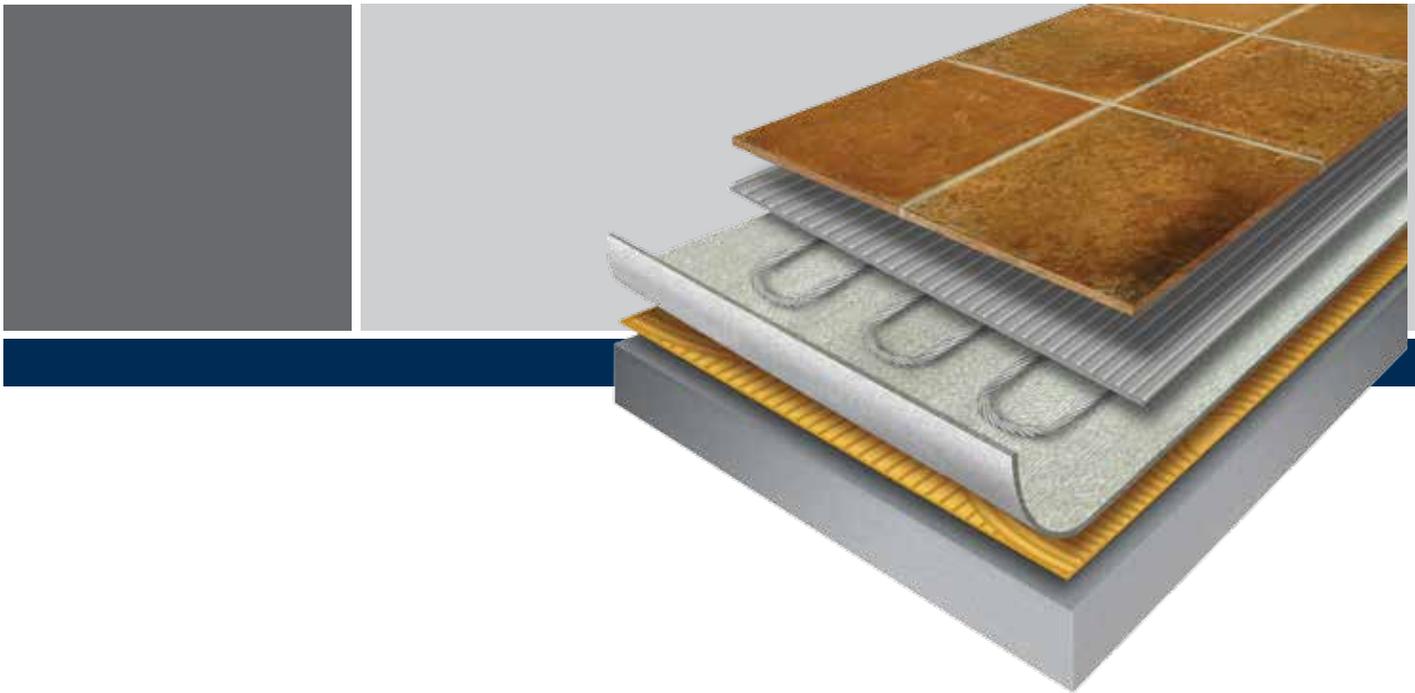


Guide for preparing a subfloor equipped with a radiant heating system



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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 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 latex mortar such as Mapei Ultraflex LFT¹ or Kerabond / Keralastic² (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 to cure (at least 24 hours for Mapei Ultraflex LFT¹ or Kerabond / Keralastic²) 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 latex mortar such as Mapei Ultraflex LFT¹ or Kerabond / Keralastic² with the recommended trowel. Let dry and harden.

6. Finish by filling the joints using a grout containing sand and polymers suitable for this type of installation, such as Mapei Keracolor³ (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.

DESCRIPTIONS

¹ Ultraflex LFT: Premium large-format tile and stone mortar with polymer.

² Kerabond / Keralastic: Two part high-performance system, Keralastic, a second-generation "flexible" acyclic latex is used to enhance the performance of Kerabond, a premium-grade mortar.

