

Tile & Stone Installation Systems

Mapeguard[®] *UM* Installation Manual



Next-Generation Underlayment Membrane for Tile and Stone



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SUBSTRATE: A foundation upon which a finished wear surface will be installed

In the wood-flooring industry, the substrate is called a subfloor. In the tile and stone industry, when two layers of wood are used below a tile installation, the lower layer is called the subfloor and the top layer is known as the underlayment. Substrates encompass a wide variety of materials that present challenges, requiring individual treatment and surface preparation. All of these issues will be addressed in this installation manual.

UNDERLAYMENT: A material placed beneath finished floor materials

Underlayments can be for the purpose of waterproofing, moisture remediation, leveling, crack isolation or heating. Underlayment products include brush- and roller-applied membranes, poured and pumped fluid formulas, plastic mats, tubes, metal meshes, laths and mats. *Mapeguard UM* is an underlayment. Wood underlayments provide added strength and protection for existing subfloors with spans or materials subject to deflection.

WATERPROOFING: A material used to prevent water intrusion

If water penetrates tiled surfaces, it can damage substrates such as wood or gypsum as well as the substructure below or behind. Typical areas that benefit from or require waterproofing are bathroom floors and shower walls. Any floor above occupied space that is subject to leaks or flooding should include waterproofing in the flooring system to protect the area below. *Mapeguard UM* provides a waterproofing layer when taped at the seams with *Mapeguard ST* sealing tape.

CONCRETE: A composite material that hardens over time and is composed of aggregate bonded together with fluid cement

While concrete provides a sound and stable substrate for tile installations, it has the potential to crack. Cracking is either in-plane (both sides of the cracked concrete are on the same plane) or out-of-plane (one side of the cracked concrete is higher than the other). Out-of-plane cracking is caused by more serious movement and is very damaging. In-plane cracking can be dealt with or planned for by filling or covering. *Mapeguard UM* protects tile from in-plane cracks of up to 1/8" (3 mm).

LEVELERS: A fluid cementitious or gypsum-based concrete poured or pumped onto substrates to achieve flatness

Self-leveling underlayments level, smooth and repair interior floors, coat and fill in any depressed areas, sometimes referred to as "divots" or "bird baths." Levelers can also be used to cover in-floor heating systems, steel decking, cement terrazzo and ceramic tile. *Mapeguard UM* can be installed over levelers.

WOOD SUBFLOORS: Solid, veneer or engineered planks or sheets used for support over joist systems

All wood subfloors present challenges when installing tile. Moisture and weight can cause deflection, bending, expansion, etc. When installing tile over wood subfloors, *Mapeguard UM* provides protection from moisture and cracking. Some wood subfloors will require an additional underlayment layer on top.

STRUCTURAL PLANKS: Wood subfloor planks fastened directly to joists or beams

The plank-and-beam method for framing floors is also called plank decking. Whether tongue-and-groove or not, subfloor planks are an approved substrate for *Mapeguard UM* when topped with a plywood or OSB underlayment.

VINYL: Sheet, plank or tile classified by their manufacturer as “vinyl”

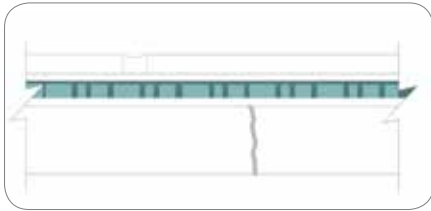
Well-adhered vinyl composition tile (VCT), luxury vinyl tile (LVT) and luxury vinyl plank (LVP), and paper- or felt-backed non-cushioned sheet vinyl flooring are approved substrates for *Mapeguard UM*. Consider using a rapid-setting, latex-modified thin-set mortar for these impervious surfaces.

HEATED FLOORS: Floors with electric mat, wire or hydronic tubing systems installed under/in the substrate

Radiant heating is not usually at a constant temperature. Fluctuation in temperature contributes to stress and movement between the heating assembly and tile. *Mapeguard UM* protects against cracking and delamination caused by stress and movement when placed between the heating system and tile.

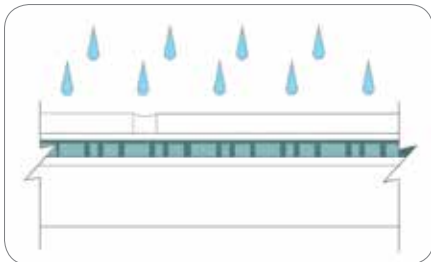
Introduction to *Mapeguard UM*

Modern construction practices require flooring products that can go over young concrete or wooden substrates with wider joist spacing. Traditional thin-set methods of tile and stone installation are not suited for these conditions without the use of an underlayment. In the past, underlayments have been heavy and sensitive to moisture. *Mapeguard UM* is a next-generation, lightweight underlayment for tile and stone. It packs a variety of features into a membrane 1/8" (3 mm) in thickness that is designed for today's construction techniques:



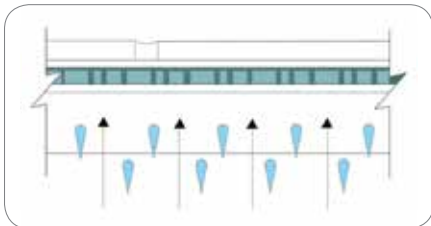
Crack suppression

Provides a strong but flexible layer to control lateral stresses in the system, thereby protecting tile and grout from cracking



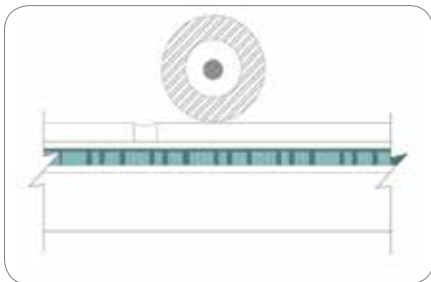
Waterproofing

Does not allow liquid moisture to pass through, making it perfect for interior and exterior installations over moisture-sensitive substrates, in combination with *Mapeguard ST* sealing tape



Vapor control

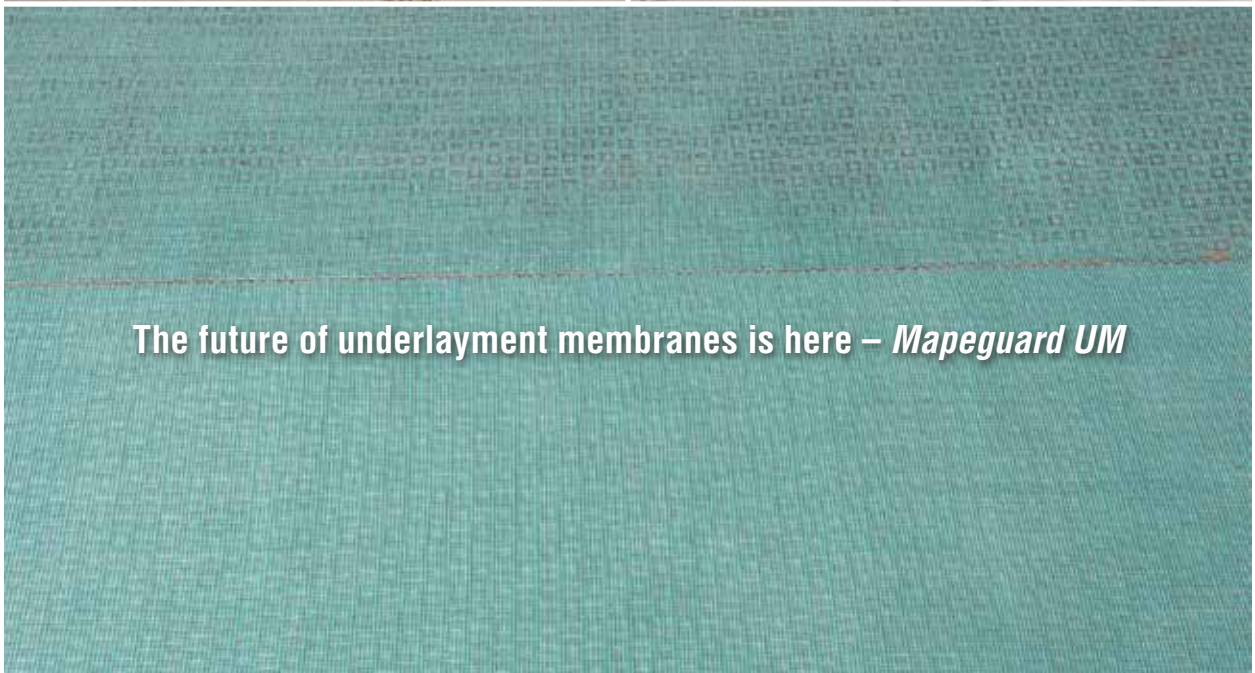
Channels away any water vapor underneath so it does not penetrate to the tile layer but rather harmlessly exits the substrate over time



