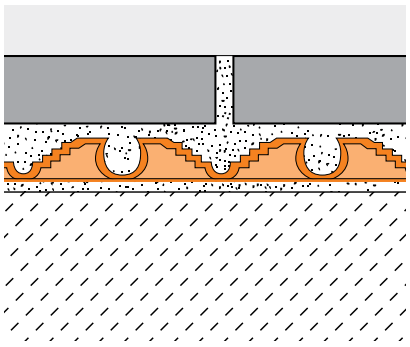
Schluter® Systems

PROFILE OF INNOVATION

Schluter®-DITRA-HEAT Installation Handbook 2015



Confidence - Security
Schluter® Systems
PROFILE OF INNOVATION
Since 1975

Electric Floor Warming System with Integrated Uncoupling Technology

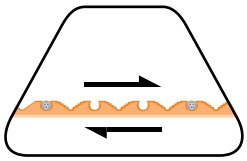
Schluter®-DITRA-HEAT

Electric Floor Warming System with Integrated Uncoupling Technology

Ceramic and stone tiles are the ideal surface coverings because they are durable, easy to maintain, and hygienic. However two common barriers to the selection of tile as a floor covering are concerns about cracking and the perception that tiles are cold.

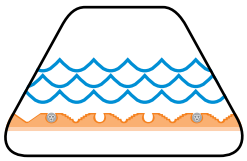
Floor warming systems are a growing trend in tile applications, but none address concerns about cracking. A viable installation system must address the magnified fluctuations in temperature that contribute to increased shear stresses between the substrate and the tile covering. **Schluter®-DITRA-HEAT** integrates customizable, comfortable electric floor warming with the functions associated with DITRA: uncoupling, waterproofing, vapor management and support to ensure a long lasting installation.

DITRA-HEAT combines the flexibility of loose heating cables with the ease of installation of mat systems. Cables can be placed wherever heat is desired, without creating height differences in the floor. Self-leveling compounds are not required to encapsulate the cables, significantly reducing installation time and effort compared to uncoupling membranes over other electric floor warming systems.



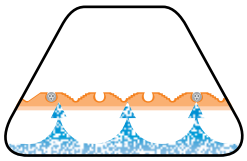
Uncoupling

Tile has been successfully installed for thousands of years by incorporating an uncoupling layer, or forgiving shear interface, within the tile assembly. **DITRA-HEAT** provides uncoupling through its geometric configuration, which allows for in-plane movement that effectively neutralizes the differential movement stresses between the substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.



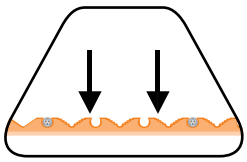
Waterproofing

DITRA-HEAT provides reliable waterproofing. Its polypropylene composition protects the substrate from moisture penetration, which is particularly important in today's building environment where most substrates are moisture sensitive.



Vapor Management

The free space on the underside of **DITRA-HEAT** provides a route for excess moisture and vapor to escape from the substrate that could otherwise cause damage to the tile covering above. Thus, DITRA-HEAT effectively manages moisture beneath the tile covering.



Support/Load Distribution

When placed on a solid foundation, columns or pillars can support tremendous loads. The same physical principle applies to **DITRA-HEAT** installations. Column-like mortar structures are formed in and between the studs on the surface of the matting. Loads are transferred from the tile covering through these column-like mortar structures to the substrate. Since DITRA-HEAT is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

Legend	
★★★	Essential
★★	Significant
★	Helpful

Schluter®-Systems' written installation instructions shall have precedence over referenced industry standard guidelines and installation procedures insofar as referenced information may contain overlapping or conflicting requirements. Type, thickness, and format of the ceramic or stone tile surface covering must be suitable for the intended application.

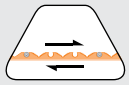
CONTENTS

Heating cables must be installed by a qualified person in accordance with this handbook and with the National Electric Code (USA) or Canadian Electric Code Part I (CAN) as applicable. All electrical connections must be made by a qualified electrician, according to the electrical and building codes effective in your region.

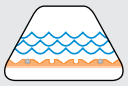
WOOD

Every substrate presents unique challenges

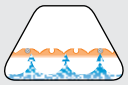
All wood materials, including OSB, plywood, and framing members, are subject to expansion, contraction, bending, and deflection as a result of changes in moisture content and loading. Further, these deformations fluctuate over the life of the building structure.



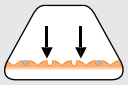
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering from the aforementioned deformations by neutralizing the differential movement stresses between the wood structure and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface. Therefore, DITRA-HEAT can replace a second layer of plywood in most applications.



Since wood structures are sensitive to moisture, DITRA-HEAT's waterproofing function adds an essential element to the flooring assembly by providing simple, effective, and permanent moisture protection.