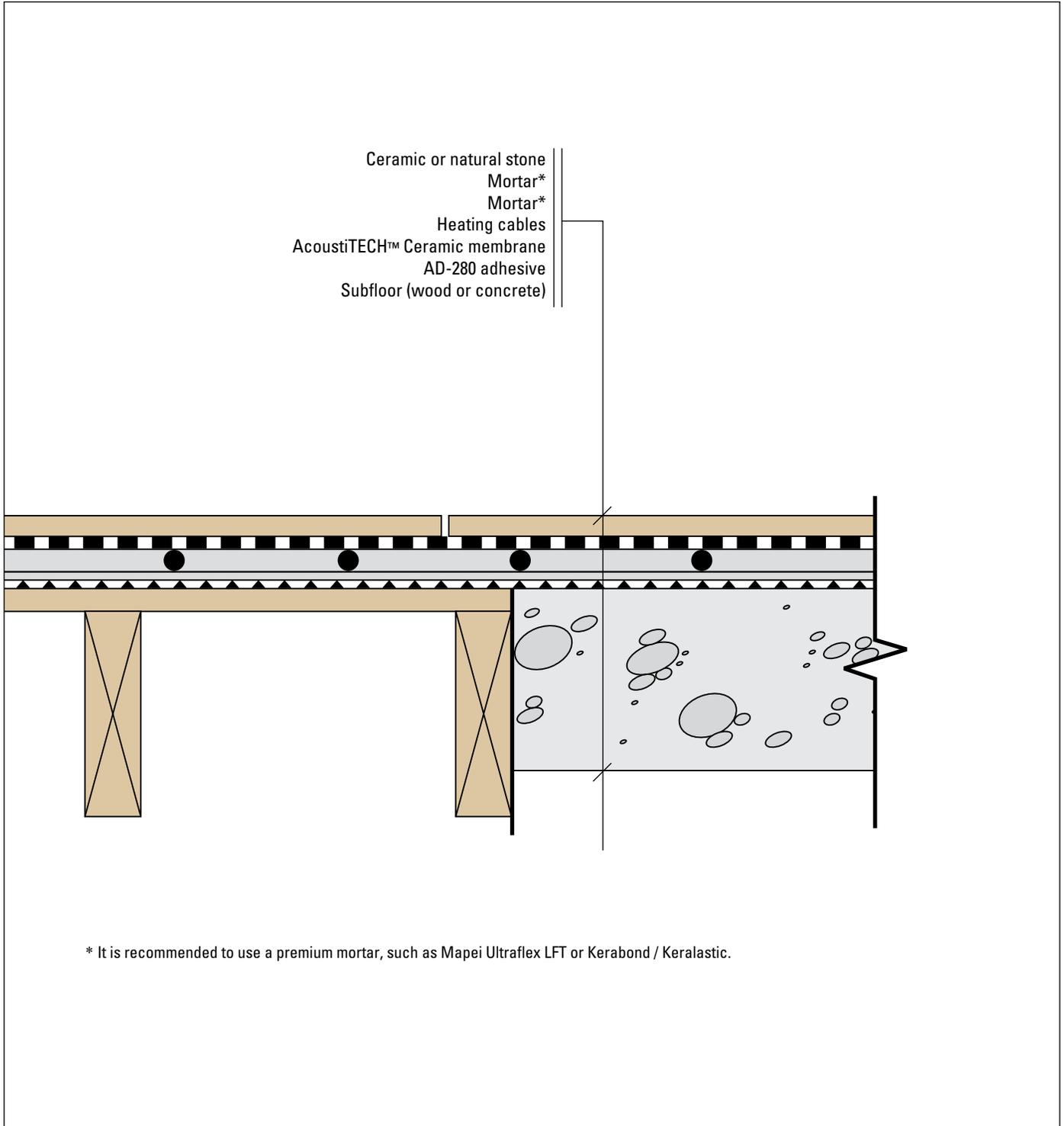
³ Keracolor: Premium pre-blended, polymer-modified sanded, Portland-cement tile grout that requires only the addition of water for mixing.

• 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 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 latex mortar such as Mapei Ultraflex LFT¹ or Kerabond / Keralastic² (or equivalent) with the recommended trowel. Let dry and harden.
8. Finish by filling the joints using a grout containing sand and polymers suitable for this type of installation such as Mapei Keracolor³ (or equivalent). Allow to dry and harden. Prohibit traffic on the area of 72 hours

DESCRIPTIONS

- ¹ Ultraflex LFT: Premium large-format tile and stone mortar with polymer.
- ² Kerabond / Keralastic: Two part high-performance system, Keralastic, a second-generation "flexible" acyclic latex is used to enhance the performance of Kerabond, a premium-grade mortar.
- ³ Keracolor: Premium pre-blended, polymer-modified sanded, Portland-cement tile grout that requires only the addition of water for mixing.

