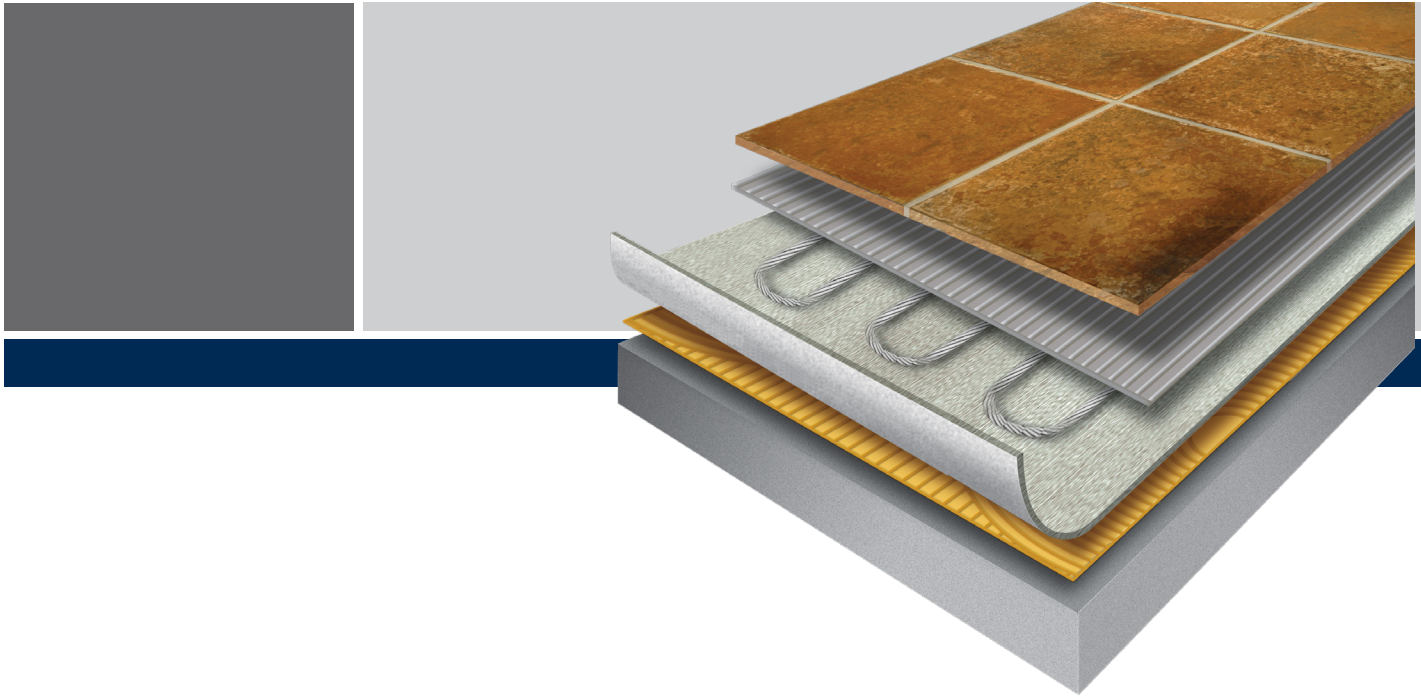


Guide for preparing a subfloor equipped with a radiant heating system



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Electric radiant heating • Ceramic and natural stone floor

1.1 Installation method with trowel and mortar

Recommended membrane: AcoustiTECH™ Ceramic

GENERAL INFORMATION

1. Be sure to read and understand the installation guides for radiant heating system, the membrane of flooring and accessories **before starting work**. When in doubt about the steps or guidelines to follow, call for service from the concerned manufacturer.
2. Before installation, ensure that the support is structurally sound, dry, solid, stable and levelled. Surfaces must be clean and free of contaminants (grease, old adhesive, sealant, paint). If the support has deficiencies, correct them immediately according to the principles and recommendations set by the flooring industry before continuing installation.
3. Carefully respect the cure time recommended by the manufacturers of adhesive, mortar, grouts and levelling. The cure time of the products used may vary depending on environmental conditions.
4. Before starting the installation of your heating system, refer to the manufacturer's written recommendations. To take full advantage of your radiant floor system, it is generally required to adjust the operating temperature to a heat below 85°F (29°C). Heat kept above this temperature may damage your flooring prematurely.
5. Make sure that the floor area, during and after installation, never exceeds the emission rate of water vapor recommended by the manufacturer of the floor covering and adhesive.
6. It is the installer's responsibility to verify and comply with all the recommendations set by the manufacturers of products used.
7. It is the end user of the facility's responsibility to understand and implement the instructions for use and maintenance set by the manufacturers of products used.