Wood continually absorbs and releases moisture. The free space beneath the DITRA-HEAT membrane allows the wood to breathe and provides a route for any residual moisture in the wood substrate to escape.



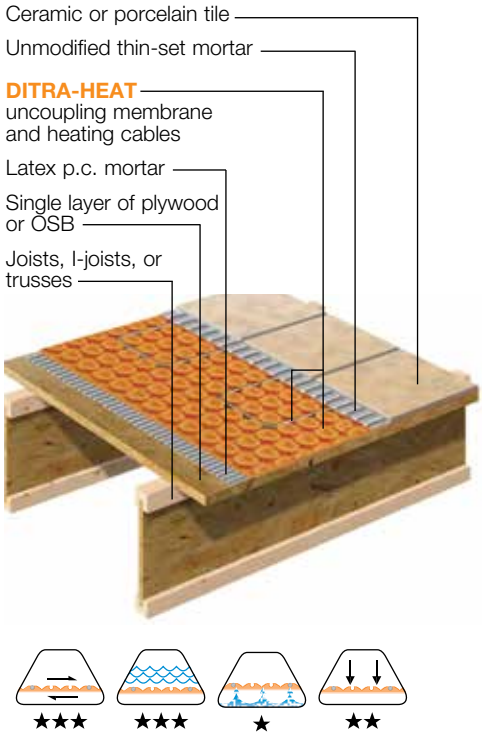
Since DITRA-HEAT is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

By addressing all of the challenges associated with today's fast, lightweight construction methods, DITRA-HEAT provides a durable installation system for ceramic and stone tile over wood substrates.

DITRA-HEAT combines the flexibility of loose heating cables with the ease of installation of mat systems. Cables can be placed wherever heat is desired, without creating height differences in the floor. Self-leveling compounds are not required to encapsulate the cables, significantly reducing installation time and effort compared to uncoupling membranes over other electric floor warming systems.

Floors, Interior - Ceramic or Porcelain Tile

DH-W16-T-15



16" *(406 mm)* o.c. joist spacing, single layer OSB or plywood subfloor

Areas of Application
- over any even and structurally sound OSB or plywood subfloor with 16" (406 mm) o.c. joist spacing
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile
- for natural stone, see detail DH-W-S (page 6) and natural stone discussion (page 23)

Requirements
- maximum spacing of joists, I-joists, or floor trusses is 16" *(406 mm)* o.c.
- minimum subfloor thickness – 19/32", 5/8" nom. *(16 mm)* tongue-and-groove with 1/8" *(3 mm)* gap between sheets.

Substrate Preparation
- verify that subfloor panels are properly fastened to framing members.
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

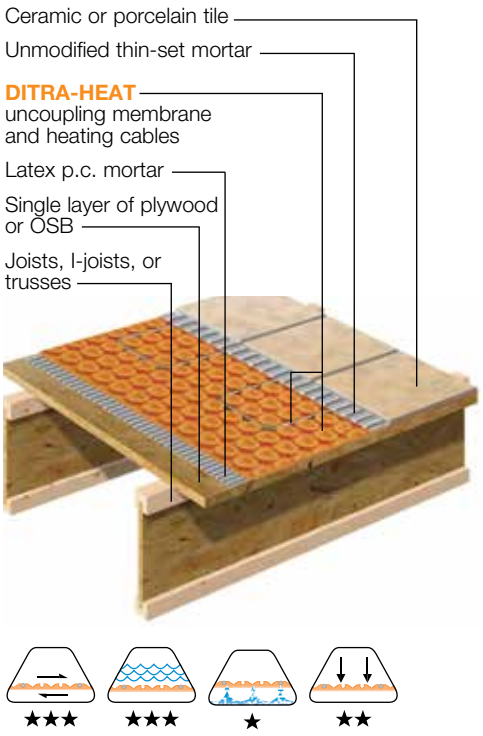
Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- latex portland cement (p.c.) mortar – ANSI A118.11
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- tightly butted and/or tented plywood or OSB seams must be addressed prior to installing DITRA-HEAT.
- vapor barrier on crawl space floors according to regional building codes.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.

DH-W19-T-15



19.2" *(488 mm)* o.c. joist spacing, single layer OSB or plywood subfloor

Areas of Application
- over any even and structurally sound OSB or plywood subfloor with 19.2" *(488 mm)* o.c. joist spacing
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile
- for natural stone, see detail DH-W-S (page 6) and natural stone discussion (page 23)

Requirements
- maximum spacing of joists, I-joists, or floor trusses is 19.2" *(488 mm)* o.c.
- minimum subfloor thickness – 23/32", 3/4" nom. *(19 mm)* tongue-and-groove with 1/8" *(3 mm)* gap between sheets.