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.

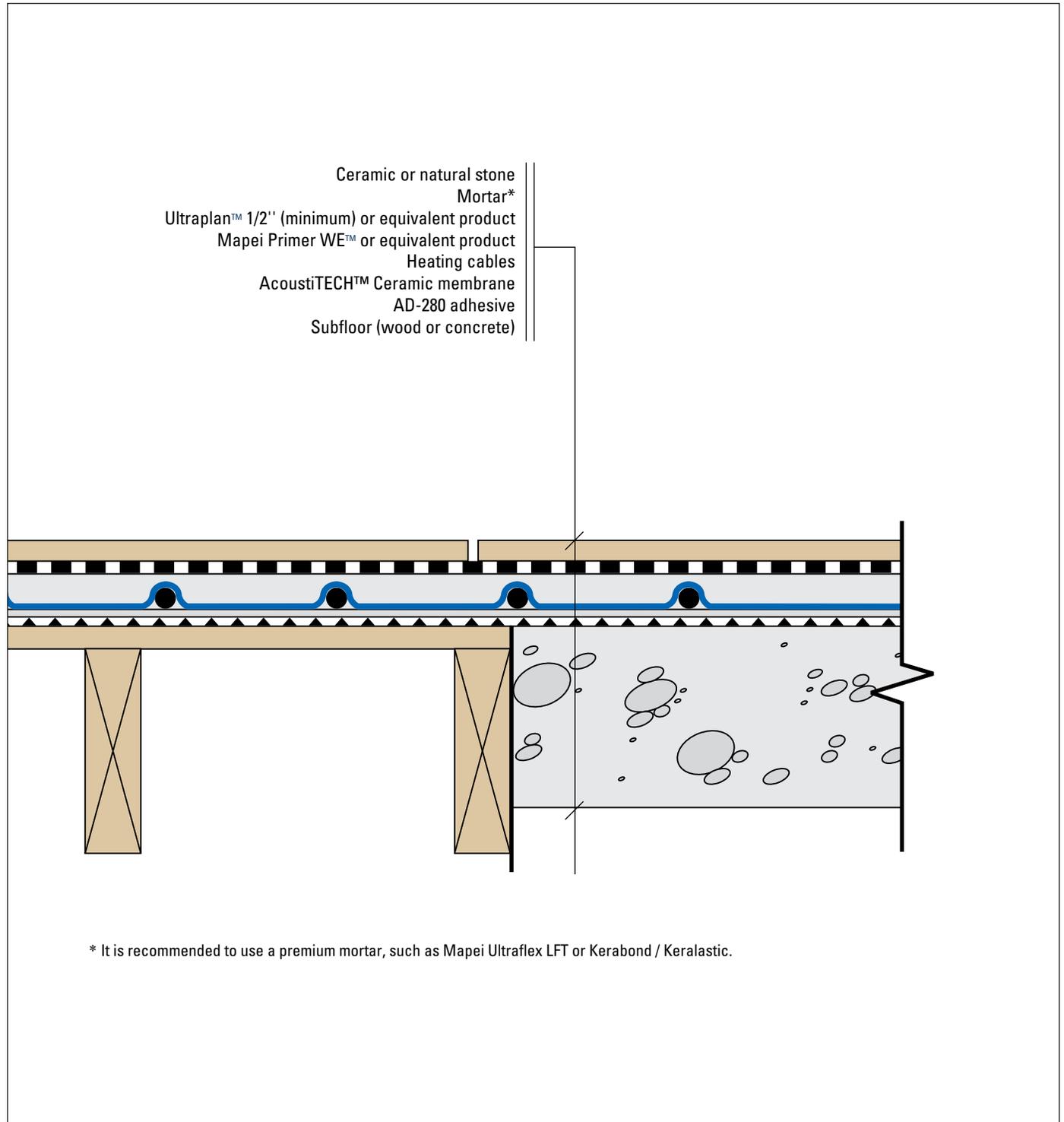
The placement of a second membrane between the thermo-acoustic assembly and radiant flooring, as described above in laying a DOUBLE GLUED-DOWN or FLOATING, will provide greater thermal and acoustical comfort.

• 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 • 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 latex mortar such as Mapei Ultraflex LFT¹ or Kerabond / Keralastic² (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 Ultraflex LFT¹ or Kerabond / Keralastic²) 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).

NOTE

The glued-down installation of the AcoustiTECH™ Ceramic with the adhesive AD-280 according to the installation guide, under the radiant system, optimize the thermal and acoustic comfort. Follow the application steps 1 to 6 of the Applications section.