APPLICATIONS

1. Install the AcoustiTECH™ Ceramic membrane with the AD-280 adhesive (AD-316, AD-532+, AD-844MS also suitable) in accordance with the AcoustiTECH™ installation guides.
2. Install the heating cables on the AcoustiTECH™ Ceramic membrane according to radiant system manufacturer's guide. The cables will be held in place with hot glue or with the recommended mechanism that is provided. The holding system must absolutely be confirmed by the manufacturer of the heating cables.
3. Cover the heating cables and membrane with a premium polymer modified mortar such as Mapei Keraflex RS (or equivalent).
 - a. Use a 50 or 75 mm (2-3 inches) plastic trowel so you can slide it between the cables and ensure the penetration of the mortar in the surface of the fiber membrane by exerting minimal pressure. Make sure you have a flat and smooth surface for the floor covering and/or membrane installation.
 - b. Immediately continue installation by using more mortar adhesive and fill the space between the cables to cover them using the flat side of the trowel, press lightly on the wires while making sure not to damage them.
4. Allow 24 hours to cure before installing the tiles. The thickness of the filling should not exceed the over all thickness of the cable plastic guides (ie more than 6 mm (1/4 inch)).
5. Install your ceramic as directed using a premium polymer modified mortar such as Mapei Keraflex RS with the recommended trowel. Let dry and harden.
6. Finish by filling the joints using a grout suitable for this type of installation, such as Mapei Ultracolor Plus FA (or equivalent). Allow the joints to harden. Prohibit traffic on the surface for a period of 72 hours.

NOTE

This method provides an installation that is suitable for the protection of heating cables. AcoustiTECH™ Ceramic membrane optimizes the radiant heat system and

it conforms to the "Light Commercial" standard of use evaluated according to the Robinson test (ASTM-C627) for an assembly of ceramic or natural stone.

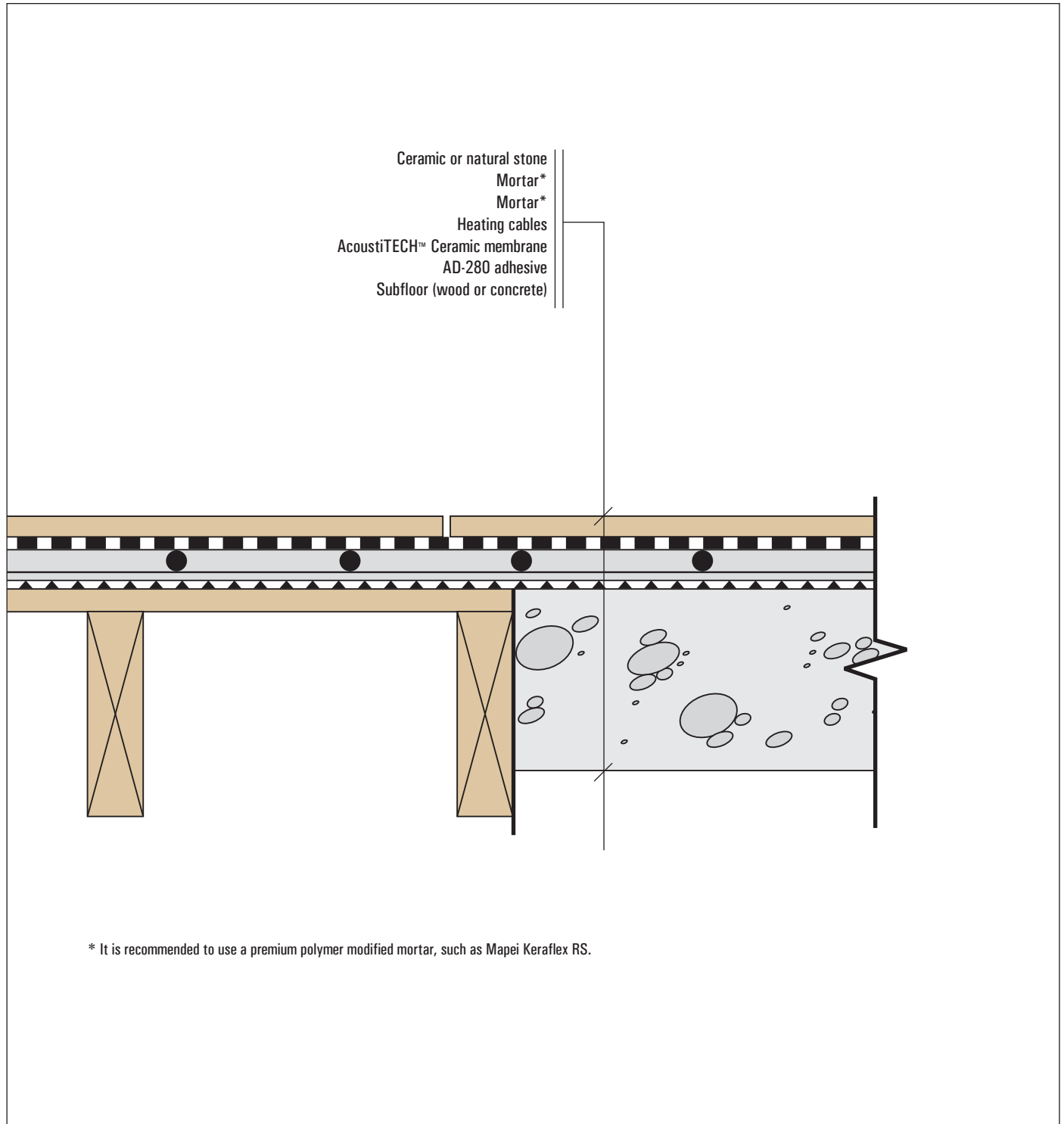
The minimum size of ceramic tile, stone is 10"x 10" or equivalent.

