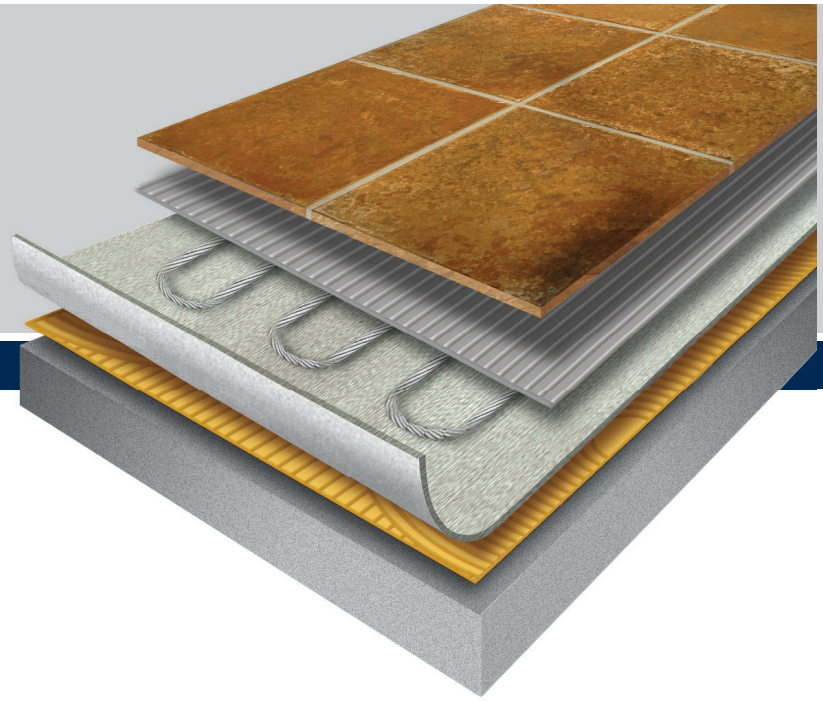
Guide for preparing a subfloor equipped with a radiant heating system



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.