Compression resistance

Offers an extra heavy commercial rating and fully supports rolling loads

This guide is designed to answer questions about *Mapeguard UM* and show the most common methods of installation. For additional information, call 1-800-992-6273 for MAPEI's Technical Services in the U.S. and Puerto Rico or 1-800-361-9309 in Canada.



Frequently Asked Questions

Can ceramic and porcelain tile be set with latex-modified thin-set mortar when using *Mapeguard UM*?

Yes, we recommend it – both below and above *Mapeguard UM* – to adhere the mat to the substrate and to set the tile on top of the mat. This allows the system to have flexibility and is in line with current industry practices for setting porcelain and other types of non-absorptive tile.

In accordance with the TCNA Handbook for Ceramic Tile Installation and porcelain tile manufacturers, MAPEI recommends the use of a MAPEI polymer-modified mortar meeting the ANSI A118.4, ANSI A118.11 or A118.15 standard and an ISO 13007 classification of at least C2 when installing ceramic or porcelain tiles. Select the appropriate mortar for the size and style of the tile selected as well as the substrate (plywood requires both ANSI A118.4 and ANSI A118.11). MAPEI warranty coverage with the *Mapeguard UM* system is determined by the installation and grouting products selected. For convenience, the same mortar selected to install the tile can be used to install the mat (check compatibility for both substrate and tile in the Technical Data Sheet).

MAPEI has conducted testing and stands behind this recommendation with our Best-Backed Warranty Program, providing single-source responsibility.

What if my tile requires an epoxy mortar?

Install *Mapeguard UM* using one of the polymer-modified mortars (*Ultraflex™ 2* or better), including filling in the voids on the top side with the trowel's flat side. Once the cement mortar has fully cured, proceed with setting the tile with the epoxy mortar.

Don't other mat manufacturers recommend unmodified mortar to install their mats?

Yes, some do. *Mapeguard UM* is engineered with a unique tri-layered design to manage moisture dissipation and control drying of the mortar between the layers. The fabric wicks the moisture upward, the smaller cavities require less mortar to fill and the mesh locking system holds the mortar in place with a single pass of the trowel. All around, less product is used and the modified mortar typically cures faster.

Installing over Interior Concrete

SUITABLE SUBSTRATES FOR FLOORS

Interior only – on or above grade

- Concrete
- Young/green concrete (cured for at least 7 days) on grade with vapor barrier installed per local building codes*
- Lightweight concrete
- Post-tensioned or pre-stressed concrete
- Older in-plane cracked slabs (renovation)
- Cured cement mortar beds
- Cementitious or gypsum-based underlayments
- Cement terrazzo, epoxy terrazzo or existing tile or stone

Before beginning installation, consult the “Surface Preparation Requirements” document for Tile & Stone Installation Systems on MAPEI's Website at www.mapei.com. Consult MAPEI's Technical Services Department for installation recommendations regarding substrates and conditions not listed.

**Mapeguard UM helps with the curing of concrete that has not fully cured by keeping moisture from leaving the concrete too quickly. It is also designed to dissipate lateral forces from concrete shrinkage to keep them from impacting the tile installation above.*

LIMITATIONS

- Do not use over cracks or control joints subject to out-of-plane movement.
- Do not use over in-plane cracks > 1/8" (3 mm).
- Do not use over substrates containing asbestos.
- Do not use where negative hydrostatic pressure exists.
- Do not install as a roof deck membrane, a final wear surface or on a vertical surface.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed products such as mastic to install *Mapeguard UM* or set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped with *Mapeguard ST*.

