) thicknesses, having widths of 32, 36 and 48 inches (813, 914 and 1219 mm) and lengths of 48, 60, 64, 72, and 96 inches (1219, 1524, 1626, 1829, and 2438 mm), and weighing approximately 3.0 and 3.7 pounds per square foot (14.6 and 18.1 kg/m²), respectively; and in a $5/16$ -inch (7.9 mm) thickness, having widths of 36 and 48 inches (914 and 1219 mm) and lengths of 48 and 60 inches (1219 and 1524 mm), and weighing approximately 2.0 pounds per square foot (9.8 kg/m²).

The PermaBase boards are considered combustible, and have a flame-spread index of 25 and a maximum smoke-developed index of 450 when tested in accordance with UBC Standard 8-1 (ASTM E 84).

2.2 Installation:

2.2.1 General: PermaBase panels are scored and snapped. When installed over wall framing, the framing members shall be spaced not more than 16 inches (406 mm) on center. When installed on a floor, the joists shall be spaced not more than 16 inches (406 mm) on center, and a subfloor (complying with the applicable code) shall be installed prior to the installation of the PermaBase panels. Allowable deflection of framing must be limited to $1/360$ of the span.

Tiled surfaces must be protected from structural movement by the use of control or expansion joints in accordance with the manufacturer's recommendations and sound architectural practices.

PermaBase panels are installed using corrosion-resistant roofing nails in wood studs or joists, or using corrosion-resistant, buglehead self-tapping screws with metal studs or joists. The $1 1/2$ -inch-long (38 mm) roofing nails have a $7/16$ -inch (11.1 mm) head and a 0.109-inch-diameter (2.8 mm) shank.

The self-tapping screws have an 0.325-inch-diameter (8.26 mm) head, a 0.190-inch-diameter (4.83 mm) shank, a high-low thread and a length of $1 5/8$ inches (41.3 mm). The seams, edges, corners and all openings around fixtures must be sealed with 2-inch-wide (51 mm), alkali-resistant, fiberglass mesh tape and a bedding coat and finish coat of either latex modified portland cement mortar complying with ANSI A118.4, or dry-set portland cement mortar complying with ANSI A118.1.1. All fastener heads must be treated with one coat of joint treatment.

All finishes applied to PermaBase panels must be bonded with Type I organic adhesive complying with ANSI A136.1, or with latex portland cement mortar complying with ANSI A118.4. All bonding materials must be of a type and brand that are approved and recommended for use on PermaBase Cement Boards by the manufacturer of the adhesive or bonding agent.

2.2.2 Floors: PermaBase panels used as underlayment must be installed over a subfloor consisting of minimum $5/8$ -inch-thick (15.9 mm) exterior-grade plywood. Plywood edges shall have approved tongue-and-groove edges or shall be supported with blocking. The subfloor must be glued and mechanically fastened to floor joists spaced not more than 16 inches (406 mm) on center. A setting bed of latex portland cement mortar is applied to the subfloor using a $1/4$ -inch-by- $1/4$ -inch-by- $1/4$ -inch (6.4 by 6.4 by 6.4 mm) square-notched trowel. Immediately after the setting bed is applied, the PermaBase panels are laminated to the subfloor, leaving a $1/8$ -inch (3.2 mm) space between the boards at all joints and corners and a $1/4$ -inch (6.4 mm) space along walls. While the mortar bed is still workable, the panels must be fastened to the subfloor at 8 inches (203 mm) on center throughout the board using fasteners described in Section 2.2.1. Joints in the boards must be staggered from the subfloor joints. Edge fasteners must be located 2 inches (51 mm) from corners and a minimum of $3/8$ inch (9.5 mm) from the edge of the board. All joints and corners must be filled with latex portland cement mortar. Taping of panel joints is required.

2.2.3 Walls and Ceilings: PermaBase panels used on walls must be a minimum of $1/2$ inch (12.7 mm) thick and must be fastened to wall studs spaced a maximum of 16 inches (406 mm) on center. Edges of panels parallel to framing must be continuously supported. Additional blocking must be provided as necessary to support all panel edges. Holes drilled into the panel, as a relief for small obstructions or protrusions, must subsequently be filled with tile setting material. Studs above shower floors must be notched or furred to accommodate the thickness of the waterproof membrane or pan. The opening for a tub or precast shower receptor must not be more than $1/4$ inch (6.4 mm) larger than the size of the unit

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installed. Maximum dead load applied to ceiling framing must not exceed 10 psf (478.8 Pa)

The panels must be installed with ends and edges closely butted. Panel joints must be staggered from those of adjacent rows.

The panels are fastened every 8 inches (203 mm) on center on walls and 6 inches (152 mm) on center on ceilings with fasteners noted in Section 2.2.1. Edge fasteners must be located 2 inches (51 mm) from the ends and $\frac{3}{8}$ inch (9.5 mm) from edges of the board. On all joints and corners, gaps must be prefilled with bonding material and covered with 2-inch (51 mm) mesh tape embedded in additional bonding material.