DESCRIPTIONS

¹ Ultraflex LFT: Premium large-format tile and stone mortar with polymer.

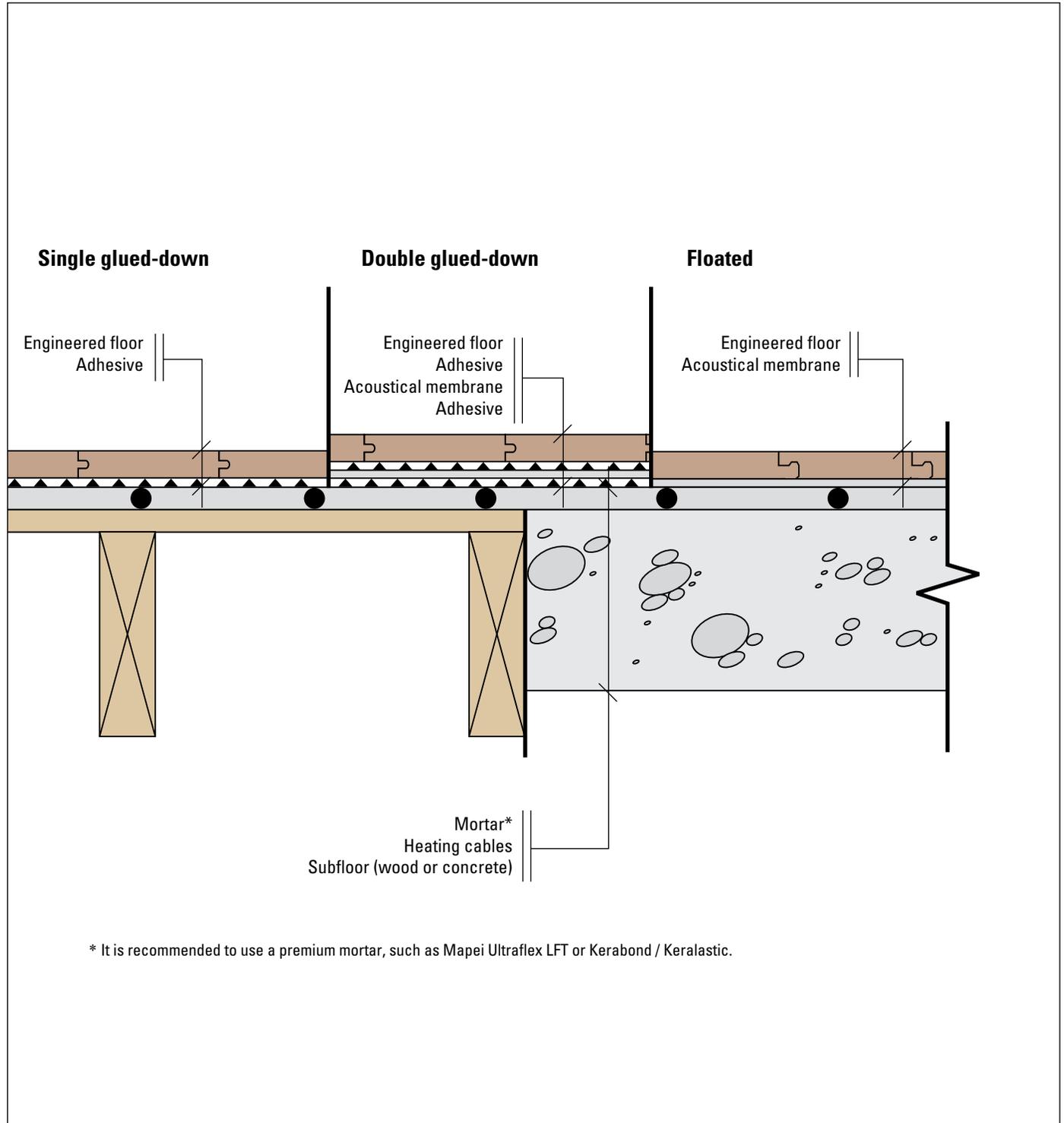
² Kerabond / Keralastic: Two part high-performance system, Keralastic, a second-generation "flexible" acyclic latex is used to enhance the performance of Kerabond, a premium-grade mortar.

• 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



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.
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.

The placement of a second membrane between the thermo-acoustic assembly and radiant flooring, as described above in laying a DOUBLE GLUED-DOWN or FLOATING, will provide greater thermal and acoustical comfort.

