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Legacy report on the 1997 Uniform Building Code™**DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07240—Exterior Insulation and Finish Systems****TOTAL WALL EXTERIOR INSULATION AND FINISH SYSTEMS****TOTAL WALL, INC.
POST OFFICE BOX 8098
MADISON, WISCONSIN 53708****1.0 SUBJECT**

T-Wall HardCoat PM, Moisture Drainage MD and SoftCoat PB Exterior Insulation and Finish Systems.

2.0 DESCRIPTION**2.1 General:**

The HardCoat PM, the Moisture Drainage MD and the SoftCoat PB systems are wall coverings applied to exterior, framed walls of combustible construction. The SoftCoat PB system is also permitted to be applied to walls of noncombustible construction as described in Section 2.4 of this report. The HardCoat PM and the SoftCoat PB systems are not recognized for use on framed walls of Type V, Group R, Division 1 or Division 3, Occupancies.

2.2 HardCoat PM System:

2.2.1 General: The HardCoat PM system is a six-component system in which the foam plastic insulation is mechanically attached over $\frac{1}{2}$ -inch-thick (12.7 mm), water-resistant core gypsum sheathing to wood studs. The system components are a weather-resistive barrier, optional plastic lath, rigid extruded polystyrene (XEPS) insulation boards, open-weave glass-fiber reinforcing fabric, a base coat and a finish coat.

2.2.2 Materials:

2.2.2.1 Gypsum Sheathing: The gypsum sheathing is water-resistant core gypsum sheathing complying with ASTM C 79-92.

2.2.2.2 Weather-resistive Barrier: The weather-resistive barrier must comply with UBC Standard 14-1.

2.2.2.3 Plastic Lath: Ultra-Lath plastic lath is a 27-inch-by-96-inch-by- $\frac{1}{4}$ -inch-thick (686 mm by 2438 mm by 6.4 mm) lath of PVC plastic. It weighs 0.139 psf (0.68 kg/m²) and is manufactured by Plastic Components, Inc.

2.2.2.4 Insulation Board: Insulation for the HardCoat PM system is rigid XEPS board identified as Dow Styrofoam

brand Square Edge or Dow Styrofoam brand Tongue-and-Groove (ER-2257). The board has minimum and maximum thicknesses of 1 inch (25.4 mm) and $1\frac{1}{2}$ inches (38 mm), respectively; a flame-spread rating of less than 25; a smoke-developed rating of less than 450; and a nominal density of 2.0 pcf (32 kg/m³).

2.2.2.5 Reinforcing Fabric: The reinforcing fabric is 4.5-ounce-per-square-yard (153 g/m²), $\frac{3}{8}$ -inch (9.5 mm) open weave, fiberglass mesh treated for alkali resistance. Rolls are 38 inches (965 mm) wide by 150 feet (45 720 mm) long.

2.2.2.6 Basecoat: HardCoat Basecoat is a field-blended mixture of 5 gallons (18.9 L) of Liquid Acrylic Additive, 94 pounds (42.6 kg) of portland cement, 150 pounds (68 kg) of graded sand and 1 pound (0.454 kg) of Total Wall Fibers. The cement is Type I, II or I-II portland cement complying with UBC Standard 19-1. The sand is dry, iron-free, quartz sand, 45-55 mesh.

Liquid Acrylic Additive is a 100 percent acrylic, water-based emulsion, and has a shelf life of 18 to 24 months when stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C). The fibers are chopped-strand, $\frac{1}{2}$ -inch-long (12.7 mm) fiberglass fibers provided in pre-weighed bags.

2.2.2.7 Finish Coat: The Acrylic Finish finish coats for the HardCoat PM system are ready-to-use 100 percent acrylic-based, integrally colored synthetic coatings, available in various colors and textures. Shelf life is 12 to 18 months when stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.2.2.8 Sealants: The sealants must be compatible with the EIFS components and be recommended by Total Wall, Inc. Evidence must be submitted to the building official showing that the EIFS manufacturer-recommended sealant is a Type S or M, minimum Grade NS, minimum Class 25, and Use O sealant complying with ASTM C 920. Under the Type O classification, the sealant shall be qualified for each material to which the sealant will be applied. The details for sealant installation, including the width and thickness of the sealant, shall be designed by the registered design professional, designer, builder or Total Wall, Inc., in that order, to the satisfaction of the building official. Backer rods must be closed-cell polyethylene.

2.2.2.9 Trim: Trim accessories such as stops, corner bead and weep bases are available.

2.2.3 Application: Planar irregularities in substrates are limited to $\frac{1}{4}$ inch (6.4 mm) in a 4-foot (1219 mm) radius. Vertical joints of insulation board must be staggered from

edges of wall openings. All penetrations must be completed by back-wrapping the board edges. Coatings must be applied at temperatures above 40°F (4.4°C), and the substrate must be protected from precipitation for 24 hours prior to application. The substrate must be structurally sound, clean and dry. Control joints are required at each floor level.

Wood framing must comply with the 1997 *Uniform Building Code*™ (UBC) and be minimum 2-by-4 wood studs spaced a maximum of 16 inches (406 mm) on center. The framing members must be designed to resist all positive and negative transverse loads with a maximum allowable deflection of L/240.

Gypsum sheathing is attached vertically to wood studs with 1½-inch-long (38 mm), No. 6, Type W screws, spaced 8 inches (203 mm) on center. Vertical board edges must butt over studs. One layer of Grade D building paper is attached in accordance with Section 1402.1 of the UBC. Optional plastic lath is then temporarily attached over the building paper with ½-inch-long (12.7 mm) staples. The extruded polystyrene boards and reinforcing fabric are mechanically attached through the lath and sheathing to the framing with 3-inch-long (76 mm), Type W, Wind-lock, corrosion-resistant No. 8 screws and minimum 1¾-inch-diameter (44.5 mm) Wind-lock ULP 302 plates, spaced 12 inches (305 mm) vertically and 16 inches (406 mm) horizontally. Fasteners must penetrate framing at least 1⅞ inches (28.6 mm).