Substrate Preparation
- verify that subfloor panels are properly fastened to framing members.
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

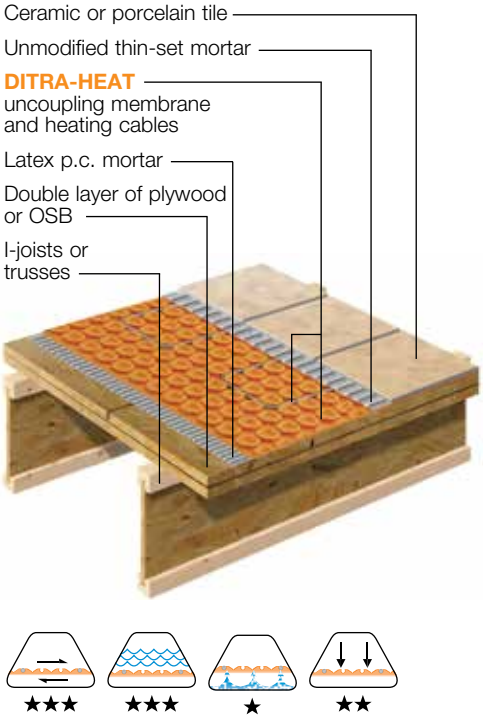
Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- latex portland cement (p.c.) mortar – ANSI A118.11
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- tightly butted and/or tented plywood or OSB seams must be addressed prior to installing DITRA-HEAT.
- vapor barrier on crawl space floors according to regional building codes.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.

DH-W24-T-15



24" *(610 mm)* o.c. joist spacing, double layer OSB or plywood subfloor

Areas of Application
- over any even and structurally sound double layer OSB or plywood floor
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile

Requirements
- maximum spacing of joists, I-joists, or floor trusses is 24" *(610 mm)* o.c.
- double layer wood floor consisting of:
  - minimum subfloor thickness – 23/32", 3/4" nom. *(19 mm)* tongue-and-groove
  - minimum underlayment thickness – 11/32", 3/8" nom. *(10 mm)*

Substrate preparation
- verify that subfloor panels are properly fastened to framing members.
- underlayment – minimum 11/32", 3/8" nom. *(10 mm)*-thick Exposure 1, plugged-face plywood or OSB with 1/8" *(3 mm)* gap between sheets; see page 14 for underlayment installation guidelines.
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

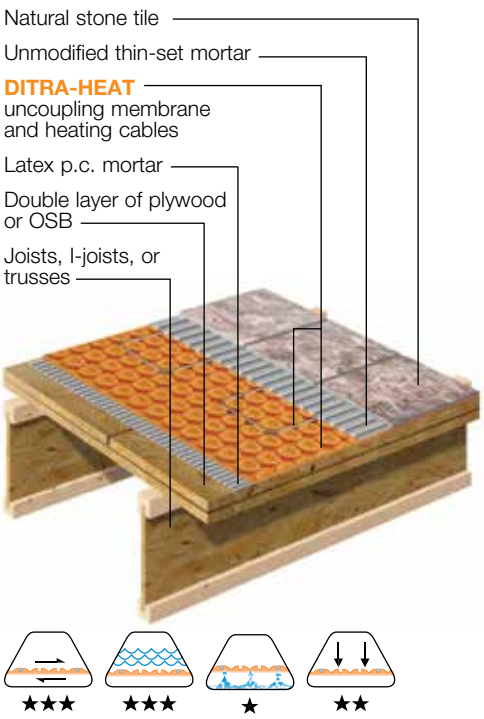
Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- latex portland cement (p.c.) mortar – ANSI A118.11
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- tightly butted and/or tented plywood or OSB seams must be addressed prior to installing DITRA-HEAT.
- vapor barrier on crawl space floors according to regional building codes.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.

DH-W-S-15



Double layer of OSB or Plywood subfloor

Areas of Application
- over any even and structurally sound double layer OSB or plywood floor
- interior dry or wet areas

Limitations
- requires double layer wood floor regardless of joist spacing
- minimum 2" x 2" *(50 mm x 50 mm)* tile

Requirements
- maximum spacing of joists, I-joists, or floor trusses is 24" *(610 mm)* o.c.
- double layer wood floor consisting of:
  - minimum subfloor thickness – 23/32", 3/4" nom. *(19 mm)* tongue-and-groove
  - minimum underlayment thickness – 11/32", 3/8" nom. *(10 mm)*

Substrate Preparation
- verify that subfloor panels are properly fastened to framing members.
- underlayment – minimum 11/32", 3/8" nom. *(10 mm)*-thick Exposure 1, plugged-face plywood or OSB with 1/8" *(3 mm)* gap between sheets; see page 14 for underlayment installation guidelines.
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