1. Substrate Preparation

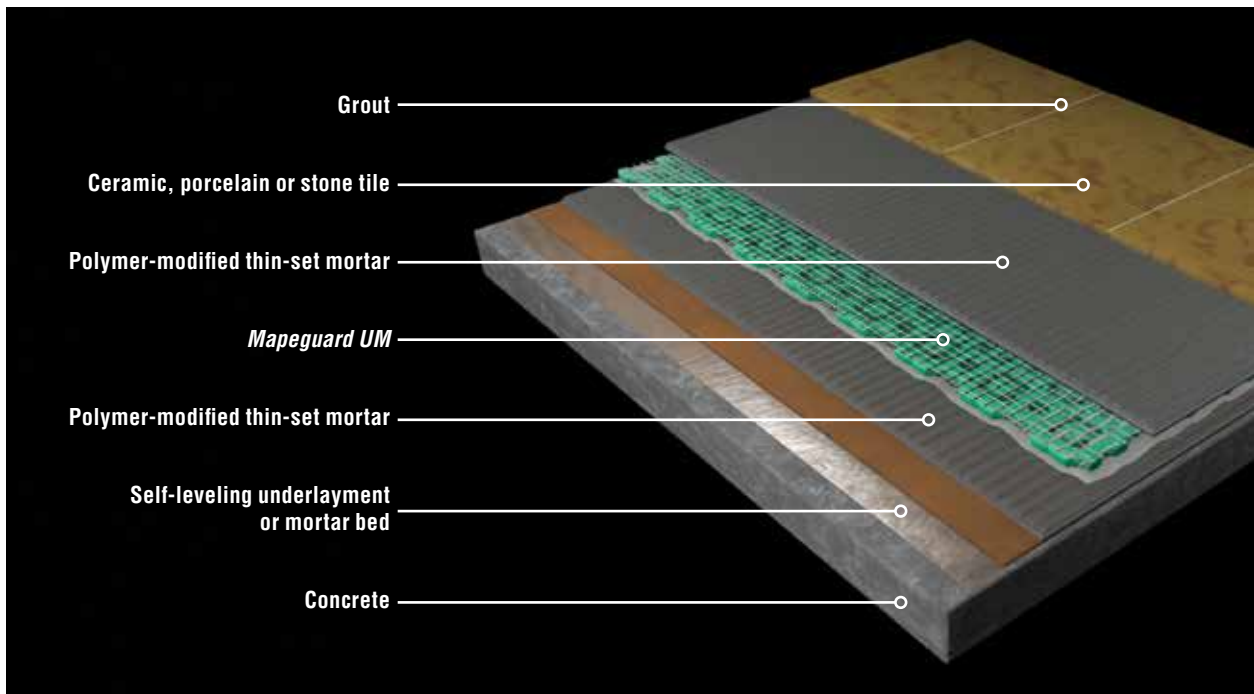
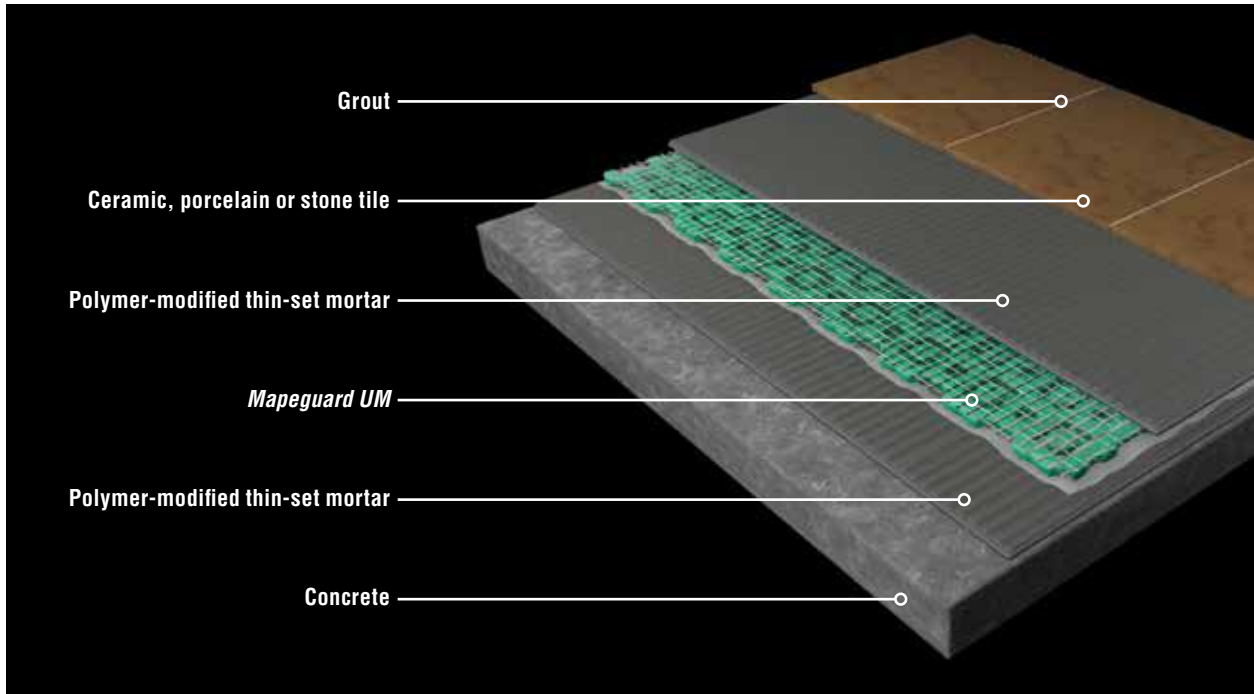
- All substrates must be structurally sound, stable, clean and free of any substance that would prevent adhesion.
- Do not use chemicals (through acid etching or stripping) to prepare approved substrates.
- Concrete substrates should have a Concrete Surface Profile #1 per the International Concrete Repair Institute (ICRI). Mechanically clean and profile by diamond-cup grinding or another engineer-approved method when necessary.
- If a smoother surface is required, apply a moisture-stable patch such as *Mapecem® Quickpatch*. For large areas, consider using a moisture-stable leveler such as *Ultraplan® Extreme 2* self-leveling underlayment. See the respective Technical Data Sheets for more information.
- Substrate and ambient temperatures must be 40°F to 95°F (4°C to 35°C) during and at least 24 hours after application.
- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate movement joint treatment to satisfy the project's requirements.
- Expansion and control joints must be carried through the floor/tile; perimeter joints can be left open or caulked.
- For additional information about joints, see Page 24 of this manual.

2. Mortar – Selection and Mixing

- For complete information on setting materials, refer to Page 26 of this manual.

3. *Mapeguard UM* Installation

- For complete information, refer to Page 28 of this manual.



Note: Concrete substrates may be patched.

SUITABLE SUBSTRATES FOR DECKS/PATIOS/WALKS

Exterior only – on or above ground

- Concrete
- Young concrete (cured for at least 7 days)*
- Post-tensioned or pre-stressed concrete
- Older in-plane cracked slabs (renovation)
- Cured cement screed mortar beds

Before beginning installation, consult the “Surface Preparation Requirements” document for Tile & Stone Installation Systems on MAPEI’s Website at www.mapei.com.

*Mapeguard UM *helps with the curing of concrete that has not fully cured by keeping moisture from leaving the concrete too quickly. It is also designed to dissipate lateral forces from concrete shrinkage to keep them from impacting the tile installation above.*

LIMITATIONS

- Do not use over cracks or control joints subject to out-of-plane movement.
- Do not use over in-plane cracks > 1/8" (3 mm).
- Do not use over substrates containing asbestos.
- Do not use where negative hydrostatic pressure exists.
- Do not install on vertical surfaces, as a roof deck membrane or as a wear surface.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed products such as mastic to set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped with *Mapeguard ST*.

1. Substrate Preparation

- All substrates must be structurally sound, stable, clean and free of any substance that would prevent adhesion.
- Do not use chemicals (through acid etching or stripping) to prepare approved substrates.
- Concrete substrates should be free of curing compounds. Mechanically clean and profile using an engineer-approved method when necessary.
- If a smoother surface is required, apply a moisture-stable patch such as *Mapecem® Quickpatch*. For large areas, consider using a moisture-stable leveler such as *Ultraplan® Extreme 2* self-leveling underlayment. See the respective Technical Data Sheets for more information.