Reinforcing fabric must be continuous at all corners, and lapped a minimum of 2 inches (51 mm) at fabric edges. HardCoat Basecoat is applied, by troweling or spraying, into the reinforcing fabric to a 3/16-inch (4.8 mm) to ¼-inch (6.4 mm) thickness, and must be allowed to dry a minimum of 12 hours prior to finish-coat application. Any irregularities in the base coat that are greater than 1/16 inch (1.6 mm) must be eliminated. The finish coat is then troweled or sprayed onto the base coat to a minimum thickness determined by the largest aggregate in the finish [approximately 1/16 inch (1.6 mm)]. See Figure 1 for typical installation details.

Sealants must be applied at system terminations, exposed joints, floor lines, changes in building shape or roof line, substrate changes and expansion joints. Horizontal control joints are required at each floor level. Control joints must be installed as specified by the architect, designer, builder or exterior coating manufacturer, in that order.

2.2.4 Wind Design: When installed in accordance with this report, the HardCoat PM system is limited to a maximum design wind pressure of 33 psf (1580 Pa), positive or negative.

2.3 Moisture Drainage MD System:

2.3.1 General: The Moisture Drainage MD system is a five-component system in which the foam plastic insulation is mechanically attached to plywood substrates attached to wood studs. The system components are a weather-resistive barrier, rigid expanded polystyrene (EPS) insulation boards, open-weave glass-fiber reinforcing fabric, a base coat and a finish coat.

2.3.2 Materials:

2.3.2.1 Plywood Sheathing: Minimum 5/8-inch-thick (15.1 mm), exterior grade or Exposure 1 plywood sheathing complying with UBC Standard 23-2.

2.3.2.2 Weather-resistive Barrier: The weather-resistive barrier must be Grade D kraft building paper complying with UBC Standard 14-1, or Tyvek StuccoWrap® (ER-4000).

2.3.2.3 Insulation: Insulation for the Moisture Drainage MD system is minimum 2-inch-thick (51 mm) rigid EPS complying with ASTM C 587-01, Type I, and shall have a flame-spread

rating of less than 25, a smoke-developed rating of less than 450, and a nominal density of 1.0 pcf (16 kg/m³). The EPS insulation must be type WSG, must be recognized in a current ICC-ES evaluation report and must be manufactured specifically for use with EIFS. When the weather-resistive barrier is building paper, the EPS insulation must incorporate 0.25-inch-deep (6.35 mm), 0.5542-inch-wide (14.07 mm) grooves spaced at approximately 1.4 inches (35.6 mm) on center across the width of the board. The grooved foam is illustrated in Figure 3.

2.3.2.4 Weep Screed: The weep screed is PVC track having ¼-inch-diameter (6.4 mm) weep holes spaced 3 inches (76 mm) on center, a 1-inch-high (25.4 mm) drip edge, and a 2¾-inch-high (70 mm) back flange with a 110-degree angle. The track is supplied by Windlock Corporation in 8-foot (2438 mm) lengths and varying thicknesses to accommodate different foam board thicknesses.

2.3.2.5 Reinforcing Fabric: The reinforcing fabric is a 4.5-ounce-per-square-yard (153 g/m²), ¼-inch (6.4 mm) open weave, fiberglass mesh treated for alkali resistance. Rolls are 38 inches (965 mm) wide by 150 feet (45 720 mm) long.

2.3.2.6 Base Coat: SoftCoat Basecoat is field-mixed with Type I, II or I-II portland cement complying with ASTM C 150 in a one-to-one ratio by weight. Up to 2 pounds (0.90 kg) of water may be added for each 60 pounds (27 kg) of mixture. Shelf life is 12 to 18 months when the base coat is stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.3.2.7 Finish Coat: The Acrylic Finish finish coats for the Moisture Drainage MD system are ready-to-use, 100 percent acrylic-based, integrally colored synthetic coatings, available in various colors and textures. Shelf life is 12 to 18 months when the finish coat is stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.3.2.8 Sealants: Sealants are as described in Section 2.2.2.8.

2.3.2.9 Trim: Trim accessories such as stops and corner beads are available.

2.3.3 Application: Wood framing must comply with the UBC and must be minimum 2-by-4 wood studs spaced a maximum of 16 inches (406 mm) on center. The framing members must be designed to resist all positive and negative transverse loads with a maximum allowable deflection of L/240.

Plywood sheathing is attached vertically to wood studs with 1¼-inch-long (31.7 mm), No. 6, bugle-head, galvanized drywall screws, spaced 8 inches (203 mm) on center. Vertical board edges must butt over studs. The weather-resistive barrier is attached to the sheathing in accordance with Sections 1402.1 and 2506.4 of the UBC. Two layers of Grade D building paper, or one layer of Grade D building paper having a 60-minute water-resistance rating, or one layer of Tyvek StuccoWrap are required over wood-based sheathing in accordance with UBC Section 2506.4. Optional plastic lath as described in Section 2.2.2.3 is temporarily attached with ½-inch-long (12.7 mm) staples. The EPS boards and reinforcing fabric are mechanically attached to the sheathing with 3-inch-long (76 mm), Type W, Wind-lock, No. 8, corrosion-resistant screws and minimum 1¾-inch-diameter (44.5 mm) Wind Devil or Wind Devil 2 plates. Ten fasteners are used per 2-foot-by-4-foot (610 mm by 1219 mm) insulation board. When building paper is used as the weather-resistive barrier, minimum 2¼-inch-thick (57.1 mm), grooved EPS foam boards must be used. The boards are installed with the grooves oriented vertically, and are attached in the same manner as described above.