- See next page for an assembly type

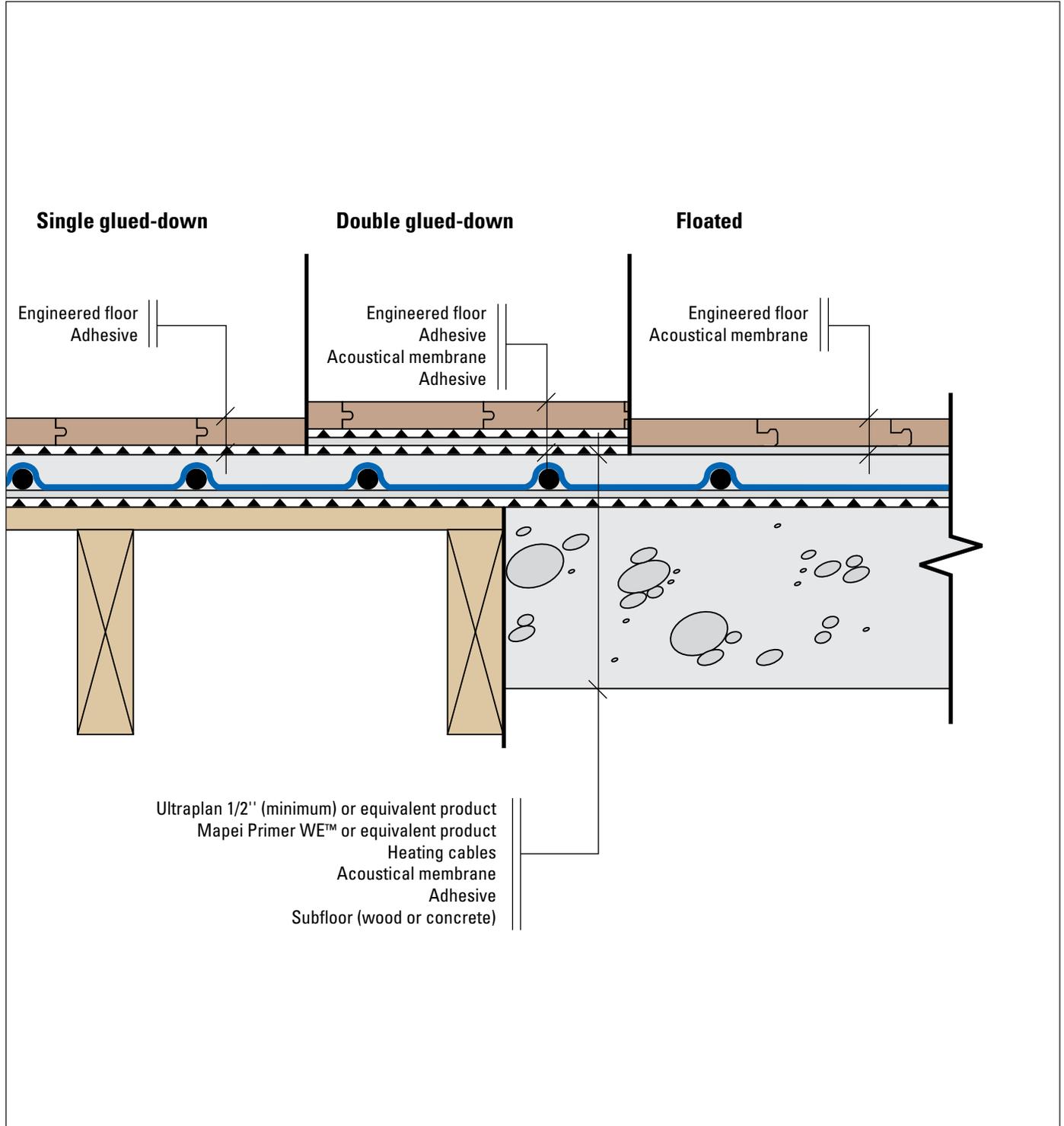
APPLICATIONS

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.

Electric radiant heating • Engineered flooring or floated floor

2.2 Installation method with self-levelling compound

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 an 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 latex mortar such as Mapei Ultraflex LFT¹ or Kerabond / Keralastic² (or equivalent) with the recommended trowel. Let dry and harden.
- Finish by filling the joints using a grout containing sand and polymers suitable for this type of installation, such as Mapei Keracolor³ (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.