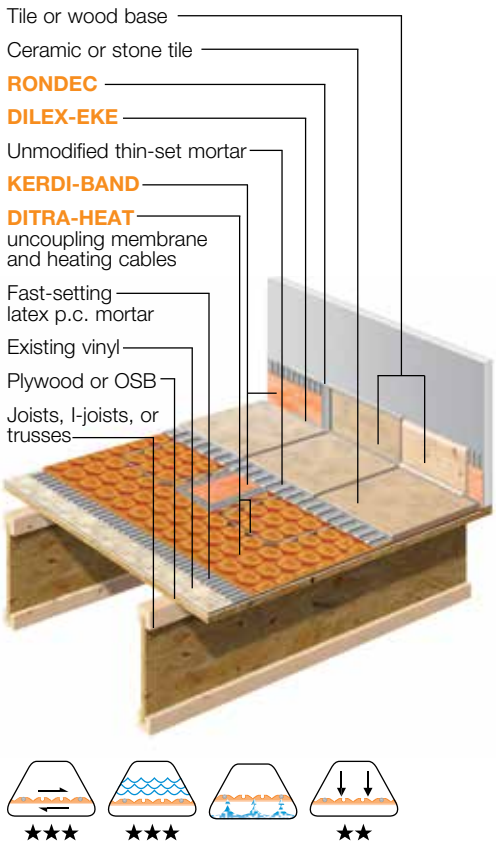
Setting and Grouting Materials
- latex portland cement (p.c.) mortar – ANSI A118.11
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.
- tightly butted and/or tented plywood or OSB seams must be addressed prior to installing DITRA-HEAT.
- vapor barrier on crawl space floors according to regional building codes.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.

Floors, Interior - Existing Vinyl Floors

DH-V-T-15



Areas of Application
- over any even and structurally sound substrate with existing vinyl flooring
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile
- cushioned vinyl unacceptable
- perimeter bonded vinyl flooring unacceptable
- multiple layers of vinyl unacceptable

Requirements
- for wood substrates, subfloor/underlayment configuration according to detail DH-W16-T, DH-W19-T, DH-W24-T, or DH-W-S

Substrate Preparation
- ensure that the structure beneath the vinyl is sound and adequate
- ensure that vinyl is well adhered
- remove any wax and clean vinyl
- for wood substrates, nail off floor with ring shank flooring nails every 4" *(102 mm)* o.c. – fasteners must pass through entire thickness of assembly with minimal penetration into joists
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

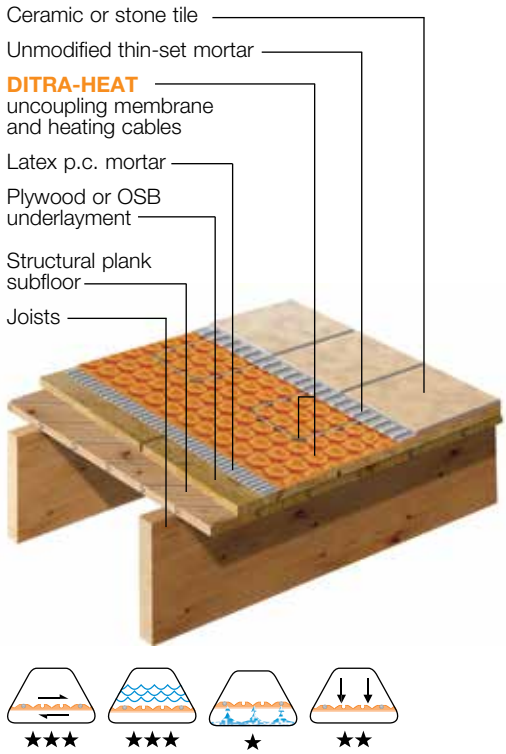
Setting and Grouting Materials
- Fast-setting latex portland cement (p.c.) mortar – ANSI A118.4 or A118.15
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- DITRA-HEAT is adhered to the vinyl flooring using a fast-setting latex-portland cement mortar suitable for bonding to vinyl. As an alternative, a suitable cement-based embossing leveler or an appropriate latex-modified thin-set mortar can be used to skim coat the vinyl to provide a bonding surface. When skim coat is cured, DITRA-HEAT is adhered to the skim coat using an unmodified thin-set mortar. See page 21 for discussion on latex-modified thin-set mortars sandwiched between two impervious layers.
- seaming DITRA-HEAT, including floor/wall connections, with KERDI-BAND may be appropriate in cases where a break in the water line of an ice maker or dishwasher can damage pre-existing moisture-sensitive substrates and underlayments. KERDI-BAND floor/wall connections are just as easily concealed with wood base as with tile. KERDI-BAND floor/wall connections in dishwasher alcoves are parged with thin-set mortar; see page 10.
- vapor barrier on crawl space floors according to regional building codes.
- certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.