The weep screed is attached to framing with 1¼-inch-long (31.7 mm) aluminum roofing nails, spaced at 6 inches (152 mm) on center.

Planar irregularities in substrates are limited to $\frac{1}{4}$ inch (6.4 mm) in a 4-foot (1219 mm) radius. Vertical joints of insulation board must be staggered from edges of wall openings. All penetrations must be completed by back-wrapping the board edges. Coatings must be applied at temperatures above 40°F (4.4°C), and the substrate must be protected from precipitation for 24 hours prior to application. The substrate must be structurally sound, clean and dry.

Reinforcing fabric must be continuous at all corners, and is lapped a minimum of $2\frac{1}{2}$ inches (63.5 mm) at fabric edges. SoftCoat Basecoat is applied, by troweling or spraying, into the reinforcing fabric to a minimum $\frac{1}{8}$ -inch (3.2 mm) thickness, and must be allowed to dry a minimum of 12 hours prior to finish-coat application. Any irregularities in the base coat that are greater than $\frac{1}{16}$ inch (1.6 mm) must be eliminated. The finish coat is then troweled or sprayed onto the base coat to a minimum thickness determined by the largest aggregate in the finish [approximately $\frac{1}{16}$ inch (1.6 mm)]. See Figure 2 for typical installation details.

Sealants must be applied at system terminations, exposed joints, floor lines, changes in building shape or roof line, substrate changes and expansion joints. Horizontal control joints are required at each floor level. Control joints must be installed as specified by the architect, designer, builder or exterior coating manufacturer, in that order.

2.3.4 Wind Design: The wood studs must be designed to resist applicable loads in accordance with the UBC. When installed in accordance with this report, the Moisture Drainage MD system is limited to a maximum design wind pressure of 53 psf (2540 Pa), positive or negative.

2.4 SoftCoat PB System:

2.4.1 General: The SoftCoat PB system is a five-component system in which the foam plastic insulation is adhesively attached to $\frac{1}{2}$ -inch-thick (12.7 mm), core-treated water-resistant gypsum sheathing over wood or steel studs. The five components are adhesive, rigid EPS insulation boards, open-weave glass-fiber reinforcing fabric, base coat and finish coat.

2.4.2 Materials:

2.4.2.1 Insulation Board: Insulation for the adhesively attached SoftCoat PB system must be rigid EPS complying with ASTM C 578-01, Type I, with a minimum thickness of 1 inch (25.4 mm), a flame-spread rating of 25 or less, a smoke-developed rating of 450 or less and a nominal density of 1.0 pcf (16 kg/m³). The EPS insulation must be recognized in a current ICC-ES evaluation report and must be manufactured specifically for use with EIFS.

2.4.2.2 Adhesive:

2.4.2.2.1 Blue Mastic Adhesive: Blue Mastic Adhesive is a ready-to-use, high-solids, 100 percent acrylic compound. Two ounces of clean water may be added for workability. The adhesive is used to adhere insulation boards to gypsum sheathing on steel studs. The shelf life is 18 months when the adhesive is stored in unopened containers at temperatures between 50°F (10°C) and 100°F (37.7°C).

2.4.2.2.2 SoftCoat Basecoat: SoftCoat Basecoat is a 100 percent acrylic emulsion that is field-mixed with Type I, II or I-II portland cement in a one-to-one ratio by weight. Portland cement must comply with UBC Standard 19-1. The mixture is used as an adhesive to adhere insulation boards to gypsum sheathing on wood studs. The shelf life of SoftCoat Basecoat is 12 to 18 months when it is stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.4.2.3 Base Coat:

2.4.2.3.1 T-2000 DRYBASE: T-2000 DRYBASE is a dry powder mixed with water at the jobsite. One 50-pound (22.7 kg) bag of T-2000 DRYBASE is mixed with between 4 and 5.5

quarts (3.8 and 5.2 L) of water. The mixture is used as the base coat of systems applied over gypsum sheathing attached to steel studs.

2.4.2.3.2 SoftCoat Basecoat: SoftCoat Basecoat is a 100 percent emulsion that is field-mixed with Type I, II or I-II portland cement in a one-to-one ratio by weight. Portland cement must comply with UBC Standard 19-1. The mixture is used as the base coat of systems applied over gypsum sheathing attached to wood studs. The shelf life is 12 to 18 months when stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.4.2.4 Reinforcing Fabric: The reinforcing fabric is a 4.5-ounce-per-square-yard (153 g/m²), $\frac{1}{4}$ -inch (6.4 mm) open weave, fiberglass mesh treated for alkali resistance. Rolls are 38 inches (965 mm) wide by 150 feet (45 720 mm) long.

2.4.2.5 Finish Coat: The Acrylic Finish finish coats for the SoftCoat PB system are ready-to-use, 100 percent acrylic-based, integrally colored synthetic coatings, available in various colors and textures. Shelf life is 12 to 18 months when the finish coat is stored in unopened containers at temperatures between 50°F and 100°F (10°C and 38°C).

2.4.2.6 Gypsum Sheathing: Core-treated water-resistant gypsum sheathing must comply with ASTM C 79-92.

2.4.2.7 Sealants: Sealants are as described in Section 2.2.2.8.

2.4.3 Application:

2.4.3.1 General: Gypsum sheathing must be installed vertically and attached with vertical board edges butting over studs. Planar irregularities are limited to $\frac{1}{4}$ inch (6.4 mm) in a 4-foot (1219 mm) radius. Vertical joints of insulation board must be staggered from edges of wall openings. The coating must be applied at temperatures above 40°F (4.4°C), and the substrate must be protected from precipitation for 24 hours prior to application. Control joints are required at each floor level.