DESCRIPTIONS

¹ Ultraflex LFT: Premium large-format tile and stone mortar with polymer.

² Kerabond / Keralastic: Two part high-performance system, Keralastic, a second-generation "flexible" acyclic latex is used to enhance the performance of Kerabond, a premium-grade mortar.

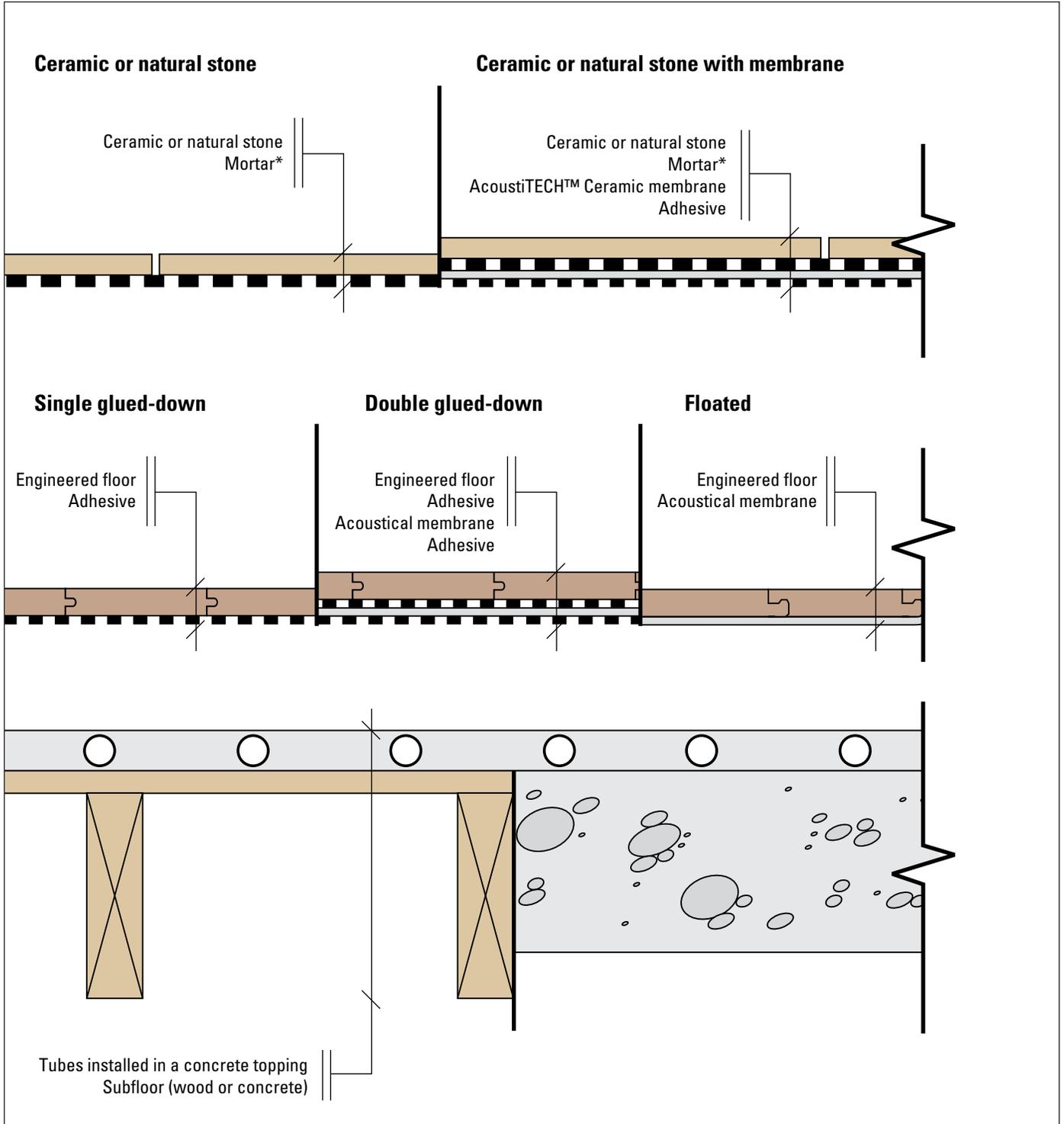
³ Keracolor: Premium pre-blended, polymer-modified sanded, Portland-cement tile grout that requires only the addition of water for mixing.

• 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 mortar, such as Mapei Ultraflex LFT or Kerabond / Keralastic.

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.