• See next page for an assembly type

Electric radiant heating • Ceramic and natural stone floor

1.1 Installation method with trowel and mortar

Assembly type on wood or concrete subfloor



Electric radiant heating • Ceramic and natural stone floor

1.2 Installation method with self-levelling compound

Recommended membrane: AcoustiTECH™ Ceramic

GENERAL INFORMATION

1. Be sure to read and understand the installation guides for radiant heating system, the membrane of flooring and accessories **before starting work**. When in doubt about the steps or guidelines to follow, call for service from the concerned manufacturer.
2. Before installation, ensure that the support is structurally sound, dry, solid, stable and levelled. Surfaces must be clean and free of contaminants (grease, old adhesive, sealant, paint). If the support has deficiencies, correct them immediately according to the principles and recommendations set by the flooring industry before continuing installation.
3. Carefully respect the cure time recommended by the manufacturers of adhesive, mortar, grouts and levelling. The cure time of the products used may vary depending on environmental conditions.
4. Before starting the installation of your heating system, refer to the manufacturer's written recommendations. To take full advantage of your radiant floor system, it is generally required to adjust the operating temperature to a heat below 85° F (29° C). Heat kept above this temperature may damage your flooring prematurely.
5. Make sure that the floor area, during and after installation, never exceeds the emission rate of water vapor recommended by the manufacturer of the floor covering and adhesive.
6. It is the installer's responsibility to verify and comply with all the recommendations set by the manufacturers of products used.
7. It is the end user of the facility's responsibility to understand and implement the instructions for use and maintenance set by the manufacturers of products used.

APPLICATIONS

1. Install AcoustiTECH™ Ceramic membrane with AD-280 adhesive (AD-316, AD-532+, AD-844 MS also suitable) according to the AcoustiTECH™ installation guide. Note: This membrane will create a thermal break and maximize heat transfer up. This will avoid unnecessary heating of the concrete and save energy and money.
2. Install heating cables on the AcoustiTECH™ Ceramic membrane according to the radiant system manufacturer's guide. The cables will be held in place with hot glue or with the recommended mechanism provided. The holding system must absolutely be authorized by the manufacturer of heating cables.
3. Apply two coats of Mapei Primer WE™ (water-based solvent-free epoxy primer) (or equivalent) on the heating cables and membrane with a 6 mm (1/4 inch) lint free roller. Allow to dry between coats. It is recommended that the second layer move in the opposite direction of the first in order to ensure that the area is completely covered and well sealed. The water in the leveler should remain in place to ensure the proper cure of the product.
4. Use a Mapei Ultraplan 1 Plus™ type self-leveling or Mapei Ultraplan Easy™ (or equivalent). Apply the self-leveling products according to the manufacturers of cement product and heating cables. Generally 12 mm (1/2 inch) to build enough thermal mass and provide adequate support to the floor. Let dry 24 hours before applying the floor covering.
5. Before proceeding to the next step, make sure that the prepared surface is flat, sound, solid, stable, and the cement product used is entirely and properly cured.
6. Make sure that the water vapor emission rate in the concrete does not exceed the manufacturer's recommendations for flooring.
7. Install your ceramic as directed, using a premium polymer modified mortar such as Mapei Keraflex RS (or equivalent) with the recommended trowel. Let dry and harden.
8. Finish by filling the joints using a grout suitable for this type of installation such as Mapei Ultracolor Plus FA (or equivalent). Allow to dry and harden. Prohibit traffic on the area of 72 hours

NOTE

For installation on an area of 200 sq.ft. and more, you should contact the Customer Service department of the product used to obtain the guidelines for expansion joints. An expansion joint is a physical separation between two surfaces covered by self-levelling and allows for contraction as it cures. The expansion joint should be located between two distinct areas of the system and parallel to the radiant heating cables.