Floors, Interior - Structural Plank Subfloor

DH-SP-TS-15



Areas of Application
- over structural plank subfloors
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile

Requirements
- maximum spacing of joists is 24" *(610 mm)* o.c.
- double layer wood floor consisting of:
  - minimum structural plank subfloor thickness – 3/4" *(19 mm)*
  - minimum underlayment thickness – 15/32", 1/2" nom. *(13 mm)*

Substrate Preparation
- verify that subfloor planks are properly fastened to framing members.
- underlayment – minimum 15/32", 1/2" nom. *(13 mm)*-thick Exposure 1, plugged-face plywood or OSB with 1/8" *(3 mm)* gap between sheets; see page 14 for underlayment installation guidelines.
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- latex portland cement (p.c.) mortar – ANSI A118.11
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

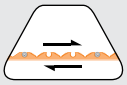
Other Considerations
- vapor barrier on crawl space floors according to regional building codes.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.
- certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.

CONCRETE

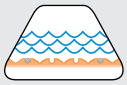
Every substrate presents unique challenges

There are various challenges associated with the installation of hard surface coverings on concrete substrates.

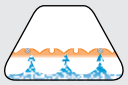
To begin, the coefficient of thermal expansion of concrete is close to twice that of ceramic tile. Additionally, tile contractors are often expected to install tile over young concrete (concrete cured less than 28 days). However, rigid surface coverings installed over young concrete are susceptible to damage as a result of shrinkage during curing. Pre-stressed/post-tensioned concrete slabs are also commonplace in today's construction environment. Although pre-stressing is used to help control deflections in concrete structures, these slabs are still subject to deformations caused by changes in moisture, temperature, and loading. Many concrete slabs on or below grade are subject to moisture migration, which can be problematic. Furthermore, these structures experience the same deformations as stated above.



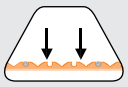
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.



DITRA-HEAT's waterproofing ability not only protects the substrate from harmful substances, it also slows the drying of fresh concrete, which reduces the chances of cracking and curling of the slab.



The configuration of the DITRA-HEAT matting provides free space to accommodate vapor emissions from the concrete slab. This allows the installation of DITRA-HEAT and the tile covering as soon as the slab can be walked upon. Vapor management is also essential for slabs subject to moisture migration.

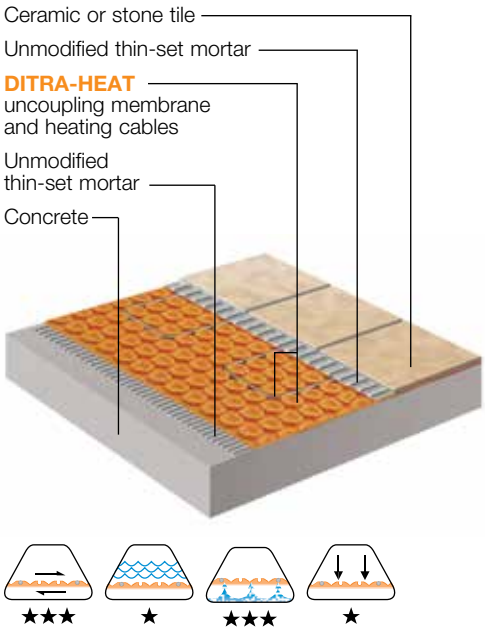


Since DITRA-HEAT is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

By addressing all of the challenges associated with today's fast construction methods, DITRA-HEAT provides a durable installation system for ceramic and stone tile over concrete substrates.

DITRA-HEAT combines the flexibility of loose heating cables with the ease of installation of mat systems. Cables can be placed wherever heat is desired, without creating height differences in the floor. Self-leveling compounds are not required to encapsulate the cables, significantly reducing installation time and effort compared to uncoupling membranes over other electric floor warming systems.

DH-C-TS-15



Floors, Interior - Ceramic or Stone Tile

Concrete subfloor

Areas of Application
- over any structurally sound and even concrete subfloor
- young concrete (concrete cured less than 28 days)
- on or below grade concrete subject to moisture migration
- post-tensioned or pre-stressed concrete
- cracked concrete

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile
- concrete slabs subject to moisture migration must have all seams in DITRA-HEAT sealed with KERDI-BAND using unmodified thin-set mortar.
- any cracks in concrete subfloor must exhibit in-plane movement only; thin-set tile assemblies, including those incorporating DITRA-HEAT, cannot accommodate differential vertical displacement.

Requirements
- slab to be structurally sound
- slab to be free of waxy or oily films and curing compounds (when present, mechanical scarifying is necessary).
- the installation of DITRA-HEAT and tile can begin as soon as the slab can be walked upon.

Substrate Preparation
- any leveling of the subfloor must be done prior to installing DITRA-HEAT.

Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

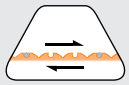
Setting and Grouting Specifications
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.
- certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.

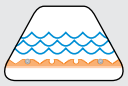
GYPSUM

Every substrate presents unique challenges

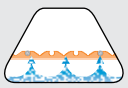
Bonding ceramic or stone tiles directly to gypsum concrete substrates is generally considered questionable or not recommended. The challenges associated with gypsum-based underlayments include the requirement of an extended drying period before installing tile and continued sensitivity to the reintroduction of moisture throughout the life of the installation. In addition, since the coefficient of thermal expansion of gypsum concrete is substantially greater than that of ceramic tile, shear stresses caused by temperature fluctuations can result in delamination or cracking of the tile covering. This is particularly important when gypsum concrete is used as a thermal mass for radiant heated floors. With the increasing popularity of radiant heated floors, which typically utilize gypsum concrete, tile installers need a reliable installation system to address these issues.



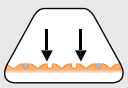
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the gypsum concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.



DITRA-HEAT's waterproofing function prevents the reintroduction of moisture to gypsum concrete underlayments, which, if not prevented, could significantly compromise performance of the underlayment and lead to damage of the tiled surface.



The configuration of the DITRA-HEAT matting provides free space to accommodate vapor emissions from the gypsum.

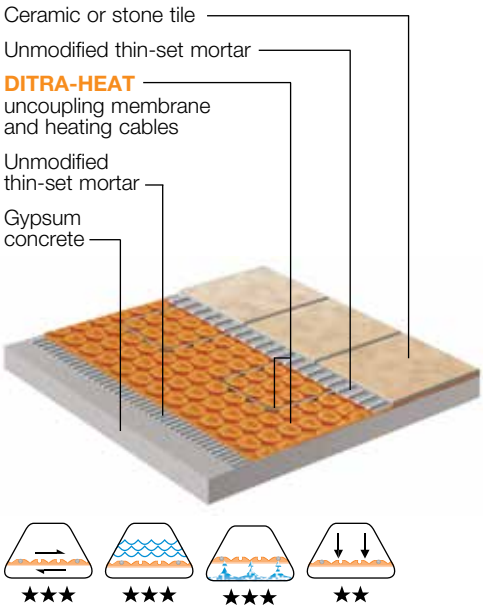


Since DITRA-HEAT is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

By addressing all of the challenges associated with today's fast, lightweight construction methods, DITRA-HEAT provides a durable installation system for ceramic and stone tile over gypsum substrates.

DITRA-HEAT combines the flexibility of loose heating cables with the ease of installation of mat systems. Cables can be placed wherever heat is desired, without creating height differences in the floor. Self-leveling compounds are not required to encapsulate the cables, significantly reducing installation time and effort compared to uncoupling membranes over other electric floor warming systems. DITRA-HEAT is useful even in applications where hydronic radiant-heating tubes are incorporated in gypsum concrete, as there may be times when floor warming is desirable while radiant heating is not necessary.

DH-G-TS-15



Floors, Interior - Ceramic or Stone Tile

Gypsum concrete

Areas of Application
- over gypsum concrete underlayment placed over structurally sound wood or concrete subfloors
- interior dry or wet areas

Limitations
- minimum 2" x 2" *(50 mm x 50 mm)* tile

Requirements
- for wood substrates, subfloor/underlayment configuration according to detail DH-W16-T, DH-W19-T, or DH-W24-T.
- where radiant heat tubes are laid over the subfloor, gypsum poured to a height that is 3/4" *(19 mm)* above the tops of the tubes is required before installing DITRA-HEAT.
- residual moisture in gypsum screed, 2.0% (percentage by volume) or less before installing DITRA-HEAT.

Substrate preparation
- gypsum – follow manufacturer's directions

Movement Joints
- DITRA-HEAT does not eliminate the need for movement joints, including perimeter joints, within the tiled surface. Movement joints must be installed in accordance with industry standards and norms; see page 11 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials
- unmodified thin-set mortar – ANSI A118.1
- grout – ANSI A118.3, A118.6, A118.7, A118.8

Installation Specifications
- gypsum – follow manufacturer's directions
- tile – ANSI A108.5
- grout – ANSI A108.6, A108.9, A108.10

Other Considerations
- since DITRA-HEAT must bond to the gypsum concrete, follow gypsum manufacturer's directions regarding primers and/or special surface preparation before installing DITRA-HEAT.
- where a waterproof floor is required, all DITRA-HEAT seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 10.
- certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.
- vapor barrier on crawl space floors according to regional building codes.