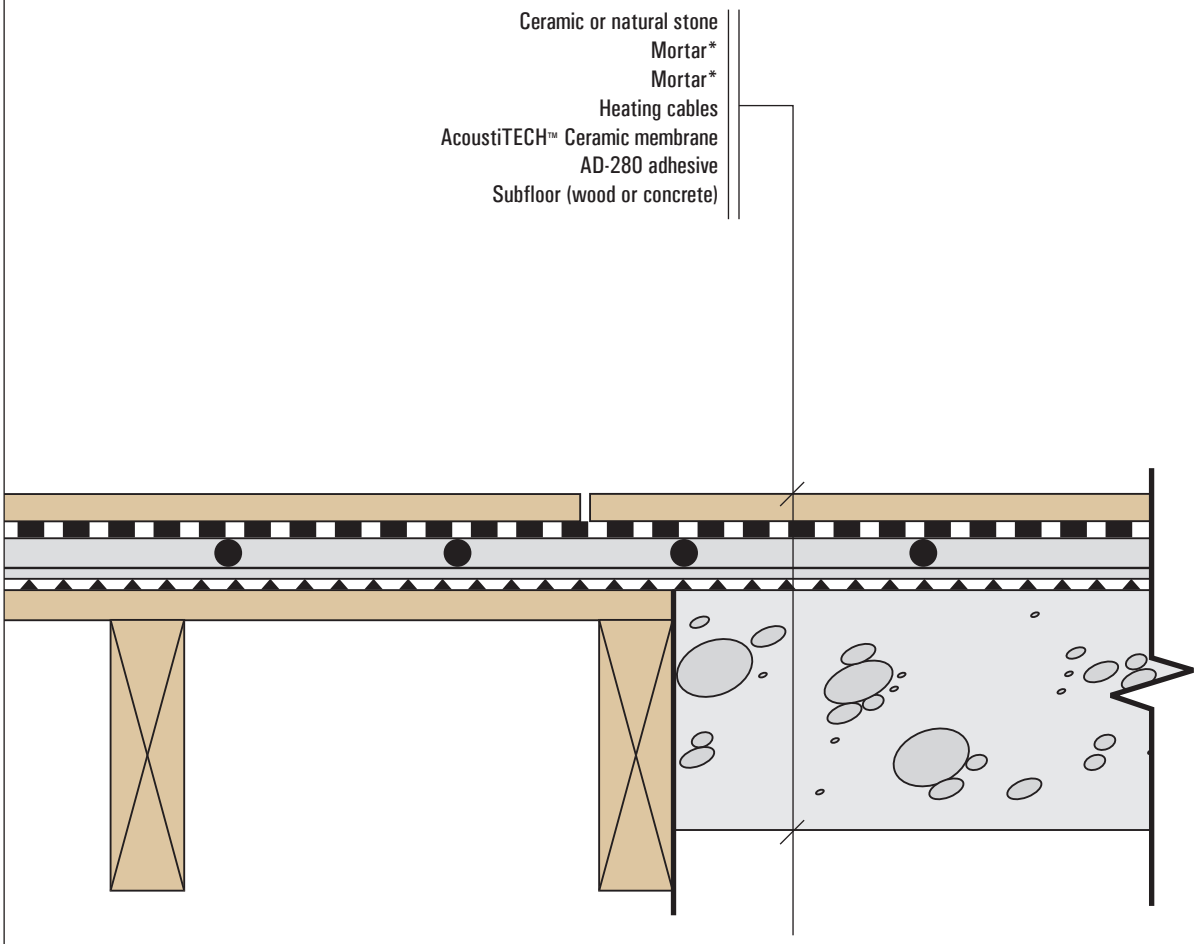
NOTE

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**

Assembly type on wood or concrete subfloor



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

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 MapeiUltracolor Plus FA (or equivalent). Allow to dry and harden. Prohibit traffic on the area of 72 hours