2.2.4 Application of Ceramic Tile: Ceramic tile meeting the requirements of the code is installed over the PermaBase panels in accordance with the requirements of the code.

2.3 One-hour Nonload-bearing Fire-resistive Wall Assembly:

One layer of minimum $\frac{1}{2}$ -inch-thick (12.7 mm) PermaBase panels is installed horizontally or vertically on one side of a steel stud wall, and one layer of $\frac{5}{8}$ -inch-thick (15.9 mm) Gold Bond Fire-Shield Type X gypsum wallboard is installed vertically to the other side. Horizontal panel edges must be blocked.

The stud wall is constructed of No. 20 gage [0.019 inch (0.5 mm)], $\frac{3}{8}$ -inch (92 mm) steel studs on 16-inch (406 mm) centers, with 3-inch-thick (76 mm), 2.47 pcf (39.6 kg/m³), Thermafiber® mineral fiber insulation friction-fitted between studs.

The PermaBase panels are installed with vertical joints located over studs, with a $\frac{1}{8}$ -inch (3.2 mm) clearance maintained between the panels along the vertical and horizontal joints. The panels are secured to each stud with $\frac{1}{8}$ -inch-long (28.6 mm), Type S, high-low thread, drywall screws spaced 8 inches (203 mm) on center. Joints in the panels must be treated as described in Section 2.2.1 of this report.

The gypsum wallboard is attached to the framing with $1\frac{1}{4}$ -inch-long (31.7 mm), Type S drywall screws spaced at 8 inches (203 mm) on center on the perimeter and 12 inches (305 mm) on center in the field. Wallboard joints must be staggered from joints in the PermaBase panels. The wallboard joints must be covered with paper tape and joint compound. Exposed screw heads are covered with a coat of joint compound.

2.3.1 Two-hour Nonload-bearing Fire-resistive Wall Assembly: One layer of minimum $\frac{1}{2}$ -inch-thick (12.7 mm) PermaBase panels is installed over one layer of $\frac{1}{2}$ -inch-thick (12.7 mm) Gold Bond Fire-Shield G Type X gypsum wallboard on one side of a steel stud wall, and two layers of $\frac{1}{2}$ -inch-thick (12.7 mm) Gold Bond Fire-Shield G Type X gypsum wallboard is installed to the other side. All layers are applied vertically. Vertical and horizontal joints between base

and face layers and between opposite faces must be staggered a minimum of 16 inches (406 mm).

The stud wall is constructed of No. 20 gage [0.019 inch (0.5 mm)], $\frac{3}{8}$ -inch (92 mm) steel studs on 16-inch (406 mm) centers, with 3-inch-thick (76 mm), 2.47 pcf (39.6 kg/m³), Thermafiber® mineral fiber insulation friction-fitted between studs.

On one side of the wall, the base layer of gypsum wallboard is applied vertically using 1-inch-long (25.4 mm), Type S drywall screws spaced 24 inches (610 mm) on center. The face layer of PermaBase panels is applied vertically using $1\frac{5}{8}$ -inch-long (41.3 mm), Type S, high-low drywall screws spaced 8 inches (203 mm) on center. Joints in the PermaBase panels must be treated as described in Section 2.2.1 of this report.

On the opposite face, the base layer of gypsum wallboard is applied vertically to the framing with 1-inch-long (25.4 mm), Type S drywall screws spaced at 24 inches (203 mm) on center. The face layer is attached with $1\frac{5}{8}$ -inch-long (41.3 mm), Type S drywall screws spaced 12 inches (305 mm) on center. The wallboard joints must be covered with paper tape and joint compound. Exposed screw heads are covered with a coat of joint compound.

2.4 Identification:

Each panel bears the National Gypsum Company name, the product name and the evaluation report number (ICBO ES ER-5731).

3.0 EVIDENCE SUBMITTED

Reports of tests in accordance with ANSI A118-9-1990, and UBC Standards 7-1, 8-1 and 26-3.

4.0 FINDINGS

That the PermaBase™ panels described in this report comply with the 1997 Uniform Building Code™, the 2000 International Building Code® and the 2000 International Residential Code™, subject to the following conditions:

- 4.1 The panels are installed in accordance with this report and the manufacturer's instructions.
- 4.2 All wall, ceiling and floor framing is designed for deflections of less than $L/360$.
- 4.3 The panels are not used structurally to resist axial, transverse or racking loads.
- 4.4 The panels are used for interior installations only.
- 4.5 The spacing of members supporting the panels (joists, studs, etc.) does not exceed 16 inches (406 mm).
- 4.6 The PermaBase panels are not waterproof. Where water penetration prevention is desired, use of an approved waterproof membrane is required.

This report is subject to re-examination in one year.