

American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation A118.10 — 20xx [Revised]

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Introduction

This introduction is not a part of American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installations A118.10 — 2005.

Waterproof membranes for thin-set ceramic tile and dimension stone installations function as barriers to positive liquid water migration. Membranes covered by this specification are bonded to a variety of manufacturer approved substrates covered by ANSI specifications and in some cases can be used as the adhesive for the ceramic tile and dimension stone as well. Others within the scope of this specification are allowed to cure and are then used as the substrate for the application of ceramic tiles and dimension stone by traditional methods and materials.

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This standard applies to trowel applied, liquid, and sheet membranes.

These membranes provide the lowest profile (elevation) of the tile installation incorporating a waterproof membrane.

Consult individual manufacturers for specific instructions, application, performance levels, and limitations concerning their materials. Follow the individual manufacturer's written instructions precisely.

This standard was developed to provide specifiers and installers with the minimum criteria necessary for a material to function as a barrier to positive liquid water migration in a load bearing, bonded, thin-set installation of ceramic tile and dimension stone.

End of Introduction

1.0 Scope

This specification describes the test methods and minimum requirements for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation.

2.0 Definitions

2.1 Latex-portland cement mortar

A modified dry-set portland cement mortar for the bonding of ceramic tile to which a polymer has been incorporated in latex form or as a redispersible powder. When added in latex form it is added as a replacement for part or all of the gauging water.

2.2 Ceramic tile: As defined in ANSI A137.1

2.2.1 The tile for tests in this standard are to be dry and clean as obtained from manufacturer's undamaged cartons. Water absorption of tile is determined by ASTM C373. Tile for tests in this standard include the following:

Designation	Description
Type A	*Glazed wall tile, 4¼ in. x 4¼ in. (108 mm x 108 mm), having a nominal thickness of 5/16 inch (8 mm), water absorption of 13-15 percent.
Type X	4 in. x 4 in. x 5/16 in. (102 mm x 102 mm x 8 mm) nominal unglazed paver tile with a water absorption of 0.0 to 0.5 percent. The smooth face is used as the bonding surface.

*In order to obtain comparable results, the tile selected shall be standard grade, of one glaze color, obtained from one manufacturer. Bonding surface must be cleaned of dust produced by cutting. Brush wet and flush with plain water.

3.0 Sampling and testing procedures

3.1 Sampling: Obtain a sufficient quantity of membrane, setting materials, and admixtures for a minimum 100 square foot installation based on the manufacturer's recommended coverage. All materials shall be in the manufacturer's sealed packaging and from commercial lots of recent manufacture.

3.1.1 Membrane sample preparation: Prepare trowel applied, liquid, or sheet membrane samples according to the manufacturer's recommended application procedures. For some tests, an unbonded sample of membrane is required. In these tests, liquid applied materials shall be applied to a non-bondable material (such as polyethylene film or Teflon), cured according to the manufacturer's instructions, peeled, and cut if necessary to obtain a suitable sample.

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3.2 Temperature: Unless otherwise stated in a particular test, all tests are to be run at room temperatures of 70°F - 77°F (21°C - 25°C) and a relative humidity of 45-55 percent.

Unless otherwise stated in a particular test, all components (latex, mortar, tile, etc.) used in performing all tests shall be stored at room temperatures of 70°F - 77°F (21°C - 25°C) and a relative humidity of 45-55 percent for a minimum of 12 hours prior to use.

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3.3 Recording test values: In any of the following tests requiring more than one specimen, record each individual test value and determine the mean of the multiple values for comparison with the test requirements.

Values which do not reflect a normal distribution of shear strengths shall be discarded when they satisfy the Dixon test for extreme values as follows:

$$\text{If } \frac{X_2 - X_1}{X_4 - X_1} \geq 0.765 \text{ then the lowest value shall be discarded}$$

$$\text{If } \frac{X_3 - X_2}{X_4 - X_1} \geq 0.765 \text{ then the highest value shall be discarded}$$

where X_1, X_2, X_3, X_4 are the observed shear strength values from lowest to highest.

4.0 Tests for material properties

4.1 Fungus and micro-organism resistance: Test for Mold Growth: The organism used for this test shall be *Aspergillus Niger*. The stock cultures shall be stored in a refrigerator at 37.4°F - 50°F (3°C - 10°C) prior to use. Stock cultures stored for more than 4 months shall not be used. The culture medium shall be potato dextrose agar from Difco Products, Inc.; Detroit, Michigan or its equivalent.

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Dissolve 39 grams of the agar in 1 liter of water, using heat. Autoclave the medium and two 1 inch (25 mm) square pieces of Type A tile at 15 psi (1.1kg/ cm²) for 15 minutes. Apply a section of membrane to the tile following the manufacturer's recommended installation procedures at the minimum required thickness. Place the coated tile with the membrane side up in a sterile Petri dish and pour sterile agar into the dish until the surface of the agar is level with the edge of the membrane. Inoculate with the organism.