The substrate must be structurally sound, clean, dry and free of all material that may reduce bonding of the adhesive. The EPS foam is adhesively attached to the sheathing with either Blue Mastic Adhesive, described in Section 2.4.2.2.1, using a stainless steel notched trowel having $\frac{1}{2}$ -inch-wide-by- $\frac{3}{8}$ -inch-high (12.7 mm by 9.5 mm) U-shaped notches spaced at 2 inches (50.8 mm); or SoftCoat Basecoat, as described in Section 2.4.2.2.2, applied to the entire surface of the insulation board, using a $\frac{3}{8}$ -by- $\frac{1}{2}$ -by- $\frac{1}{2}$ -inch (9.5 by 12.7 × 38 mm) U-notched trowel. The board, applied in running bond, is slid into place on the sheathing, with pressure applied over the entire surface to ensure uniform contact. All joints are tightly butted, and any gaps greater than $\frac{1}{16}$ inch (1.6 mm) must be filled with insulation.

The adhered insulation board must be left undisturbed a minimum of 12 hours prior to application of the base coat. The base coat is applied to the entire surface of the insulation board by troweling or spraying to a thickness of $\frac{1}{8}$ inch (3.2 mm). The reinforcing fabric is fully embedded in the base coat and is troweled from the center to the edges. The fabric must be continuous at all corners and is lapped at least 2 inches (51 mm) at fabric edges. The base coat must be allowed to set a minimum of 18 hours before the application process continues. Any irregularities in the base coat greater than $\frac{1}{16}$ inch (1.6 mm) must be eliminated. The finish coat is then applied by troweling or spraying to a thickness determined by the largest aggregate in the finish, approximately $\frac{1}{16}$ inch (1.6 mm). See Figure 4 for typical installation details.

2.4.3.2 Wood Framing: The SoftCoat PB system, consisting of wood studs, gypsum sheathing, SoftCoat Basecoat as the adhesive and base coat, and Acrylic Finish as the finish coat, is limited to application on structures

permitted to be of combustible, Type V construction, in other than Group R, Division 1 or Division 3, Occupancies. Wood studs must have a minimum specific gravity of 0.42, and be spaced a maximum of 16 inches (406 mm) on center. The gypsum sheathing is attached to the framing with 1½-inch-long (38 mm), No. 6, Type W screws, spaced 8 inches (203 mm) on center.

2.4.3.3 Steel Framing: The SoftCoat PB system consisting of steel studs, gypsum sheathing, Blue Mastic Adhesive, T-2000 SoftCoat Base as the base coat and Acrylic Finish as the finish coat may be used in noncombustible, nonfire-resistive construction and on structures permitted to be of combustible, Type V construction, in other than Group R, Division 1 or Division 3, Occupancies.

Steel studs must be minimum No. 18 gage [0.0486 inch (1.234 mm)], 3⅝-inch-deep (92 mm) studs, and must be spaced a maximum of 16 inches (406 mm) on center. Minimum ⅝-inch-thick, Type X gypsum wallboard and minimum ⅝-inch-thick (15.9 mm), Type X gypsum sheathing are attached to the framing on the interior and exterior, respectively, with No. 6, 1¼-inch-long (31.7 mm), Type S screws spaced at 8 inches (203 mm) on center. Interior joints of the wallboard must be taped and treated with joint compound, and screw heads on the interior must be treated with joint compound. Openings must be framed with minimum No. 18 gage [0.0486 inch (1.234 mm)] steel framing. Maximum 4-inch-thick (102 mm) EPS insulation board, base coat and finish coat are applied as described in Section 2.4.3.1.

2.4.4 Allowable Loads: The SoftCoat PB system applied over wood or steel studs is limited to a maximum design wind pressure of 33 psf (1580 Pa), positive or negative.

2.5 Identification:

System materials are identified by the Total Wall name and address; the product name; shelf life information, if applicable; and the evaluation report number (ER-5245). Foam plastic insulation is identified in accordance with the applicable evaluation report. Wind-lock fasteners and plates are identified on the packaging by the Wind-lock name and the product name.

3.0 EVIDENCE SUBMITTED

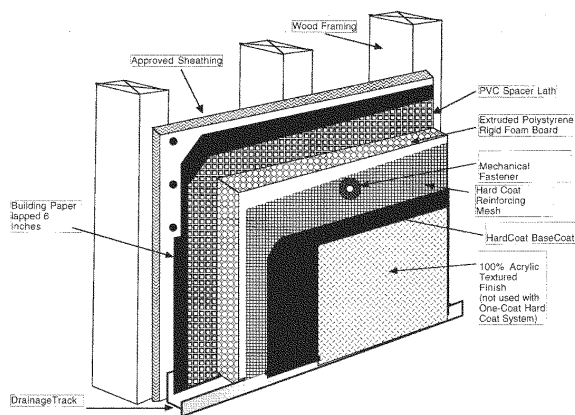
Reports of tests in accordance with the Acceptance Criteria for Exterior Insulation and Finish Systems (AC24), dated June 2003.