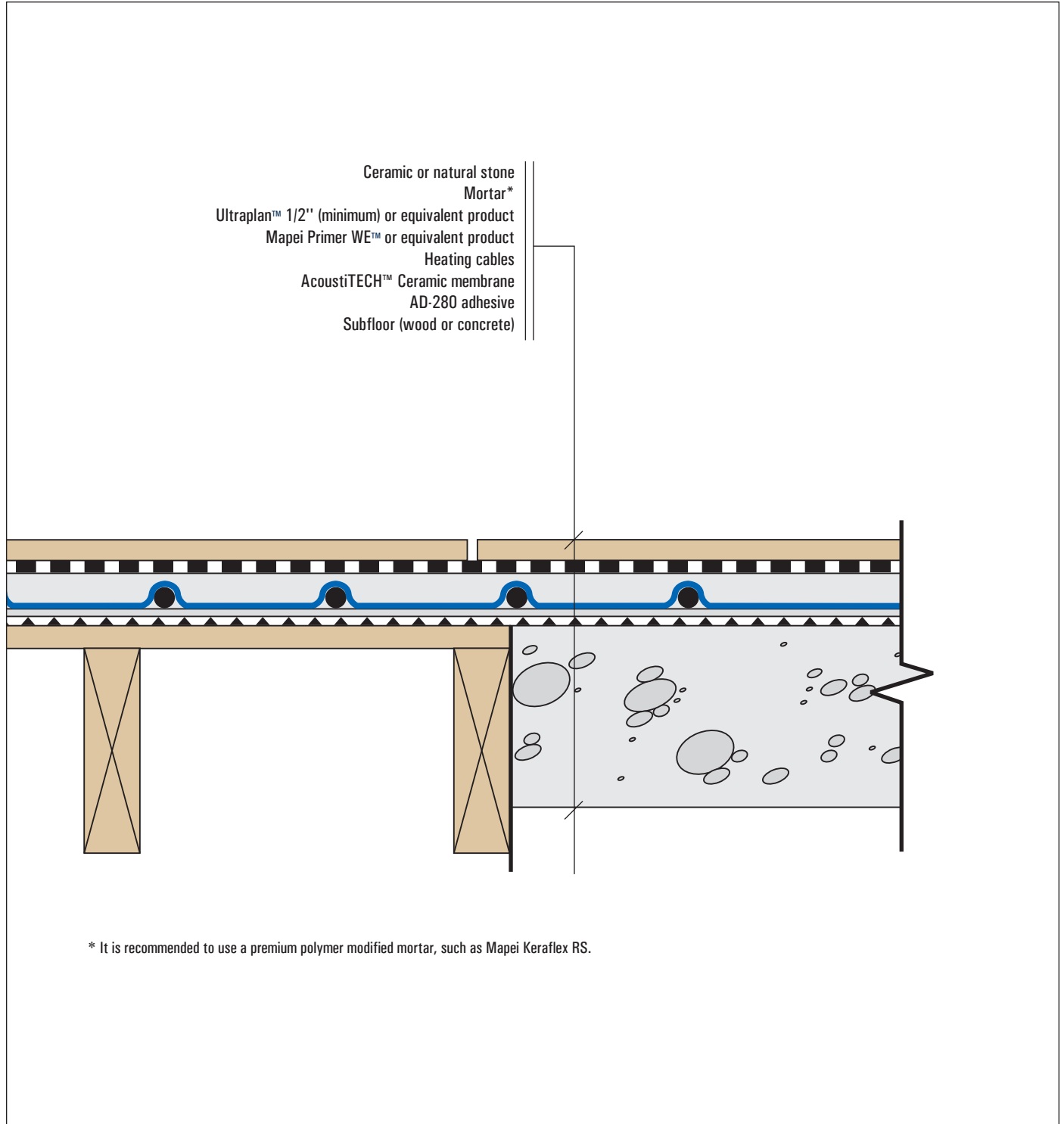
You must also install a flexible membrane (etafoam type) around the perimeter of the floor and wherever leveling meets a vertical surface. This is to separate the cement product from the building structure and allow the contraction of the self-leveling product as it cures.