WATERPROOFING

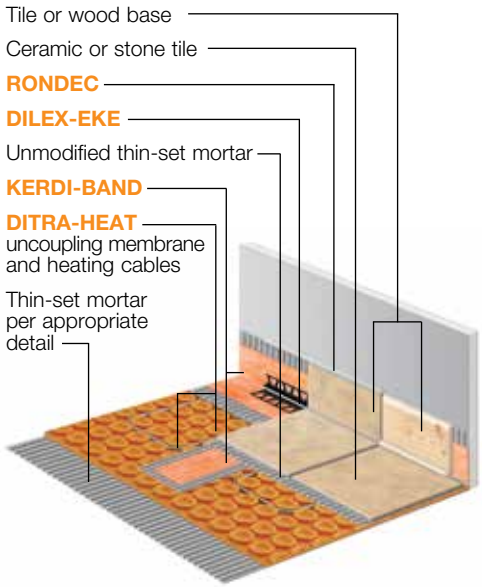
Every substrate presents unique challenges

Today's construction methods, which include the use of lightweight, moisture-sensitive materials, such as plywood, OSB, and gypsum concrete, have made the installation of hard surface coverings particularly challenging. If wood or gypsum concrete substrates are exposed to moisture, the tile layer above can be damaged as a result.

Typical areas that require waterproofing include tub surrounds and showers. However, there are other commonly tiled areas that may, through unexpected circumstances, become exposed to significant amounts of water; for example, an overflowed toilet, or ruptured dishwasher, icemaker, or washing machine lines, which can result in flooding.

Waterproofing these floors can save an owner from replacing the tile assembly and substructure in the event of a leak. DITRA-HEAT installations can be made waterproof with minimal effort. Since the matting is made of waterproof polypropylene, the only extra step necessary is to seal the seams and floor/wall connections. This is easily accomplished by applying KERDI-BAND to these areas using an unmodified thin-set mortar. The result is a waterproof installation that will not suffer damage in the event of an unexpected water leak. KERDI-DRAIN or KERDI-LINE may be used to provide drainage in DITRA-HEAT installations.

DH-WP-15



Floors, Interior - Ceramic or Stone Tile

Areas of Application

- over any even and structurally sound substrate where waterproofing is desired

Limitations

- minimum 2" x 2" *(50 mm x 50 mm)* tile

Requirements

- all seams in DITRA-HEAT matting and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar. **Note:** KERDI-BAND must lap DITRA-HEAT at seams and at floor/wall transitions by a minimum of 2" *(50 mm)* in order to maintain waterproof integrity

Other Considerations

- seaming DITRA-HEAT, including floor/wall connections, with KERDI-BAND may be appropriate in cases where a break in the water line of an ice maker or dishwasher can damage pre-existing moisture-sensitive substrates and underlayments. KERDI-BAND floor/wall connections are just as easily concealed with wood base as with tile. KERDI-BAND floor/wall connections in dishwasher alcoves are parged with thin-set mortar.
- in some applications the vertical section of the floor/wall transition will not accept a bond to unmodified thin-set mortar. Connections to such elements can be achieved using KERDI-FIX or suitable trowel-applied waterproofing materials, such as those that require atmospheric moisture to cure (e.g., urethane sealant).
- KERDI-DRAIN or KERDI-LINE may be used to provide drainage in DITRA-HEAT applications. DITRA-HEAT is sealed to the fleece-laminated KERDI-DRAIN bonding flange with a section of KERDI membrane using unmodified thin-set mortar. KERDI-FIX is used to seal the section of KERDI to the stainless steel KERDI-DRAIN bonding flange. DITRA-HEAT is sealed to the KERDI waterproofing collar on KERDI-LINE using unmodified thin-set mortar.

MOVEMENT JOINTS

Every substrate presents unique challenges

DISCUSSION

Movement joints are an integral part of any tile assembly. The various components of a tile assembly (tile, mortar, substrate, etc.) have unique physical characteristics that affect their behavior. Specifically, these components will expand and contract at different rates, according to each component's intrinsic physical properties, with changes in moisture, temperature, and loading (both dead and live loads). This differential expansion/contraction of attached components results in internal stresses. Furthermore, structures that restrain overall expansion of the tile field (walls, columns, etc.) cause stress buildup within the system. If the aforementioned movements are not accommodated through the use of movement joints in the tile field and at restraining structures, the resulting stresses can cause cracking of the grout and tile and delamination of the tile from the substrate. Thus, movement joints are an essential component of any durable tile assembly.

SOLUTIONS

Movement joints must be incorporated within the tile field, at doorsills, and at transitions to walls and other restraining structures to allow movement of the assembly and prevent stresses that can damage the system. Schluter®-Systems' prefabricated movement joint profiles protect tile edges and prevent sound bridges and surface water penetration, resulting in a permanent, maintenance-free installation. The family of **Schluter®-DILEX** prefabricated movement profiles includes a variety of shapes, sizes, and materials to suit different applications. Please see Schluter®-Systems' Illustrated Price List and visit www.schluter.com for more detailed information on DILEX movement profiles.