For control purposes, one petri dish containing only the agar medium and the other piece of tile shall be inoculated with the test organism to determine the viability of the inoculum.

Place the petri dishes in an incubator at 82.4°F - 86.0°F (28°C – 30°C) and at a relative humidity of 85-95 percent. After 14 days of incubation, examine to ascertain whether the membrane supports mold growth. (At the end of inoculation period, the control shall demonstrate visible evidence of mold growth.)

Requirement: The membrane shall not support mold growth.

4.2 Seam strength: By ASTM D751 at the test conditions specified above in 3.2. Seams in liquid applied membranes shall be prepared according to the manufacturer's instructions for joining one day's work to that placed the previous day.

Requirement: 8 pounds per inch width (16 lbs./2 in.) minimum.

4.3 Breaking strength: By ASTM D751; Procedure B at the test conditions specified in 3.2. Liquid applied membrane sample thickness shall be the minimum specified by the manufacturer for a waterproofing application. Both transverse and longitudinal strengths shall be tested for materials having a sheet structure.

Requirement: 170 psi minimum.

4.4 Dimensional stability: Test in accordance with ASTM D1204 at temperature of +158°F and -15°F (±2°F variation).

Requirement: 0.7% maximum length change (expansion or shrinkage).

4.5 Waterproofness: Test in accordance with ASTM D4068-01 (Annex 2: Hydrostatic Pressure Test), modified as follows:

4.5.1 Specimens: Obtain three 3 in. x 3 in. specimens of membrane as described in Paragraph 3.1.1 above.

4.5.2 Apparatus: As described in Section A2.1 of ASTM D4068-01 (Annex 2).

4.5.3 Procedure: Follow the procedure outlined in Section A2.3 of ASTM D4068-01 (Annex 2), however, it is not necessary to make observation until the sample has been under hydrostatic pressure for 48 hours.

4.5.4 Performance criteria: The specimen shall be left under hydrostatic pressure for 48 hours and examined for evidence of moisture penetration.

Requirement: Evidence of wetness on top of the material, or the formation of a droplet, are both considered as visible water penetration and require rejection of the material.

5.0 Shear strength to ceramic tile and cement mortar

5.1 Preparation of mortar blocks: Prepare 20 mortar blocks as specified in ASTM C482; Section 9.1.2. Blocks shall be stored for 25 additional days at the conditions specified in Section 3.2 above prior to use.

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5.2 Preparation of shear bond assemblies: Follow the manufacturer's instructions and apply the membrane to the entire face of the mortar blocks molded in Section 5.1. Apply Type X tile to the membrane, offset ¼-inch, using the manufacturer's recommended adhesive system(s) and application rate including bonding material thickness after beat in of the tile. Use spacers, as described in applicable ANSI A118 and A136 sections for the bonding material to establish a consistent thickness. Allow the bonded assemblies to cure for 7 days at 70°F - 77°F (21°C - 25°C), 45-55 percent relative humidity. Measure the bond area to the nearest ½ square inch.

5.3 7-day shear strength: Shear 4 specimens to failure immediately after the 7-day cure in Section 5.2 using the method described in ASTM C482; Section 9.8.

Requirement: Average shear strength greater than 50 psi.

5.4 7-day water immersion shear strength: Immerse 4 specimens prepared in Section 5.2 in water immediately after the 7-day cure in Section 5.2. Shear the specimens to failure (per Section 5.3) seven days after immersion.

Requirement: Average shear strength greater than 50 psi.

5.5 4-week shear strength: Cure 4 specimens prepared in Section 5.2 for an additional three weeks at the temperature and relative humidity specified in Section 5.2. Shear the specimens to failure (per Section 5.3).

Requirement: Average shear strength greater than 50 psi.

5.6 12-week shear strength: Cure 4 specimens prepared in Section 5.2 for an additional eleven weeks at the temperature and relative humidity specified in Section 5.2. Shear the specimens to failure (per Section 5.3).

Requirement: Average shear strength greater than 50 psi.

5.7 100-day water immersion shear strength: Immerse 4 specimens prepared in Section 5.2 in water immediately after the 7 day cure in Section 5.2. Periodically check the water level to ensure that full immersion is maintained. Shear the specimens to failure (per Section 5.3) 100 days after immersion.

Requirement: Average shear strength greater than 50 psi.

6.0 System performance

NOTE: Due to the wide range of membranes, substrates, and tiles available, it is not possible to write a single test which is applicable to all materials.

When performance data is required for a particular substrate and tile, the procedures in ASTM C627 shall be followed. The membrane, bonding material, and grout shall be installed in accordance with the manufacturer's instructions. The manufacturer must disclose all of the components used in the test.

End of ANSI A118.10