4.0 FINDINGS

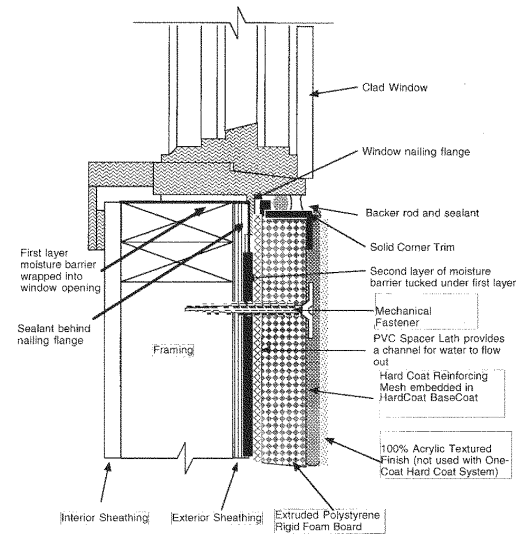
That the T-Wall HardCoat PM system, the Moisture Drainage MD system and the SoftCoat PB system described in this report comply with the 1997 *Uniform Building Code*™ (UBC), subject to the following conditions:

- 4.1 Construction is as set forth in this report and the manufacturer's instructions.
- 4.2 Insulation boards are separated from the building interior with a thermal barrier complying with Section 2604.3 of the UBC, such as ½-inch-thick (12.7 mm) gypsum wallboard attached in accordance with the UBC.
- 4.3 The HardCoat PM and SoftCoat PB systems are not recognized for use on framed walls of Type V, Group R, Division 1 or Division 3, Occupancies.
- 4.4 The SoftCoat PB system is recognized for use on noncombustible construction in accordance with Section 2.4.3.3 of this report.
- 4.5 The systems may be attached to the surface of an exterior, combustible, fire-resistive assembly without a change in the assigned hourly rating of the assembly.
- 4.6 Installation is by applicators qualified by Total Wall, Inc.
- 4.7 Installation cards, such as those shown in Figures 5 and 6, are presented to the building official at the completion of each project.

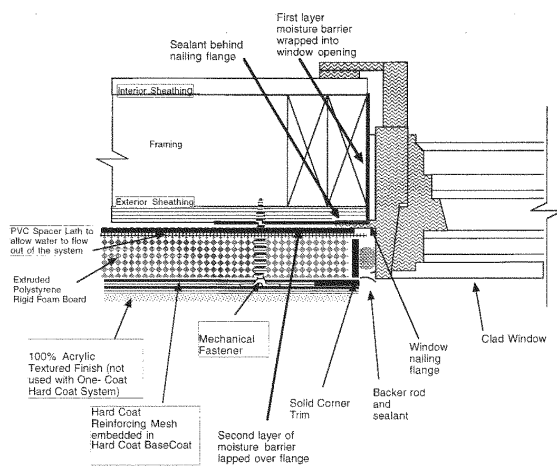
This report is subject to re-examination in two years.



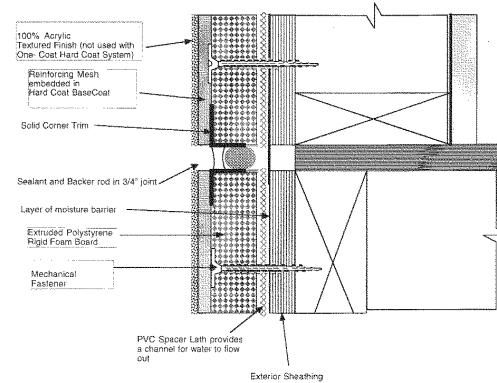
HardCoat PM System (with drainage track)



Typical HardCoat PM Window Sill Detail

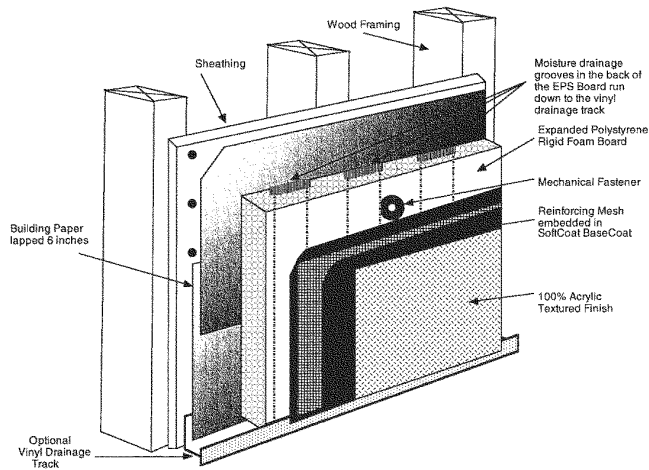


Typical HardCoat PM Window Jamb Detail

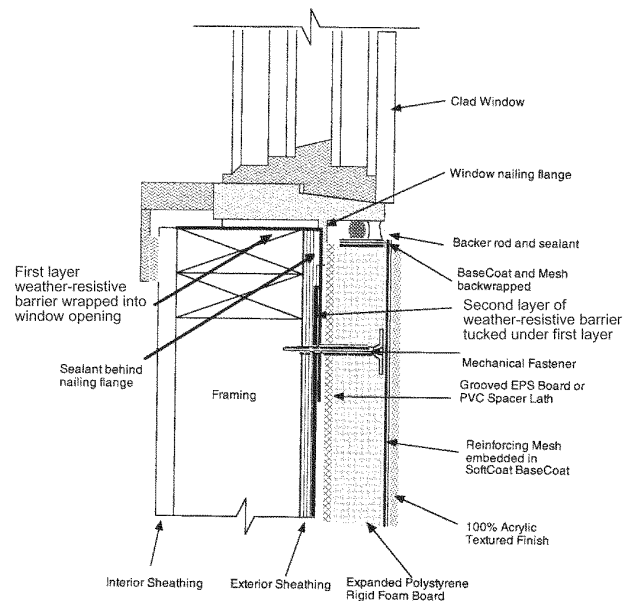


Typical HardCoat PM System Floorline Expansion Joint Detail

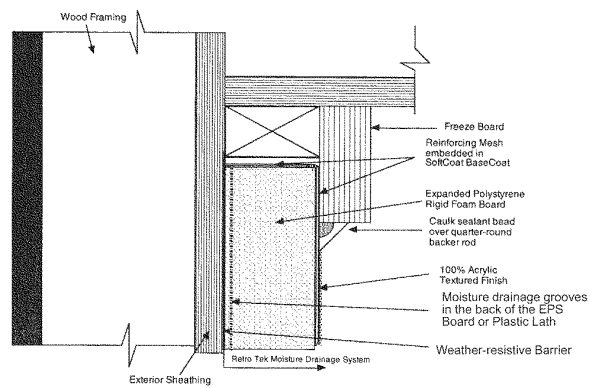
FIGURE 1—TYPICAL HARD COAT PM INSTALLATION DETAILS