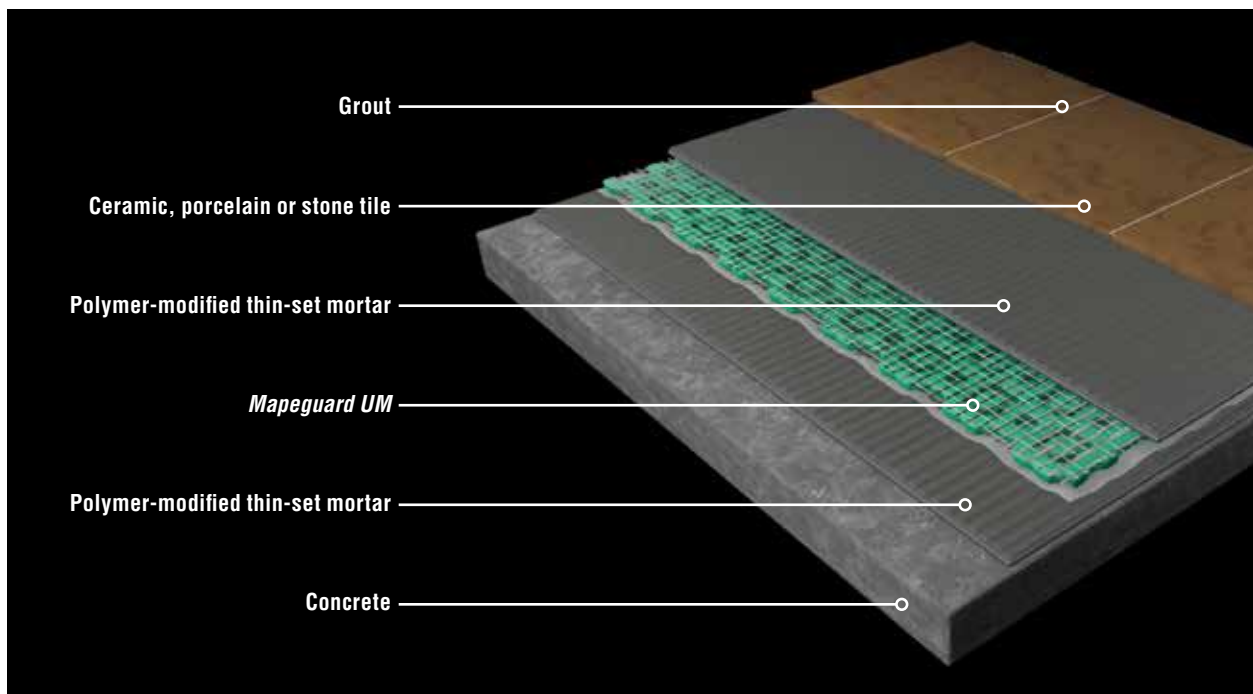
- Substrate must be sloped for complete surface drainage per local building codes.
- A gravel bed or another means of drainage must be installed below the substrate.
- The substrate must be free of standing water, ice and frost.
- Substrate and ambient temperatures must be 40°F to 95°F (4°C to 35°C) before, during and at least 24 hours after application.
- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate joint treatment to satisfy the project's requirements.
- Expansion and control joints must be carried through the floor/tile; perimeter joints can be left open or caulked.
- For additional information about joints, see Page 24 of this manual.

2. Mortar – Selection and Mixing

- For complete information on setting materials, refer to Page 26 of this manual.

3. Mapeguard UM Installation

- Exterior areas require seam tape to waterproof and must be properly sloped to facilitate drainage and prevent standing water.
- For complete information, refer to Page 28 of this manual.



Note: Concrete substrates may be patched with a moisture-stable patching compound such as *Mapecem Quickpatch*.

SUITABLE SUBSTRATES FOR FLOORS – over joist systems

Interior only – on or above grade

- Plywood – industry-approved exterior-grade T&G
- Oriented strand board (OSB) – APA Sturd-I-Floor, Exposure 1 industry-approved exterior-grade T&G*

*Mapeguard UM is designed to be adhered with a very thin layer of mortar below the membrane sufficient to embed the membrane. The membrane then acts as the substrate for the tile installation. It is acceptable to apply a thin layer of ANSI A118.11 mortars over exterior-glue OSB to adhere Mapeguard UM. ANSI A118.11 mortars should not be used to direct-bond tile to OSB per industry recommendations.

LIMITATIONS

- Do not use over substrates containing asbestos, plank wood flooring, presswood, particleboard, pressure- or oil-treated plywood, Lauan plywood, Masonite, self-stick tile, metal or fiberglass surfaces, epoxy flooring or dimensionally unstable materials.
- Do not install over a subfloor that is in direct contact with the ground. The plywood or OSB must have at least 18" (46 cm) of cross-ventilated air space between the underside and the ground. Cover the ground surface of crawl spaces with a suitable vapor barrier.
- Do not install on vertical surfaces, as a roof deck membrane or as a wear surface.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed products such as mastic to set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped with *Mapeguard ST* and a minimum of 2" (5 cm) up the walls.

1A. Substrate Preparation

- All substrates must be structurally sound, stable, clean and free of any substance that would prevent adhesion.
- For projects in Canada, refer to CANPLY exterior registered certifications.
- Plywood must be installed with the smooth side facing up.
- Wood panels must be properly fastened to joists or beams per the manufacturer's instructions.
- Adjacent edges of wood sheets should not be more than 1/32" (1 mm) out of plane.
- Any leveling or skimcoating of the subfloor must be done prior to installation of *Mapeguard UM*.

- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate joint treatment to satisfy the project's requirements.
- Expansion joints must be carried through the floor/tile; perimeter joints can be left open or caulked.
- Substrate and ambient temperatures must be 40°F to 95°F (4°C to 35°C) during and at least 24 hours after application.
- For additional information about joints, see Page 24 of this manual.

1B. Substrate Preparation

When a single-layer subfloor is specified, it must meet the industry requirement of L/360. When a double-layer wood underlayment over subfloor is specified, it must meet the industry requirement of L/480.

For natural-stone tile installations, the maximum allowable floor member live load and concentrated load deflection for wood-framed floor systems should not exceed L/720, where "L" is the clear span length of the supporting member, per applicable building code. For additional information about wood underlayment, refer to Page 22 of this manual.

16" (41 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor of plywood or OSB
- Minimum subfloor thickness – 19/32" (15 mm) or nominally 5/8" (16 mm) T&G

19.2" (49 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor of plywood or OSB
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G

24" (61 cm) on-center joist spacing – ceramic or porcelain tile

- Double layer of plywood or OSB
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

16" or 19.2" or 24" (41 or 49 or 61 cm) on-center joist spacing – natural-stone tile

- Double layer of plywood or OSB
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum plywood underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

Note: A double-layer plywood underlayment over plywood subfloor is required for natural stone. The flexural strength for natural stone tends to be much less than for ceramic tile. Also, characteristics such as veins and fissures can contribute to weakness and create the potential for out-of-plane cracks.



Travertine tile

2. Mortar – Selection and Mixing

- For complete information on setting materials, refer to Page 26 of this manual.

3. *Mapeguard UM* Installation

- For complete information, refer to Page 28 of this manual.

Installing over Structural Wood Planks

SUITABLE SUBSTRATE FOR FLOORS – over joist systems

Interior only – on or above grade

- Structural plank subfloors

LIMITATIONS

- Do not use over substrates containing asbestos, presswood, particleboard, pressure- or oil-treated plywood, Lauan plywood, Masonite, self-stick tile, metal or fiberglass surfaces, epoxy floors or dimensionally unstable materials.
- Do not install over a subfloor that is in direct contact with the ground. The subfloor must have at least 18" (46 cm) of cross-ventilated air space between the underside and the ground. Cover the ground surface of crawl spaces with a suitable vapor barrier.
- Do not install as a roof deck membrane, wear surface or on vertical surfaces.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed organic adhesive products such as mastic to install *Mapeguard UM* or set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped with *Mapeguard ST*.

1A. Substrate Preparation

- All substrates must be structurally sound, stable, clean and free of any substance that would prevent adhesion.
- Plywood and OSB underlayments must be industry-approved exterior-grade T&G.
- For projects in Canada, refer to CANPLY exterior registered certifications.
- Plywood must be installed with the smooth side facing up.
- Wood planks must be properly fastened to joists or beams.
- Adjacent edges of wood sheets should not be more than 1/32" (1 mm) out of plane.
- Any leveling or skimcoating of the subfloor must be done prior to installation of *Mapeguard UM*.
- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate movement joint treatment to satisfy the project's requirements.
- Perimeter joints can be left open or caulked.

- Substrate and ambient temperatures must be 45°F to 95°F (4°C to 35°C) during and at least 24 hours after application.
- For additional information about joints, see Page 24 of this manual.

1B. Substrate Preparation

When a single-layer subfloor is specified, it must meet the industry requirement of L/360. When a double-layer wood underlayment over subfloor is specified, it must meet the industry requirement of L/480.

For additional information about wood underlayments, refer to Page 22 of this manual.