- See next page for an assembly type

Electric radiant heating • Ceramic and natural stone floor

1.2 Installation method with self-levelling compound

Assembly type on wood or concrete subfloor



Electric radiant heating • Ceramic and natural stone floor

1.3 Installation method with pre-wired membrane for heated floors

Recommended membrane: AcoustiTECH™ Ceramic

GENERAL INFORMATION

1. Be sure to read and understand the installation guides for radiant heating system, the membrane of flooring and accessories **before starting work**. When in doubt about the steps or guidelines to follow, call for service from the concerned manufacturer.
2. Before installation, ensure that the support is structurally sound, dry, solid, stable and levelled. Surfaces must be clean and free of contaminants (grease, old adhesive, sealant, paint). If the support has deficiencies, correct them immediately according to the principles and recommendations set by the flooring industry before continuing installation.
3. Carefully respect the cure time recommended by the manufacturers of adhesive, mortar, grouts and levelling. The cure time of the products used may vary depending on environmental conditions.
4. Before starting the installation of your heating system, refer to the manufacturer's written recommendations. To take full advantage of your radiant floor system, it is generally required to adjust the operating temperature to a heat below 85° F (29° C). Heat kept above this temperature may damage your flooring prematurely.
5. Make sure that the floor area, during and after installation, never exceeds the emission rate of water vapor recommended by the manufacturer of the floor covering and adhesive.
6. It is the installer's responsibility to verify and comply with all the recommendations set by the manufacturers of products used.
7. It is the end user of the facility's responsibility to understand and implement the instructions for use and maintenance set by the manufacturers of products used.

Technical data sheets, safety data sheets and surface preparation bulletins are available upon request or on both websites.

AcoustiTECH: acousti-tech.com
MAPEI: mapei.com/ca/fr-ca/accueil

Defects caused by incorrect installation and/or incorrect subfloor preparation, including insufficient attention to subfloor dampness will void this warranty.

*If the structure has no concrete (wood substrate), this warranty & installation guidelines are still valid as long as the plywood is doubled (no sheathing). Please review the Mapei surface preparation documentation, section 10.

Please contact our customer service for additional questions.

*** MAPEI offers a Lifetime System Limited Warranty using MAPEHEAT cable, MAPEHEAT membrane and AcoustiTECH CERAMIC membrane. Please refer to documents

• See next page for an assembly type

APPLICATIONS

in attachment for more details.

The following is the installation method recommended by Mapei:

AcoustiTECH CERAMIC membrane adhered to cement slab (concrete slab)* using AcoustiTECH AD-532+ or AcoustiTECH AD-280 adhesive;

MAPEHEAT membrane adhered to the AcoustiTECH CERAMIC membrane using a polymer-modified thinset mortar adhesive (such as Mapei Ultraflex LFT or other similar ANSI A118.11 or better product);

MAPEHEAT cable installed into MAPEHEAT Membrane using flexible spacing of 3/3/3 (10W/ft²), 2/3/2 (12W/ft²) or 2/2/2 (15W/ft²); For a thinner installation assembly, MAPEHEAT Mats can replace the layer of MAPEHEAT membrane & MAPEHEAT cable and can be adhered directly to the AcoustiTECH CERAMIC membrane using the same thinset mortar adhesive described above and applied in the same manner. This method offers a prefabricated floor heating system and is quicker to install.

Installation of a ceramic tile floor covering using the same polymer-modified thinset mortar adhesive used to adhere the MAPEHEAT membrane (such as Mapei Ultraflex LFT or another similar ANSI A118.11 or better product);

The temperature of the heated floor must be controlled by a MAPEHEAT thermostat such as the MAPEHEAT Signature, MAPEHEAT Home or MAPEHEAT Element and the thermostat must be installed according to the supplied instructions.

All manufacturer's directions should be followed. Refer to the most current technical data sheet for more detailed information regarding the use of MAPEI & AcoustiTECH products.

Electric radiant heating • Engineered flooring or floated floor

2.1 Installation method with cables under the membrane

Recommended membranes: AcoustiTECH™ 7000, 5000, 3500, AcoustiTECH™ Lead 6, Lead 4.5, Lead 3.3, AcoustiTECH™ Premium or AcoustiTECH™ VP

GENERAL INFORMATION

1. Be sure to read and understand the installation guides for radiant heating system, the membrane of flooring and accessories **before starting work**. When in doubt about the steps or guidelines to follow, call for service from the concerned manufacturer.
2. Before installation, ensure that the support is structurally sound, dry, solid, stable and levelled. Surfaces must be clean and free of contaminants (grease, old adhesive, sealant, paint). If the support has deficiencies, correct them immediately according to the principles and recommendations set by the flooring industry before continuing installation.
3. Carefully respect the cure time recommended by the manufacturers of adhesive, mortar, grouts and levelling. The cure time of the products used may vary depending on environmental conditions.
4. Before starting the installation of your heating system, refer to the manufacturer's written recommendations. To take full advantage of your radiant floor system, it is generally required to adjust the operating temperature to a heat below 85°F (29°C). Heat kept above this temperature may damage your flooring prematurely.
5. Make sure that the floor area, during and after installation, never exceeds the emission rate of water vapor recommended by the manufacturer of the floor covering and adhesive.
6. It is the installer's responsibility to verify and comply with all the recommendations set by the manufacturers of products used.
7. It is the end user of the facility's responsibility to understand and implement the instructions for use and maintenance set by the manufacturers of products used.