Vertical Moisture Drainage System
with Drainage Track

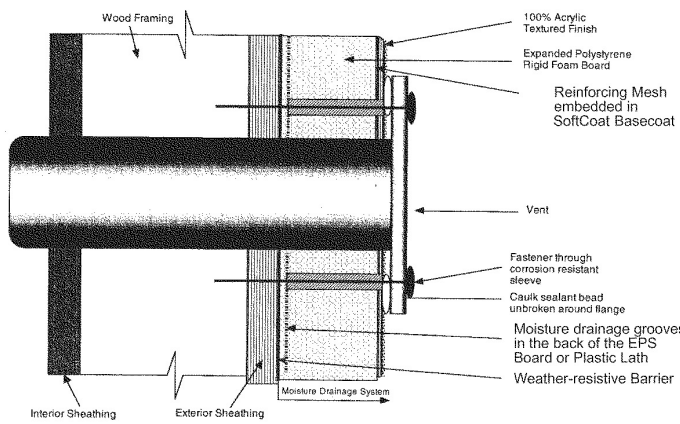


Typical Moisture Drainage Window Sill Detail

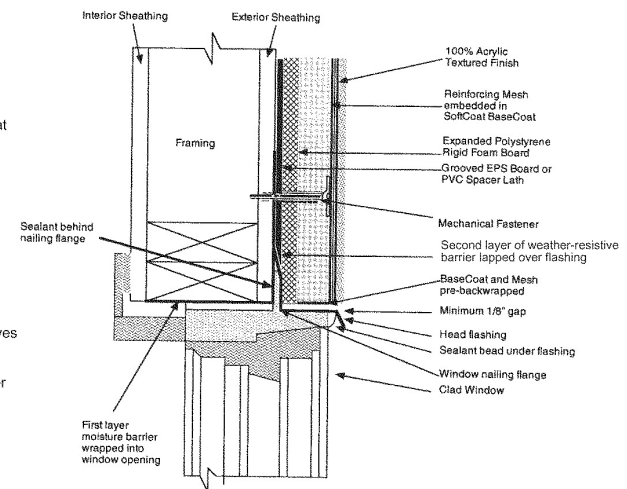


Typical Moisture Drainage
Soffit Termination

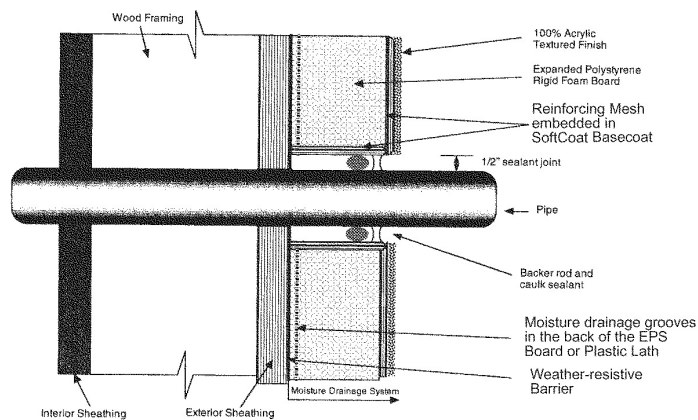
FIGURE 2—TYPICAL MOISTURE DRAINAGE MD SYSTEM INSTALLATION DETAILS



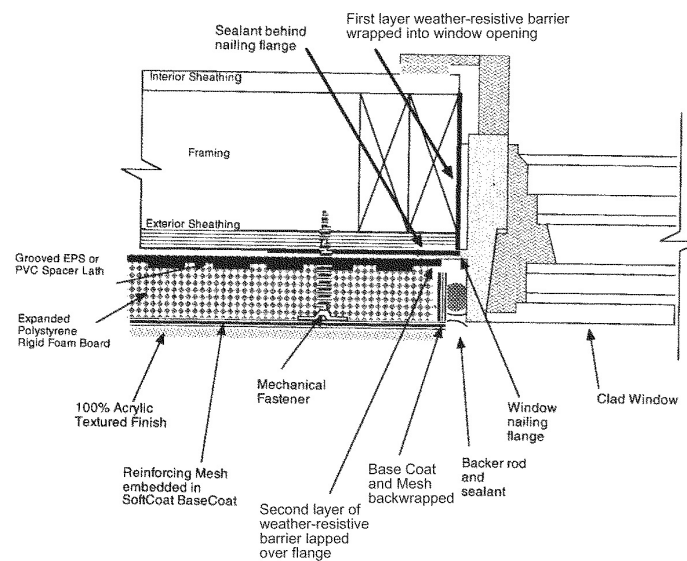
Typical Vent Detail



Typical Moisture Drainage Window Head Detail

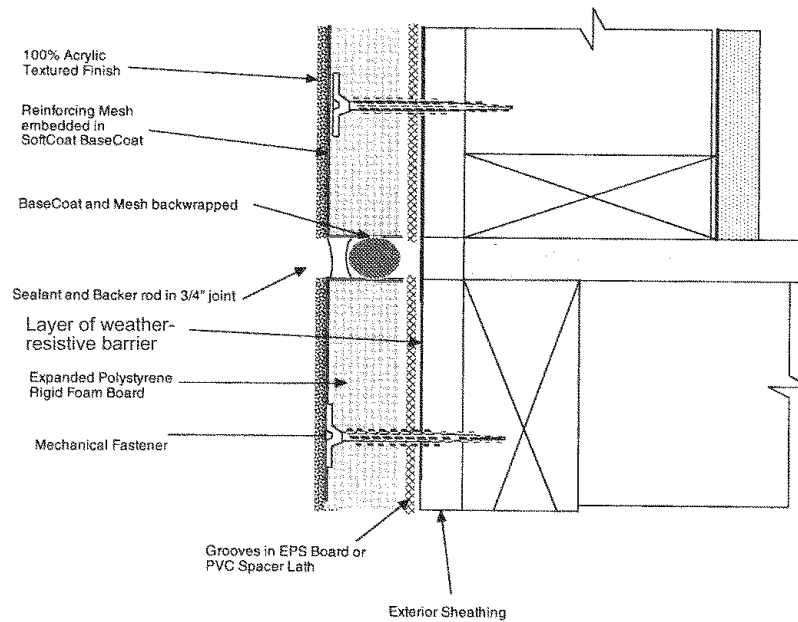


Typical Pipe or Conduit Penetration