16" or 19.2" or 24" (41 or 49 or 61 cm) on-center joist spacing – ceramic, porcelain or stone tile

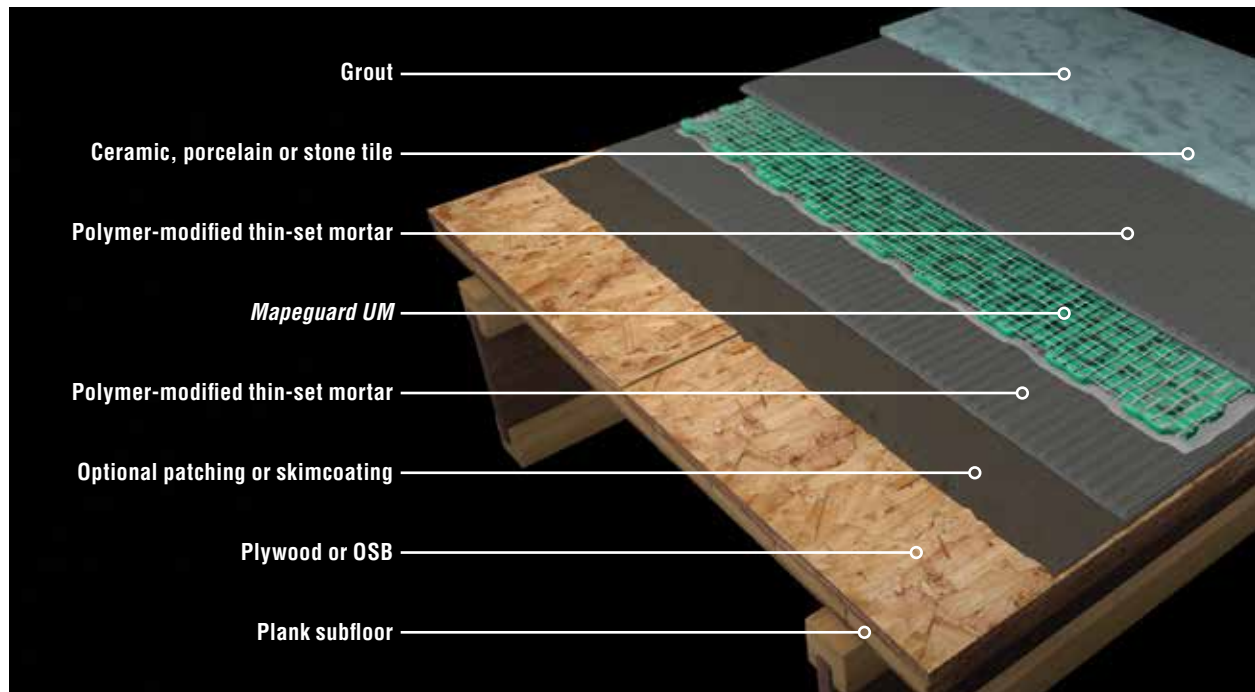
- Double layer – plywood underlayment over subfloor
- Minimum subfloor thickness – 22/32" (18 mm) or nominally 3/4" (19 mm)
- Minimum plywood underlayment thickness – 15/32" (nominally 1/2" nominal) or 12 mm

2. Mortar – Selection and Mixing

- For complete information on setting materials, refer to Page 26 of this manual.

3. Mapeguard UM Installation

- For complete information, refer to Page 28 of this manual.



Note: Underlayments may be patched or skimcoated.

SUITABLE SUBSTRATE FOR FLOORS

Interior only – on or above grade

- Existing paper- or felt-backed, non-cushioned vinyl flooring, luxury vinyl tile or luxury vinyl plank over existing plywood or OSB subfloor
- Existing paper- or felt-backed, non-cushioned vinyl flooring, luxury vinyl tile or luxury vinyl plank over existing concrete

LIMITATIONS

- Do not install over a subfloor that is in direct contact with the ground. The subfloor must have at least 18" (46 cm) of cross-ventilated air space between the underside and the ground. Cover the ground surface of crawl spaces with a suitable vapor barrier.
- Do not install as a roof deck membrane, wear surface or on vertical surfaces.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed organic adhesive products such as mastic to set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped with *Mapeguard ST*.

1A. Substrate Preparation

- All existing concrete subfloors must be structurally sound and stable.
- Plywood and OSB underlayments must be industry-approved and exterior-grade.
- All existing wood subfloors must be structurally sound and stable, and properly fastened to joists or beams.
- All vinyl substrates must be well-bonded, clean and free of any substance that would prevent adhesion.
- For projects in Canada, refer to CANPLY exterior registered certifications.
- Plywood must be installed with the smooth side facing up.
- Any leveling or skimcoating of the subfloor must be done prior to installation of *Mapeguard UM*.
- Adjacent edges of wood sheets should not be more than 1/32" (1 mm) out of plane.
- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate movement joint treatment to satisfy the project's requirements.
- Perimeter joints can be left open or caulked.

- Substrate and ambient temperatures must be 45°F to 95°F (4°C to 35°C) during and at least 24 hours after application.
- For additional information about joints, see Page 24 of this manual.

1B. Substrate Preparation

When single-layer subfloor is specified, it must meet the industry requirement of L/360. When double-layer wood underlayment over subfloor is specified, it must meet the industry requirement of L/480.

For additional information about wood underlayments, refer to Page 22 of this manual.

16" (41 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor
- Minimum subfloor thickness – 19/32" (15 mm) or nominally 5/8" (16 mm) T&G

19.2" (49 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G

24" (61 cm) on-center joist spacing – ceramic or porcelain tile

- Double layer – plywood underlayment over subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

16" or 19.2" or 24" (41 or 49 or 61 cm) on-center joist spacing – natural-stone tile

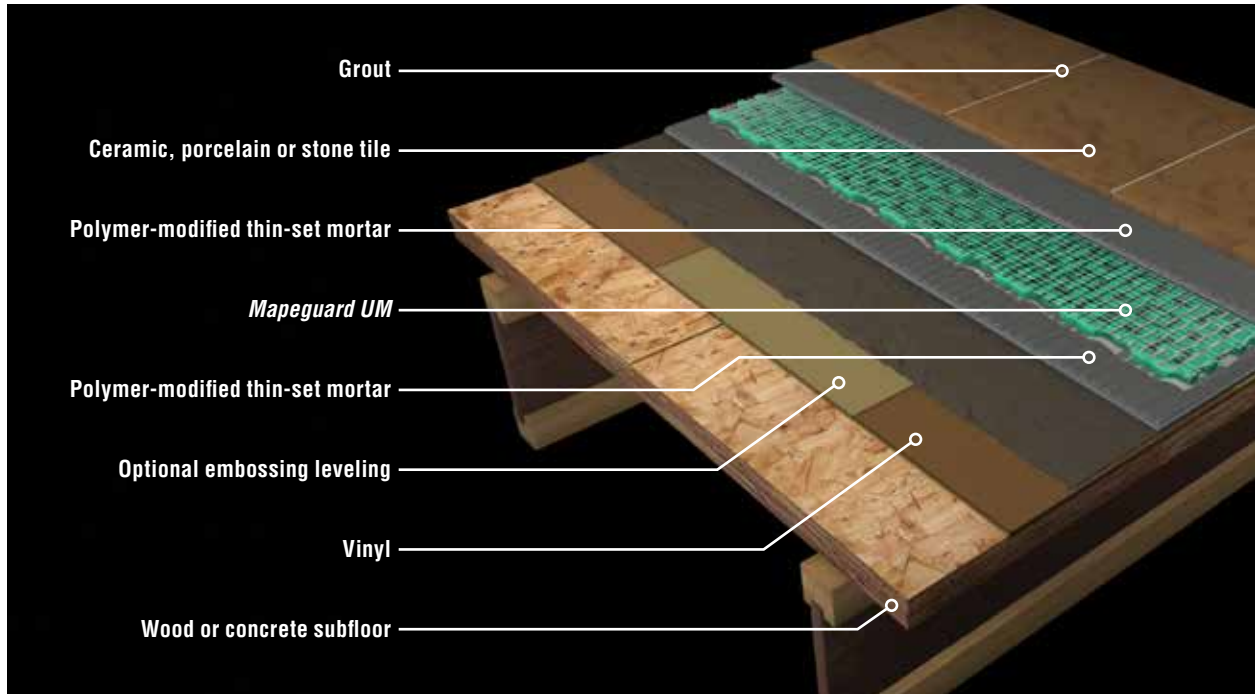
- Double layer – plywood underlayment over subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum plywood underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