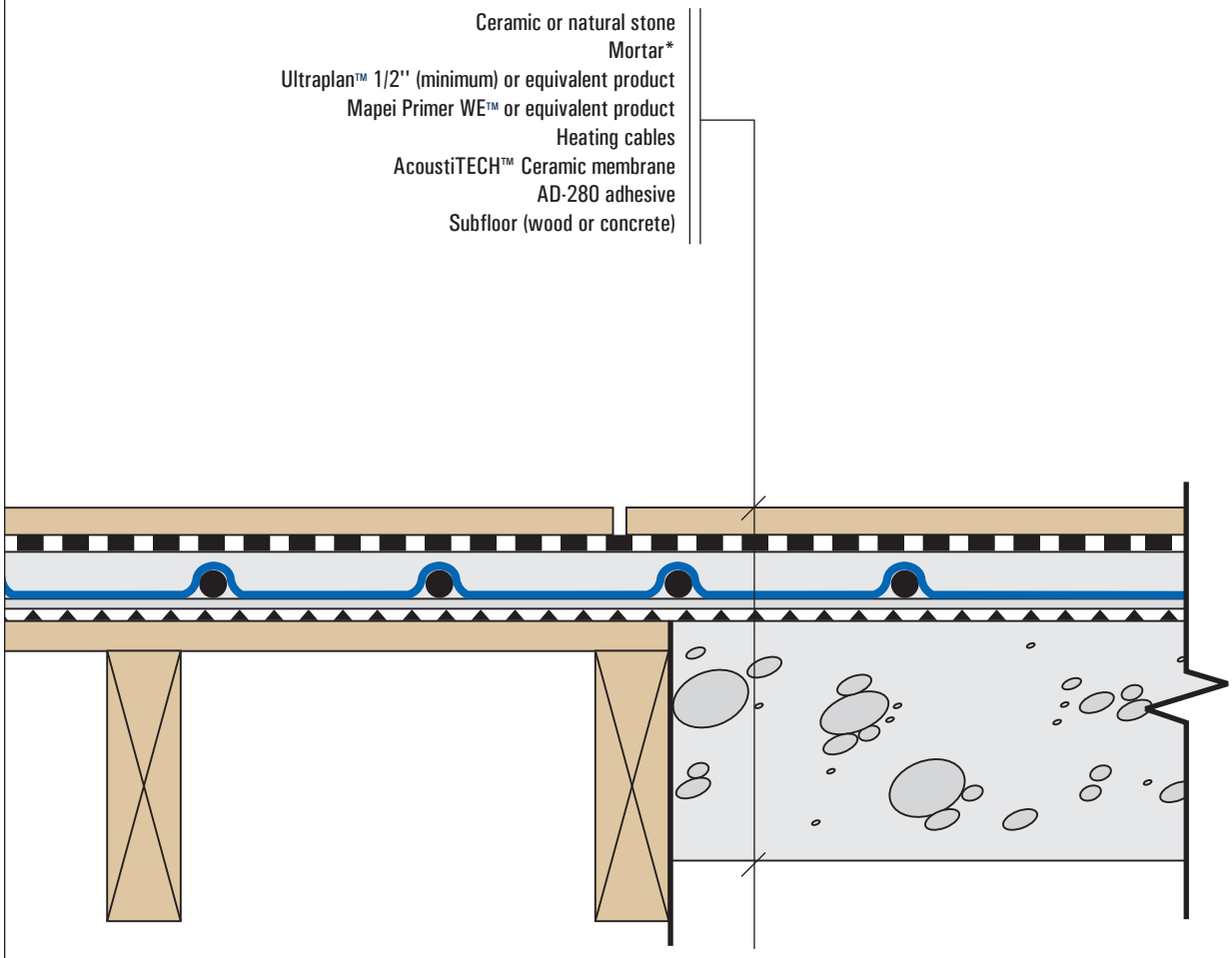
NOTE

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**

Assembly type on wood or concrete subfloor



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

Electric radiant heating • Engineered flooring or floated floor

2.1 Installation method with trowel and mortar, 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.

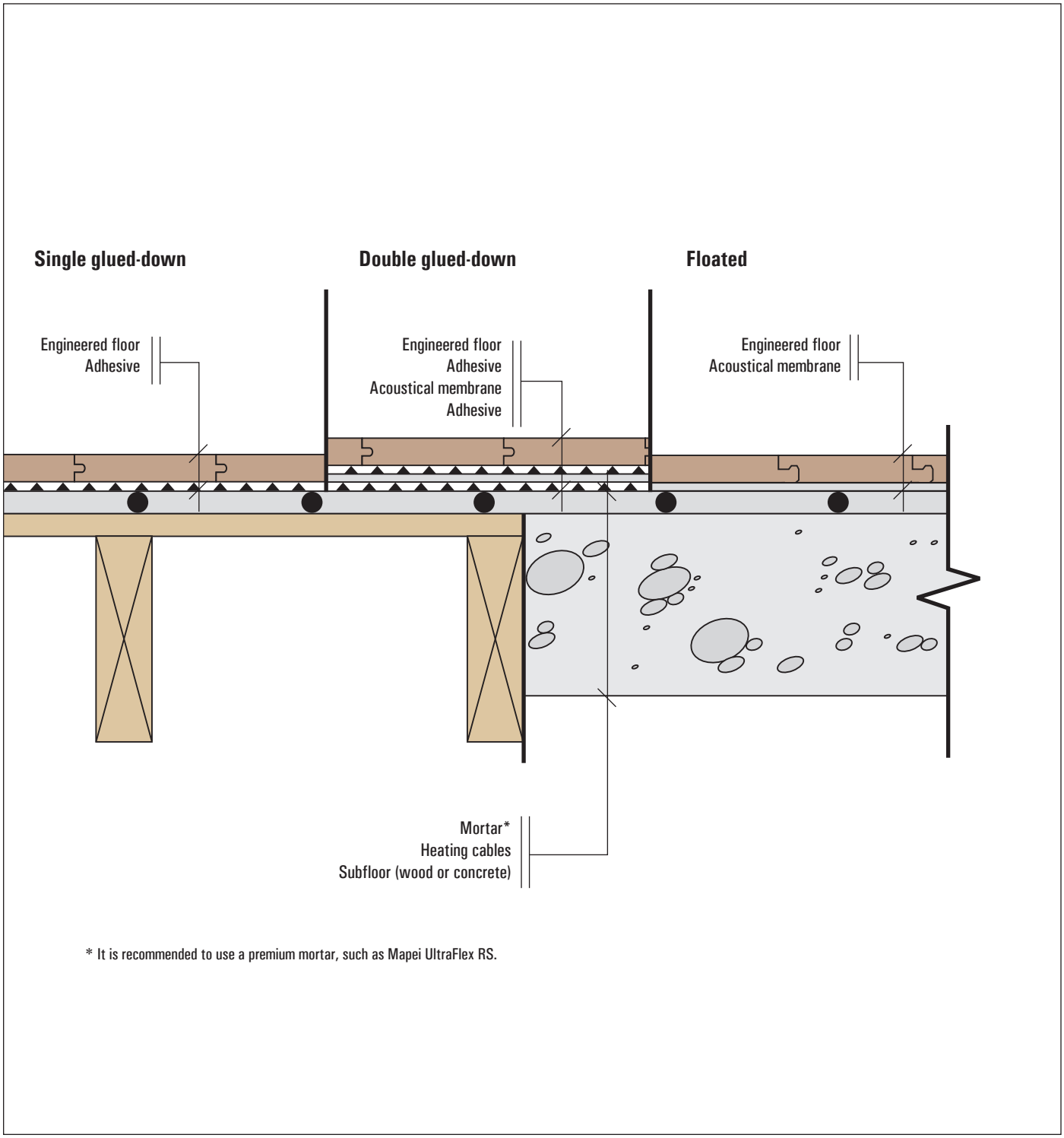
APPLICATIONS

1. Install heating cables on the selected AcoustiTECH™ 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.
2. 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 or 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.
3. Allow to cure at least 24 hours for Mapei Keraflex RS 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)).
4. 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.
5. Make sure that the moisture vapour emission rate of in the concrete does not exceed the manufacturer's recommendations for flooring.

6. 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**

Assembly type on wood or concrete subfloor



* It is recommended to use a premium mortar, such as Mapei UltraFlex RS.

Electric radiant heating • Engineered flooring or floated floor

2.2 Installation method with self-levelling compound

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 the selected AcoustiTECH™ membrane with AD-316, AD-532+ or AD-844 MS adhesive depending on the situation and according to the AcoustiTECH™ installation guide. Note: This membrane will create a thermal break and maximize heat transfer to above. This will avoid unnecessary heating of the concrete in the assembly, save energy and money.
2. Install heating cables on the selected AcoustiTECH™ membrane according to the radiant system manufacturer's guide. The cables will be held in place with hot glue or the provided mechanism and according to manufacturer's recommendations. The choice must absolutely be authorized by the heating cables manufacturer.
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 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 self-leveling Ultraplan 1™ or Ultraplan Easy™ (or equivalent). Apply self-leveling compound according to the manufacturer of cement product and heating cables recommendations. 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 has entirely cured.
6. Make sure that the moisture vapor emission rate of in the concrete does not exceed the manufacturer's recommendations for flooring.
7. 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 Acousti-Tech 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 Acousti-Tech™ 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).