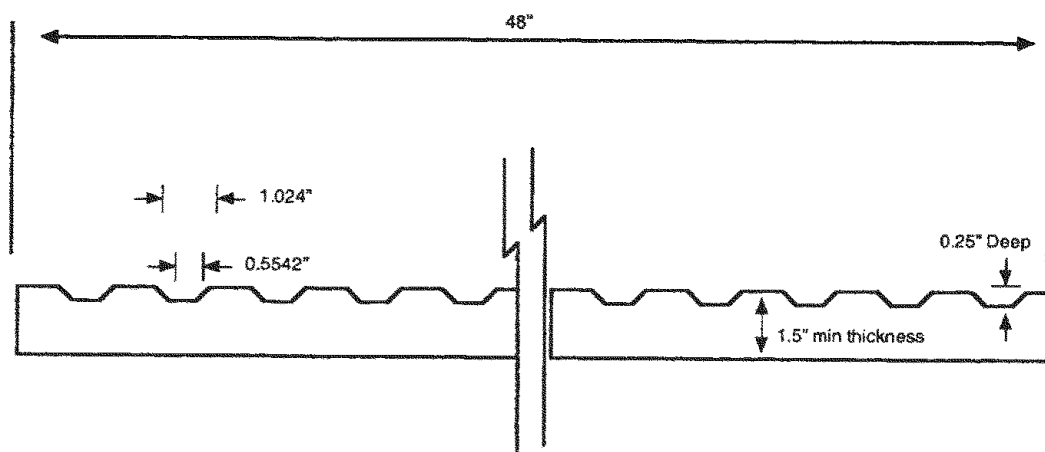
Typical Moisture Drainage Window Jamb Detail

FIGURE 2—TYPICAL MOISTURE DRAINAGE MD SYSTEM INSTALLATION DETAILS—(Continued)



Typical Moisture Drainage System
Floorline Expansion Joint Detail

FIGURE 2—TYPICAL MOISTURE DRAINAGE SYSTEM INSTALLATION DETAILS—(Continued)



EPS Foam for Moisture Drainage EIFS. Boards are 2' x 4' with 33.5 vents or grooves per board. Grooves are designed so that channels are created no matter how with boards are aligned during installation.