2. Mortar – Selection and Mixing

- For complete information on setting materials, refer to Page 26 of this manual.

3. Mapeguard UM Installation

- For complete information, refer to Page 28 of this manual.



SUITABLE SUBSTRATE FOR FLOORS

Interior only – on or above grade

- Radiant heating system over plywood or OSB subfloor
- Radiant heating system laid on wood or concrete subfloor and covered with self-leveling underlayment
- Hydronic tubing incorporated in concrete or self-leveling underlayment

LIMITATIONS

- Do not install over a subfloor that is in direct contact with the ground. The subfloor must have at least 18" (46 cm) of cross-ventilated air space between the underside and the ground. Cover the ground surface of crawl spaces with a suitable vapor barrier.
- Do not install as a roof deck membrane, as a wear surface or on vertical surfaces.
- Do not use for submerged applications.
- Do not use under tile smaller than 2" x 2" (5 x 5 cm).
- Do not use premixed products such as mastic to set tile over *Mapeguard UM*.
- Do not allow direct contact with solvent-based materials.
- Substrates subject to moisture migration must have all *Mapeguard UM* seams taped.

1A. Substrate Preparation

- All concrete subfloors must be structurally sound and stable.
- Plywood and OSB underlayments must be industry-approved and exterior-grade.
- All wood subfloors must be structurally sound and stable, and properly fastened to joists or beams.
- Any leveling or skimcoating of the subfloor must be done prior to installation of *Mapeguard UM*.
- Provide expansion and control joints where specified, per TCNA Detail EJ171, with appropriate joint treatment to satisfy the project's requirements.
- Expansion and control joints must be carried through the floor/tile; perimeter joints can be left open or caulked.
- Substrate and ambient temperatures must be 45°F to 95°F (4°C to 35°C) during and at least 24 hours after application.
- For additional information about joints, see Page 24 of this manual.

1B. Substrate Preparation

For additional information about wood underlayments, refer to Page 22 of this manual.

16" (41 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor
- Minimum subfloor thickness – 19/32" (15 mm) or nominally 5/8" (16 mm) T&G

19.2" (49 cm) on-center joist spacing – ceramic or porcelain tile

- Single-layer subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G

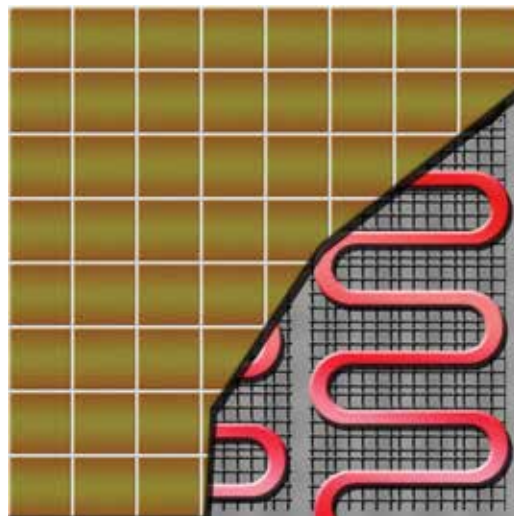
24" (61 cm) on-center joist spacing – ceramic or porcelain tile

- Double layer – underlayment over subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

16" or 19.2" or 24" (41 or 49 or 61 cm) on-center joist spacing – natural-stone tile

- Double layer – underlayment over subfloor
- Minimum subfloor thickness – 23/32" (18 mm) or nominally 3/4" (19 mm) T&G
- Minimum underlayment thickness – 11/32" (9 mm) or nominally 3/8" (10 mm) T&G

Note: A double-layer plywood underlayment over subfloor is required for natural stone. The flexural strength for natural stone tends to be much less than for ceramic tile. Also, characteristics such as veins and fissures can contribute to weakness and create the potential for out-of-plane cracks.



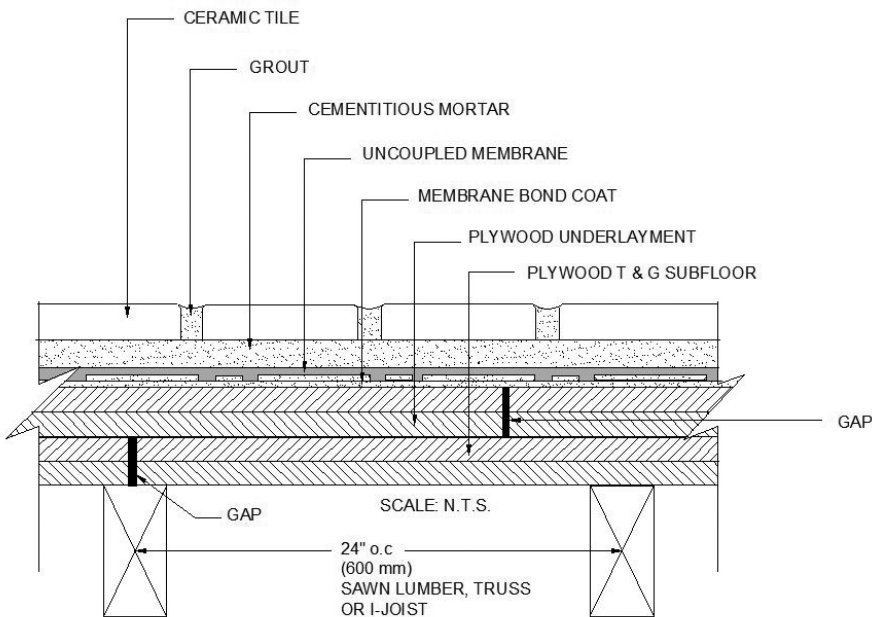
Installing over Wood Underlayments

PLYWOOD OR OSB UNDERLAYMENT INSTALLATIONS

Wood underlayments provide added strength and protection for existing subfloors with spans or materials subject to deflection.

Underlayment panels are to be industry-approved exterior-grade plywood and APA Sturdi-I-Floor, Exposure 1 OSB (interior, for dry areas only). Minimum thicknesses are detailed in each Substrate Preparation 1B section on pages 13 through 21 of this manual.

Whether a single-layer subfloor or a double-layer subfloor with underlayment is required depends on joist spacing and type and size of tile selection. Refer to the same Substrate Preparation 1B Sections on pages 13 through 21 of this manual.