APPLICATIONS

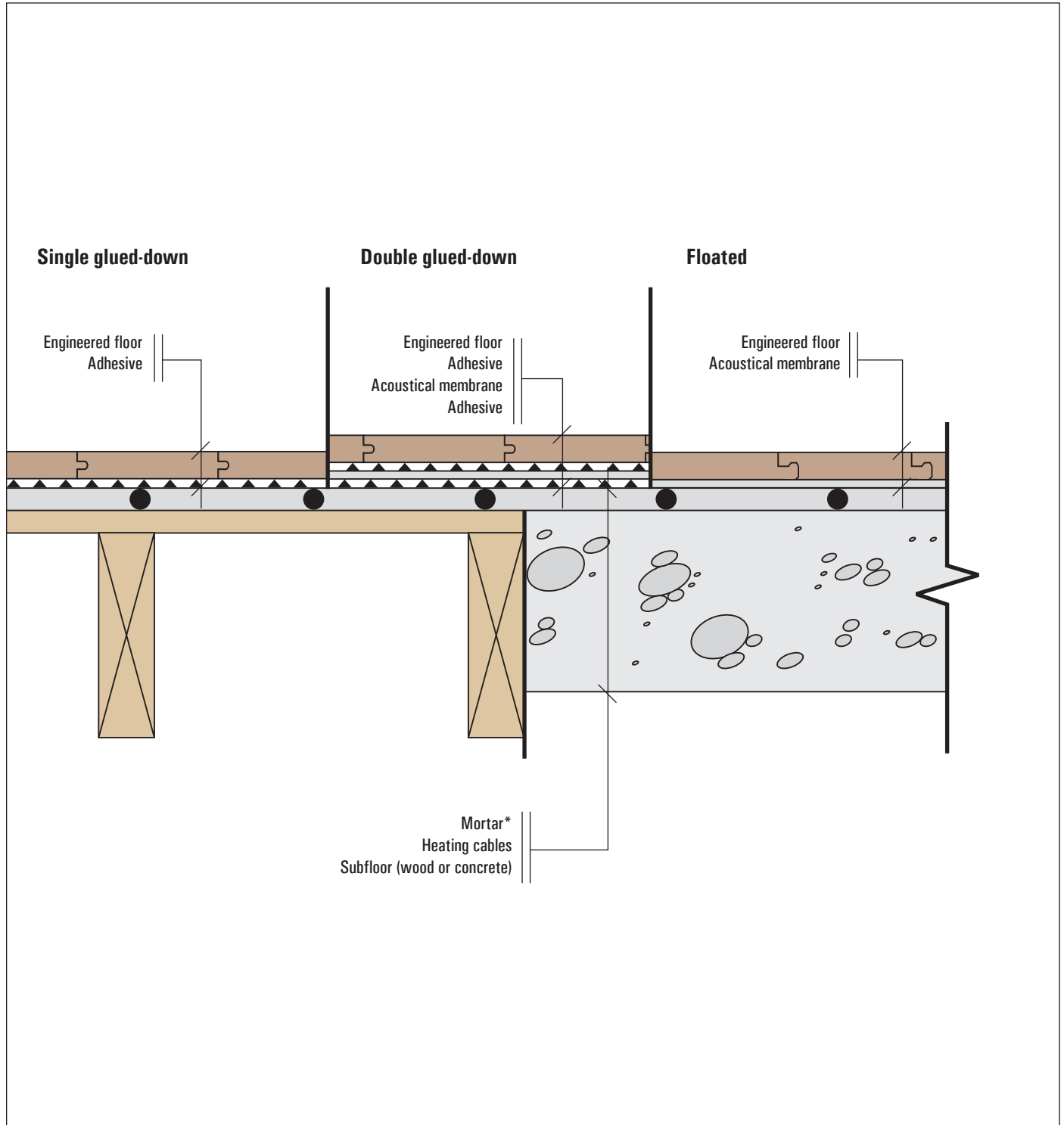
1. Install heating cables on the structure according to the radiant system manufacturer's guide.
2. Cover the heating cables according to the manufacturer's recommendations.
3. Before proceeding to the next step, make sure that the prepared surface is flat, sound, solid, stable, and the cement product used has entirely cured.
4. Make sure that the moisture vapour emission rate of the concrete does not exceed the manufacturer's recommendations for flooring.
5. Install flooring as recommended by the manufacturer .
 - SINGLE GLUED-DOWN: Apply AD-316, AD-532+ or AD-844 MS adhesive on the new surface and install engineered wood flooring or laminate.
 - DOUBLE GLUED-DOWN: Apply a first coat of AD-316, AD-532+ or AD-844 MS adhesive on the new surface. Install the selected AcoustiTECH™ membrane. Apply a second coat of AD-316, AD-532+ or AD-844 MS adhesive and finally install the engineered wood flooring or laminate.
 - FLOATING: Spread the AcoustiTECH™ Premium or VP membrane and apply tape over all joints to hold in place while laying the floor. Install engineered floating wood floors or laminate (Lock or Click).