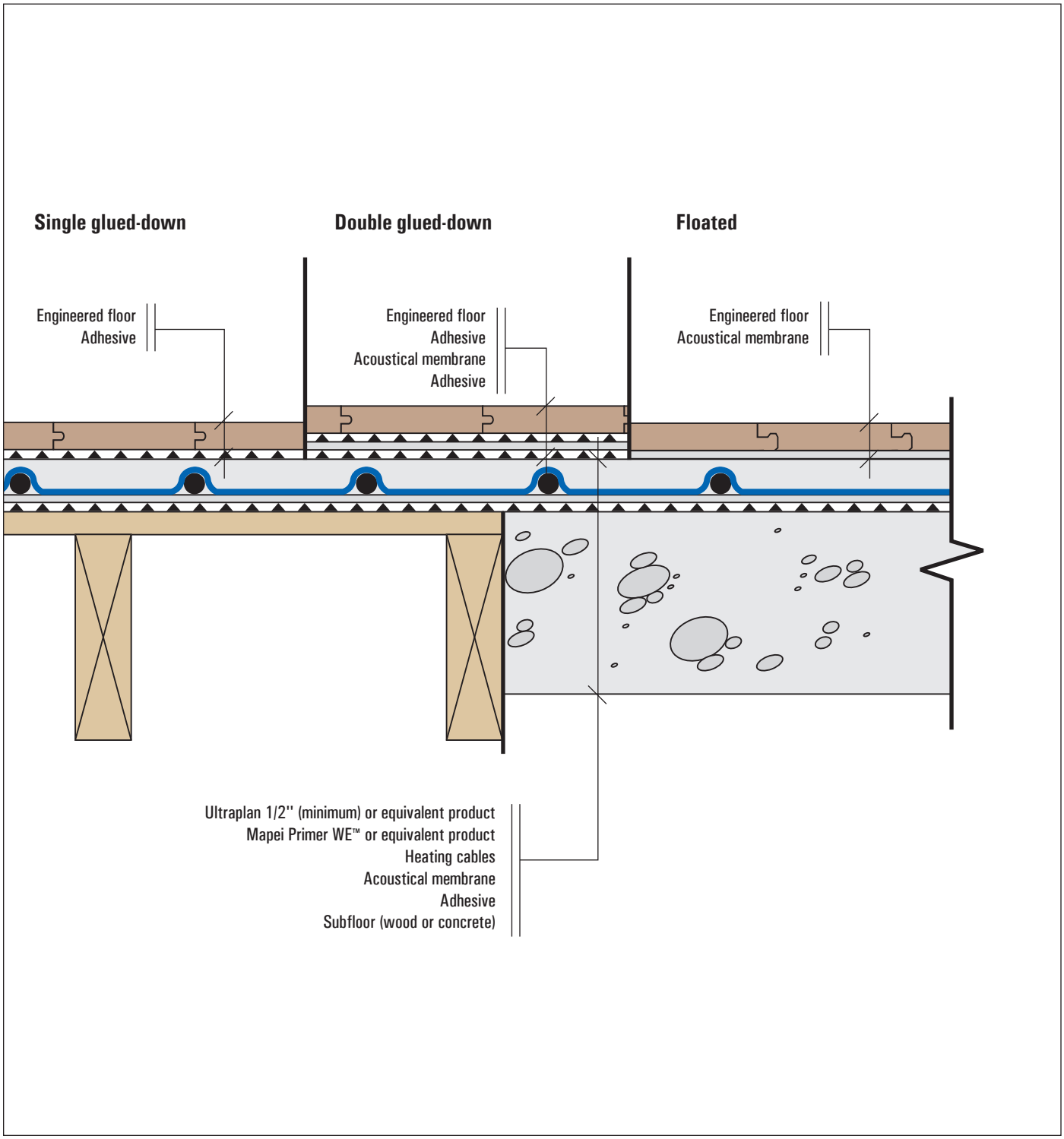
NOTE

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

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 MapeiUltracolor 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