FIGURE 3—GROOVED EPS FOAM

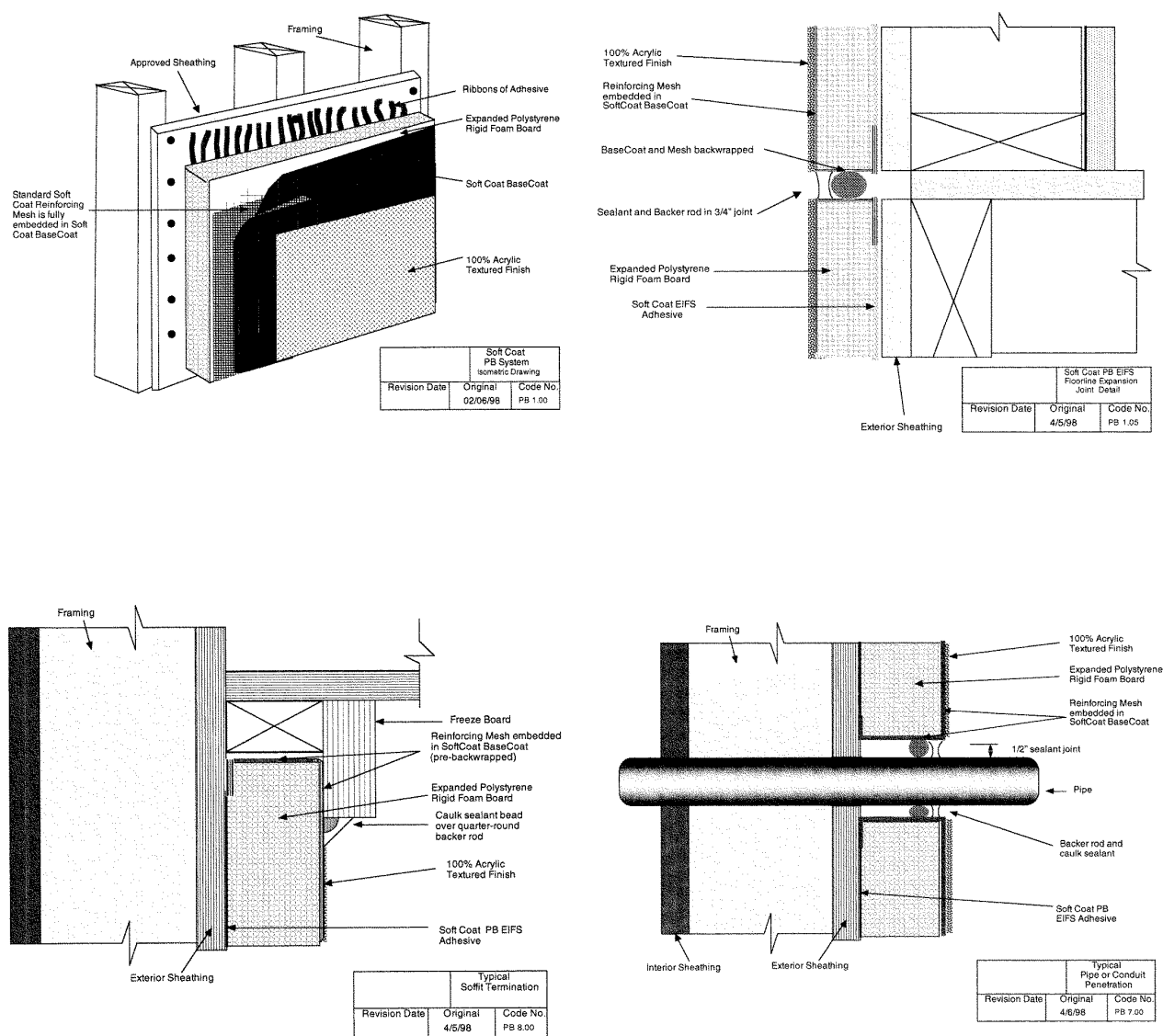


FIGURE 4—SOFTCOAT PB SYSTEM—TYPICAL DETAILS

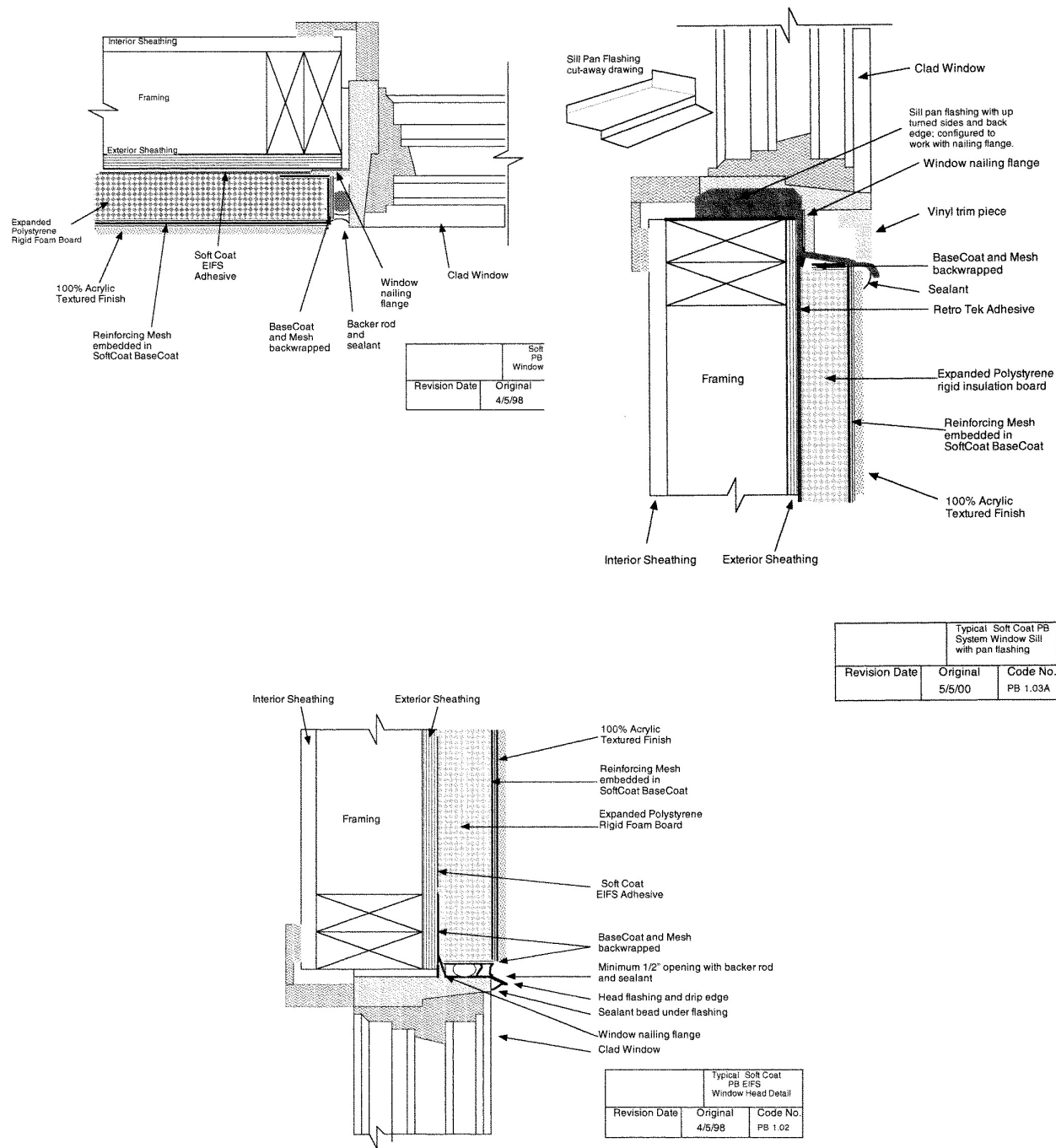


FIGURE 4—SOFTCOAT PB SYSTEM—TYPICAL DETAILS—(Continued)