- See next page for an assembly type

Electric radiant heating • Engineered flooring or floated floor

2.1 Installation method with trowel and mortar, cables under the membrane

Assembly type on wood or concrete subfloor



Radiant hydronic (liquid) • Floor all categories

3.1 Installation method with all types of floor

Recommended membranes: AcoustiTECH™ 7000, 5000, 3500, AcoustiTECH™ Lead 6, Lead 4.5, Lead 3.3, Acousti-TECH™ Ceramic, AcoustiTECH™ Premium or AcoustiTECH™ VP

GENERAL INFORMATION

1. Be sure to read and understand the installation guides for radiant heating system, the membrane of flooring and accessories **before starting work**. When in doubt about the steps or guidelines to follow, call for service from the concerned manufacturer.
2. Before installation, ensure that the support is structurally sound, dry, solid, stable and levelled. Surfaces must be clean and free of contaminants (grease, old adhesive, sealant, paint). If the support has deficiencies, correct them immediately according to the principles and recommendations set by the flooring industry before continuing installation.
3. Carefully respect the cure time recommended by the manufacturers of adhesive, mortar, grouts and levelling. The cure time of the products used may vary depending on environmental conditions.
4. Before starting the installation of your heating system, refer to the manufacturer's written recommendations. To take full advantage of your radiant floor system, it is generally required to adjust the operating temperature to a heat below 85°F (29°C). Heat kept above this temperature may damage your flooring prematurely.
5. Make sure that the floor area, during and after installation, never exceeds the emission rate of water vapor recommended by the manufacturer of the floor covering and adhesive.
6. It is the installer's responsibility to verify and comply with all the recommendations set by the manufacturers of products used.
7. It is the end user of the facility's responsibility to understand and implement the instructions for use and maintenance set by the manufacturers of products used.

APPLICATIONS

1. Make sure the installed radiant system has been tested, it does not leak and is ready to receive flooring.
2. Before proceeding with the installation of the membrane, we must ensure that the surface meets the flooring manufacturer's recommendations in regard to the flatness of the surface and its rate of water vapor emission and the surface is free of imperfections.
3. Install AcoustiTECH™ membranes and flooring :

Engineered wood or floating

- SINGLE GLUED-DOWN: Apply AD-532+ or AD-844 MS adhesive (see note below) on the new surface and install the engineered wood flooring or laminate.
- DOUBLE GLUED-DOWN: Apply a first coat of AD-532+ or AD-844 MS adhesive (see note below) on the new surface, install the selected AcoustiTECH™ membrane, apply a second layer of AD-532+ adhesive, finally install the engineered wood flooring or laminate.
- FLOATING: Install Acousti-Tech™ membranes with a vapor barrier (**AcoustiTECH™ Premium** and **AcoustiTECH™ VP** membranes). Install the membrane according to the manufacturer's recommendations. Make sure to seal joints and openings made in the vapour barrier. To seal the joints use a adhesive tape like "Red sheathing Tuck Tape™" or "3M™ 8088 Red construction sheathing Tape" (or equivalent). Finally install the engineered wood flooring or laminate.

Ceramic or natural stone

- Install AcoustiTECH™ Ceramic membrane with AD-280 adhesive (see note below), depending on the situation and according to AcoustiTECH™ installation guide.
- Install your ceramic as directed using a premium polymer modified mortar such

as Mapei Keraflex RS (or equivalent) with the recommended trowel. Let dry and harden.

- Finish by filling the joints using a grout suitable for this type of installation, such as Mapei Ultracolor Plus FA (or equivalent). Allow the joints to harden. Prohibit traffic on the surface for a period of 72 hours.