End Joints

- The face grain of plywood subfloor and underlayment shall run perpendicular to joists.
- Leave a gap of 1/8" (3 mm) at all ends that meet.
- End joint gaps of the subfloor must always be centered over a joist.
- End joint gaps of the underlayment must be created at "quarter points" to one side of the selected joist. For example, for 24" (61 cm) o.c. as illustrated above, an underlayment joint gap must be created 6" (15 cm) to one side of the joist.
- The illustration is to exemplify distance only; underlayment joints should be placed as far away from subfloor end joints as possible.

Edge Joints

- Leave a gap of 1/8" (3 mm) at all edges that meet.
- Edge joint gaps of the underlayment shall be placed one-half the width of the plywood (24" or 61 cm) in distance over the subfloor gaps. If a panel is less than 48" (1,22 m) wide, overlap may be less than 24" (61 cm) – cut to size.

Fastening

- Use ring shank nails (not staples) or wood screws (not drywall screws) to fasten the underlayment.
- Fasteners must pass through the entire thickness of the underlayment and subfloor panels with minimal penetration into joists. See the chart below for the spacing of fasteners.

Plywood/OSB Thickness	Maximum On-Center Fastener Spacing	
	Panel Edges	Field
3/8" (10 mm)	4" (10 cm)	6" (15 cm)
1/2" (12 mm)	4" (10 cm)	6" (15 cm)
> 1/2" (12 mm)	6" (15 cm)	6" (15 cm)



Installing with Movement Joints

Perimeter and field movement joints are required in all tile installations. The Tile Council of North America (TCNA) publishes general information in the “EJ171 MOVEMENT JOINT GUIDELINES FOR CERAMIC, GLASS, AND STONE” section of its Handbook for Ceramic, Glass, and Stone Tile Installation.

Joint widths, location and frequency of joints are also discussed in the TCNA method EJ171.

Ultimately, the architect or designer will specify locations and details of movement joints for the project, due to the need for professional assessment of each assembly or system.

Perimeter Joints – required

- Changes of plane
- Every adjoining wall
- Columns, islands or curbs
- Pipe/toilet penetrations
- Any change in adjoining substrate types

Joints in Concrete

Expansion joints:

- Separation between adjoining parts of a structure or pavement slabs
- Allow movement where expansion is likely to exceed contraction
- Cut the full depth of the slab
- Must be continued through the tile surface
- Filled with a compressible filler material designed for this purpose

Construction/cold joints:

- Surface where two successive placements of concrete meet
- Reinforcement may be continuous but not necessarily permanent.
- If weakened, they will crack if there is movement.
- Should be treated as expansion or control joints for best results

Control/contraction joints:

- Formed, sawed or tooled grooves in concrete
- Regulate the location of cracking
- Also called “saw-cut joints”
- Provide surface movement joint in the tile covering

Isolation joints:

- Separations between adjoining parts of concrete structure, usually vertical
- At a designated location to interfere least with performance
- Will allow relative movement in three directions to avoid cracks elsewhere

Other treatment considerations:

- Install all movement joints per ASTM C1193 Standard Guide for Use of Joint Sealants.
- Sealants in traffic areas require a Shore A hardness of 35 or greater (*Mapesil™ T*).
- Sealants are designated according to Type, Grade, Class and Use per ASTM C920 for use in tilework. Check performance requirements to determine type and grade of sealant (*Mapesil T*).
- Silicone sealants contain plasticizers that may stain some natural stones. Consult manufacturers.
- Manufactured/pre-formed joint profiles are available. Consult manufacturers.

Tile Mortar Selection

Selecting the mortar

- Select the appropriate mortar for the size and style of the tile selected as well as the substrate (plywood must meet both ANSI A118.4 and A118.11 standards).
- MAPEI recommends the use of a MAPEI polymer-modified mortar meeting the ANSI A118.4, ANSI A118.11 or A118.15 standard and carrying an ISO 13007 classification of at least C2 when installing ceramic or porcelain tiles. To facilitate bonding of *Mapeguard UM* to the substrate, mortars should be mixed at the upper limit of the acceptable water range listed on their Technical Data Sheet.
- MAPEI warranty coverage with a *Mapeguard UM* system is determined by the installation and grouting products selected.
- The design and construction of the mat allow hydration to occur, so the same mortar may be used under and over the mat (except when an epoxy mortar is used).
- A rapid-setting mortar will further shorten the curing time.
- Do not use premixed products such as mastic to set tile.
- When mortar coverage is checked, gray mortar can be more easily seen through the translucent mat than white mortar can.
- When installing white and light-colored marble, use a white mortar on top of the mat.
- When installing moisture-sensitive stone (green marble as well as some limestone and granite), agglomerate tile or resin-backed tile, prefill the membrane cavities with a modified mortar, allow overnight curing and proceed to set tile with *Kerapoxy 410* mortar.
- Review the Safety Data Sheet at www.mapei.com for the MAPEI mortar being used.

Mixing the mortar

- Choose suitable safety equipment before mixing and use of the mortar.
- When using single-component polymer-modified mortars, mix with the maximum amount of water that is recommended in the mixing instructions.



MAPEI Tile Mortars	Meets or Exceeds ANSI Standard(s)	ISO 13007 Classifications
<i>Granirapid® System</i>	A118.4F, A118.11, A118.15F	C2FS2P2
<i>Kerabond/Keralastic™</i>	A118.4E, A118.11, A118.15E	C2ES2P2
<i>Kerabond® T / Keralastic®</i>	A118.4E, A118.11, A118.15E	C2ES2P2
<i>Ultracontact™</i>	A118.4E, A118.11	C2EP1
<i>Ultracontact RS</i>	A118.4F, A118.11	C2FP1
<i>Ultraflex™ 2</i>	A118.4E, A118.11	C2EP1
<i>Ultraflex 3</i>	A118.4E, A118.11, A118.15E	C2ES1P1
<i>Ultraflex LFT</i>	A118.4TE, A118.11	C2TES1P1
<i>Ultraflex LFT Rapid</i>	A118.4TF, A118.11	C2TFS1P1
<i>MAPEI Ultralite™ Mortar</i>	A118.4TE, A118.11, A138.1	C2TES1P1
<i>MAPEI Ultralite Mortar Pro</i>	A118.4TE, A118.11, A138.1	C1TES1
<i>MAPEI Ultralite S1 Quick</i>	A118.4TF, A118.11, A138.1	C2TFS1P1
<i>MAPEI Ultralite S2</i>	A118.4E, A118.11, A138.1	C2ES2P2
<i>Ultraflex LHT</i>	A118.4TE, A118.11	C2TE
<i>Ultraflor® Plus</i>	A118.4	C2
<i>Ultraflex 1</i>	A118.4E, A118.11	C2E
<i>Ultraflex RS</i>	A118.4F, A118.11, A118.15F	C2FS1P1

Installing *Mapeguard UM*



1. Snap chalk lines onto the substrate for installation of *Mapeguard UM* membrane.
2. Use a MAPEI polymer-modified mortar meeting ANSI or ISO specifications to install the membrane for the applicable installation. For tile-setting choices, see Page 26 of this manual.
3. Mix the mortar on the high end of the recommended water range. The mortar should still be able to hold a notched ridge while wetting out the fleece layer backing of the membrane.
4. With pressure, apply a coat by using the trowel's flat side to key mortar into the substrate.
5. Apply additional mortar, combing it in a single direction using a 1/4" x 3/16" (6 x 4,5 mm) V-notched trowel or a 1/4" x 1/4" x 1/4" (6 x 6 x 6 mm) square-notched trowel.
6. Spread only as much mortar as can be covered with membrane before the mortar skins over. Open times vary with jobsite conditions and mortar choice.
7. Embed the membrane into the mortar, fabric side down. Using a rubber or wooden float, hand roller or preferably a steel roller (not exceeding 75 lbs. or 34,0 kg), apply pressure to ensure proper bedding of the membrane. Areas of membrane embedded into the mortar properly will appear darker. Move slowly from one end of the membrane to the other.
8. Ensure that all edges or ends of each roll abut edges or ends of other rolls without leaving gaps. To ensure a flat surface, do not overlap edges or ends from one roll onto another.
9. Leave approximately 1/4" (6 mm) between the membrane and the edge of walls, columns, etc., for movement. If waterproofing, refer to Page 30 of this manual for instructions on treating seams, walls, columns, etc.
10. Lift the membrane occasionally to verify coverage. Ensure that there is full contact between the fleece layer backing

and the tile-setting mortar. If full coverage is not achieved, add additional mortar and re-comb in a single direction. Verify that the mortar still has the proper consistency.