NOTE

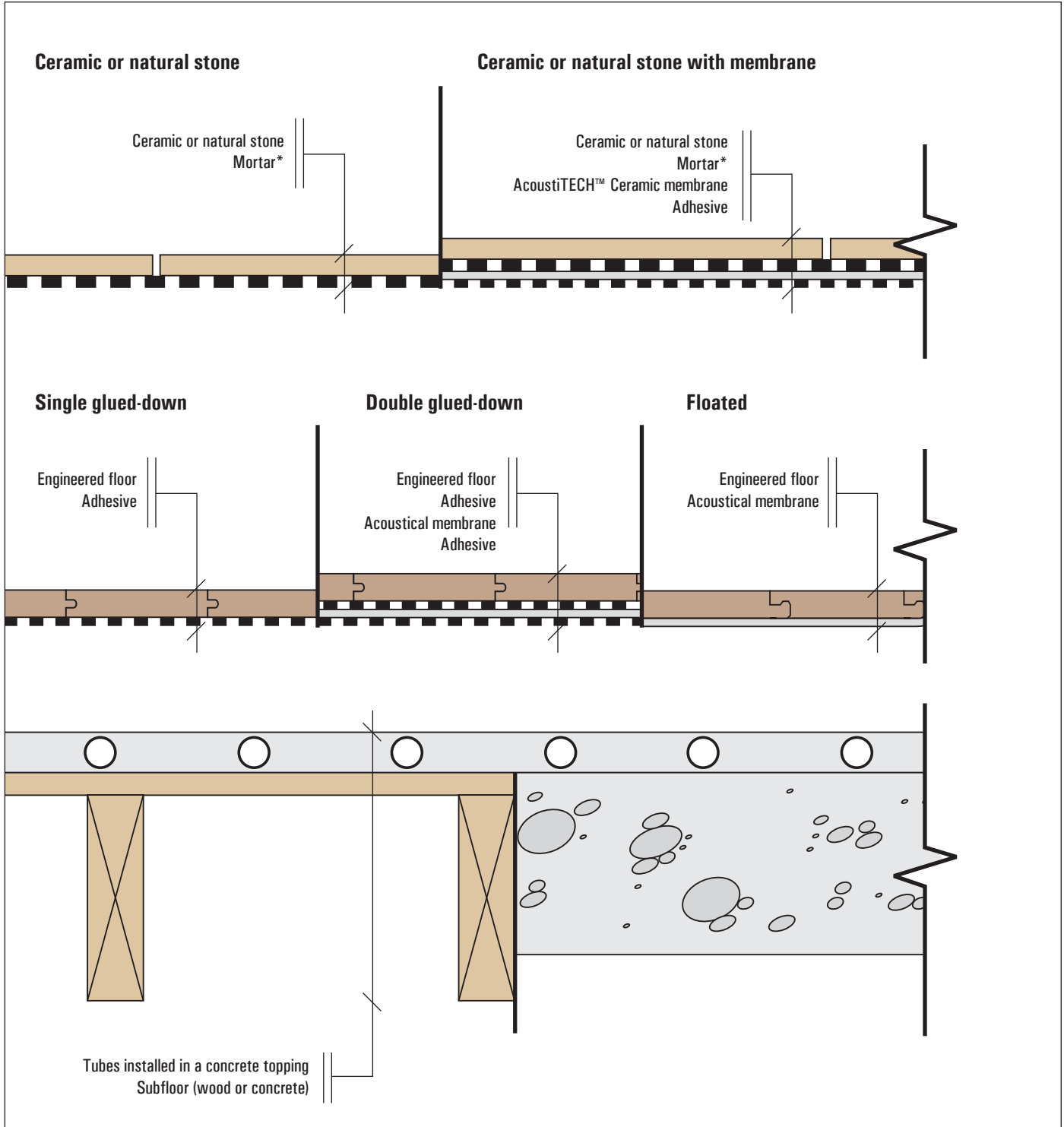
It is not recommended to use AD-316 adhesive for the installation of flooring over hydronic radiant systems, use the AD-844 MS, AD-532+ or AD-280 adhesive instead.

- See next page for an assembly type

Radiant hydronic (liquid) • Floor all categories

3.1 Installation method with all types of floor

Assembly type on wood or concrete subfloor



* It is recommended to use a premium polymer modified mortar, such as Mapei Keraflex RS

Heat transfer principles

4.

Heat transport in a floor assembly equipped with a radiant heating system and an acoustical membrane.

Text aimed to help understand the distribution of energy as heat. Explanations are given on the diffusion of heat through a radiant heating system located under an acoustical membrane which is itself covered with wood floor.

There are three types of energy transfer (heat) in thermodynamics. There is **radiation**, **convection** and **conduction**. All three may act jointly or independently depending on the heating type chosen.

Radiation heat is as a type of heat that is transported in the form of energy waves. When this energy comes in contact with construction materials like flooring, it is transformed into heat. The higher the density and more compact a product, the more likely it is to capture the energy and warmth. AcoustiTECH™ membrane is lower in density than wood and is quite porous; it will therefore not tend to hold this radiation.

Convection is the transportation of heat by air movement. Air is heated through contact with a hot surface. This heats up the air, causing it to increase in volume and become buoyant and rise. In this case, the heat is created by wires and the heat mass is created by the heated subfloor. The heat will pass through the AcoustiTECH™ membrane as it is made of synthetic nonwoven fibers and will naturally transfer warm air toward the floor.

Conduction is the mode of heat transfer that requires direct contact between two materials. Density is a major element that promotes heat transfer. In the case of AcoustiTECH™ membranes, direct contact is less, but this will be offset by the saturation of the hot air that is between the subfloor and the floor.

Finally, when using a radiant heat system, the predominant mode of energy transportation is radiation and the other types and used to a lesser degree. The R factor only moderately affects the membrane performance of the radiant heat system. We must contemplate the various modes of thermal energy (heat) and consider all of these phenomena.