11. Snap lines onto the membrane for installation of tile.
12. For interior installations, tile or stone can be installed immediately after installation of the membrane, with no waiting time required. For exterior installations, wait until the mortar for the membrane has properly hardened.
13. First, skim or fill the surface of the membrane using the flat side of the trowel, ensuring that all cavities and mesh fabric are completely filled. Immediately apply additional mortar and comb over the membrane with notched side of the trowel recommended for the size and type of tile being installed.
14. Choose a notched trowel with sufficient depth to achieve greater than 80% mortar contact to both the tile and membrane for all interior installations and 95% for exterior installations, commercial floors and wet applications. It may be necessary to back-butter in order to satisfy these requirements. (Refer to ANSI specifications and TCNA guidelines.) Periodically lift a tile to check that full coverage is being achieved. If using epoxy mortar, see the instructions on the blue box below.
15. Grouting may be performed once the mortar has cured enough to allow light traffic, which will depend on the mortar used, tile size, tile type and jobsite conditions.

INSTALLATION OF MOISTURE-SENSITIVE STONE TILE

- Pre-fill the membrane cavities with a MAPEI polymer-modified mortar.
- Allow the mortar to cure overnight.
- Use *Kerapoxy*® 410 premium, 100%-solids epoxy setting mortar per Technical Data Sheet recommendations to install moisture-sensitive stone over the pre-filled membrane.
- Install grout as instructed above in this manual.

Waterproofing *Mapeguard UM*

Mapeguard UM is a premium-performance, lightweight waterproofing and vapor-pressure-equalizing underlayment membrane when installed using *Mapeguard ST* sealing tape.

Tile installations in bathrooms, showers and any area above occupied living spaces are examples of areas where leaks or floods can be prevented using waterproofing.

Typical areas to apply seam tape

- Changes of plane
- Every adjoining wall
- Columns, islands or curbs
- Floor drains
- Any change in adjoining substrates



1. After embedding *Mapeguard UM* as directed in this manual, proceed to sealing and waterproofing the membrane seams with *Mapeguard ST* seam tape. Use a MAPEI mortar meeting the ANSI A118.4, ANSI A118.11 or ANSI A118.15 standard, or classified as ISO 13007 C2 or better.
2. Using a 1/4" x 3/16" (6 x 4,5 mm) V-notched trowel, key in the mortar to the adjoining seams with the flat side of the trowel, being sure to fill in any holes or voids.
3. Apply mortar with the trowel on top of the seams with the notched side of the trowel. Then center *Mapeguard ST* sealing tape over the seam with at least 2" (5 cm) on each side of the seam and apply the *Mapeguard ST*. Work the sealing tape into the thin-set with a grout float or the trowel's flat side while the thin-set is still workable.
4. Seam tape must be used in the same manner around the walls of the installation area.
5. Begin by taking a pre-measured length of seam tape and folding it in half along its length. One side of the fold will be adhered to the floor, and the other side will be adhered up the wall. To accomplish this, first apply the needed quantity of mortar on both the floor and wall.
6. Next, embed the *Mapeguard ST* tape into the mortar with a grout float or the trowel's flat side, taking care not to puncture the membrane.

Mapeguard UM Certifications

Industry Standards and Approvals

- ASTM C627 (Robinson): Extra Heavy Rating (see chart below)
- ANSI: Exceeds A118.10 (Waterproof Membrane for Thin-Set Ceramic Tile)
- ANSI: A118.12, Section 5.1.3 – Achieves bond strength of 50 psi (0,34 MPa) or greater in 7 days per test method
- ANSI: A118.12, Section 5.2.3 – Passes; point load resistance after 28-day cure

Uncoupling and Support/Load Distribution

ASTM C627 method, “Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson Type Floor Tester,” was used to evaluate the performance ratings listed below. Each assembly is tested in cycles using a loaded, revolving carriage. Once a specified level of damage is exceeded, the test is stopped.

The Tile Council of North America (TCNA) establishes performance ratings including residential, light, moderate, heavy and extra heavy, based on test results.

Substrate	Joist Spacing	Rating
Wood	16" (41 cm) o.c.	Extra heavy
Wood	19.2" (49 cm) o.c.	Extra heavy
Wood	24" (61 cm) o.c.	Heavy
Concrete	N/A	Extra heavy

- All plywood and OSB sheets were 3/4" (19 mm) in nominal thickness.
- *Mapeguard UM* was bonded to concrete using modified thin-set mortar (ANSI A118.4).
- *Mapeguard UM* was bonded to plywood and OSB using modified thin-set mortar (ANSI A118.4 and ANSI A118.11).
- Tile was bonded to *Mapeguard UM* with modified thin-set mortar (ANSI A118.4).
- Polymer-modified cement grout (ANSI A118.6) was used.

Waterproofing

Mapeguard UM exceeds the requirements of the American National Standards Institute's ANSI A118.10 specifications for “Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation.”

Technical Data

Sheet thickness..... 1/64" (0,5 mm)
Working temperature -40°F to 176°F (-40°C to 80°C)
Compressive strength..... About 0,37 N/mm²
Permeance..... < 0.07

ORDERING INFORMATION

Product code	Packaging type	Units / case
<i>Mapeguard UM</i>		
2850905	Roll, 54 sq. ft. (5 m ²)	1
2850930	Roll, 323 sq. ft. (30 m ²)	1
<i>Mapeguard ST</i>		
2851010	5.9" x 32.8' (15 cm x 10 m)	20
2851030	5.9" x 98.4' (15 cm x 30 m)	6

INSPECTION OF PRODUCT

Prior to starting installation

- Verify that you have received the sizes and quantity of rolls ordered.
- Thoroughly inspect the membrane as it is unrolled.
- Any suspect or defective material must be reported to the supplier immediately.
- Ensure that the material is protected from exposure to rain, sleet and snow. Any water collected in the texturing must be removed/dried before application.
- Provide for dry, heated storage on site and deliver materials at least 24 hours before tilework begins.
- Do not store the membrane in direct sunlight.
- Protect the membrane from spills, contamination and damage before and during tilework to ensure a positive bond with the mortar.
- Always provide proper protection of finished floors when heavy equipment (such as fork lifts or scissor lifts) is to be used over installations with underlayment membranes during construction.
- Protect from heavy traffic, frost and rain for 7 days.



Keyword: MAPEI Americas

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0-1-800-MX-MAPEI (0-1-800-696-2734)

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