TECHNICAL NOTES

The Tile Council of North America (TCNA) and the Terrazzo, Tile, and Marble Association of Canada (TTMAC) provide guidelines (EJ171 and 301MJ, respectively) for the placement and construction of movement joints in and around the tile field. Schluter®-Systems accepts these guidelines. However, given the increased use of larger tiles, smaller grout joints, and lighter building materials, which are more susceptible to movement, Schluter®-Systems recommends that movement joints within the tile field be placed at more frequent intervals, as indicated below.

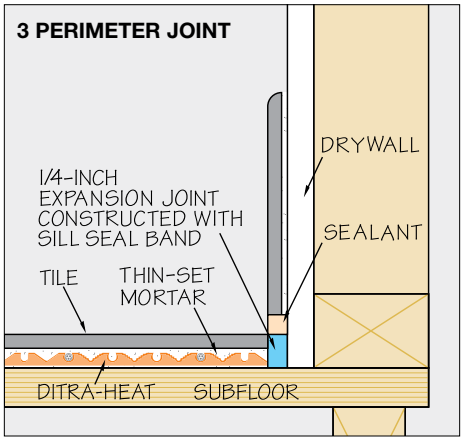
Guidelines for the placement of movement joints

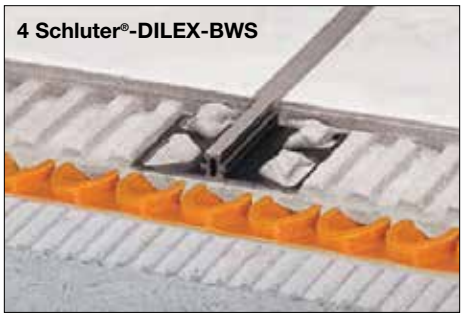
- Applications without heating cables: 16' - 20' *(4.9 m - 6.1 m)* in each direction
- Applications with heating cables or exposed to direct sunlight or moisture: 12' - 16' *(3.7 m - 4.9 m)* in each direction
- Place around the perimeter of any size floor and/or against all restraining surfaces
- Fields should be as square as possible. The ratio between length and width should not exceed 1:1.5.

Typical movement joint applications

1 Schluter®-DILEX-EKE

2 SILL SEAL BAND





4 Schluter®-DILEX-BWS

Perimeter Joints

Perimeter joints are provided at the outer edges of any tile installation to accommodate movements attributable to changes in moisture, temperature, and loading. See figures 1, 2, and 3.

If Schluter®-DILEX corner movement profiles will not be used, Schluter®-Systems recommends the use of sill seal (a compressible polyethylene gasket used to seal the gap between foundations and sill plates) as a quality control measure when providing perimeter movement joints. The sill seal band is placed against perimeter structures before any component of the tile assembly is installed, (e.g., DITRA-HEAT, additional underlayments including self-leveling materials, mortar beds, etc. See figures 2 and 3). After the tile is installed and grouted, any excess sill seal material is cut away, leaving a movement joint with uniform width that is void of any mortar, grout, or other restraining materials that would render the joint ineffectual.

Surface Joints

Surface joints must be placed within the tiled surface regardless of substrate conditions. They provide for stress relief from movements in the tile field due to thermal and moisture expansion/contraction and loading. See figure 4.

Expansion Joints

Expansion joints permit both horizontal and vertical differential movements attributable to thermal and moisture expansion/contraction by providing a complete separation for the full depth of the slab to allow for free movement between adjoining parts of a structure or abutting surfaces. They are typically placed at columns, walls, and any other restraining surfaces. Expansion joints must be continued through the tile covering. The DITRA-HEAT membrane is separated at expansion joints and the joint is continued through the tile covering using DILEX movement joint profiles. The DITRA-HEAT-E-HK heating cables must not cross expansion joints. When DITRA-HEAT is used as waterproofing, the abutted sections must be covered with KERDI-FLEX or KERDI-BAND.

Cold Joints

Cold (construction) joints occur where two successive placements of concrete meet. True cold joints bond the new concrete to the old and do not allow movement. However, it takes extra care to accomplish this, so they are usually designed to act as expansion or control/contraction joints. Cold joints are treated in the same manner as expansion joints. See above.

Control/Contraction Joints

Control/contraction joints are designed to induce controlled cracking caused by drying and chemical shrinkage at preselected locations. They are typically formed by saw cutting, tooling, or through the use of inserts. DITRA-HEAT is not separated at control/contraction joints; however, surface movement joints must be provided in the tile covering in accordance with the aforementioned guidelines. See also Surface Joints.

Structural or Seismic Joints

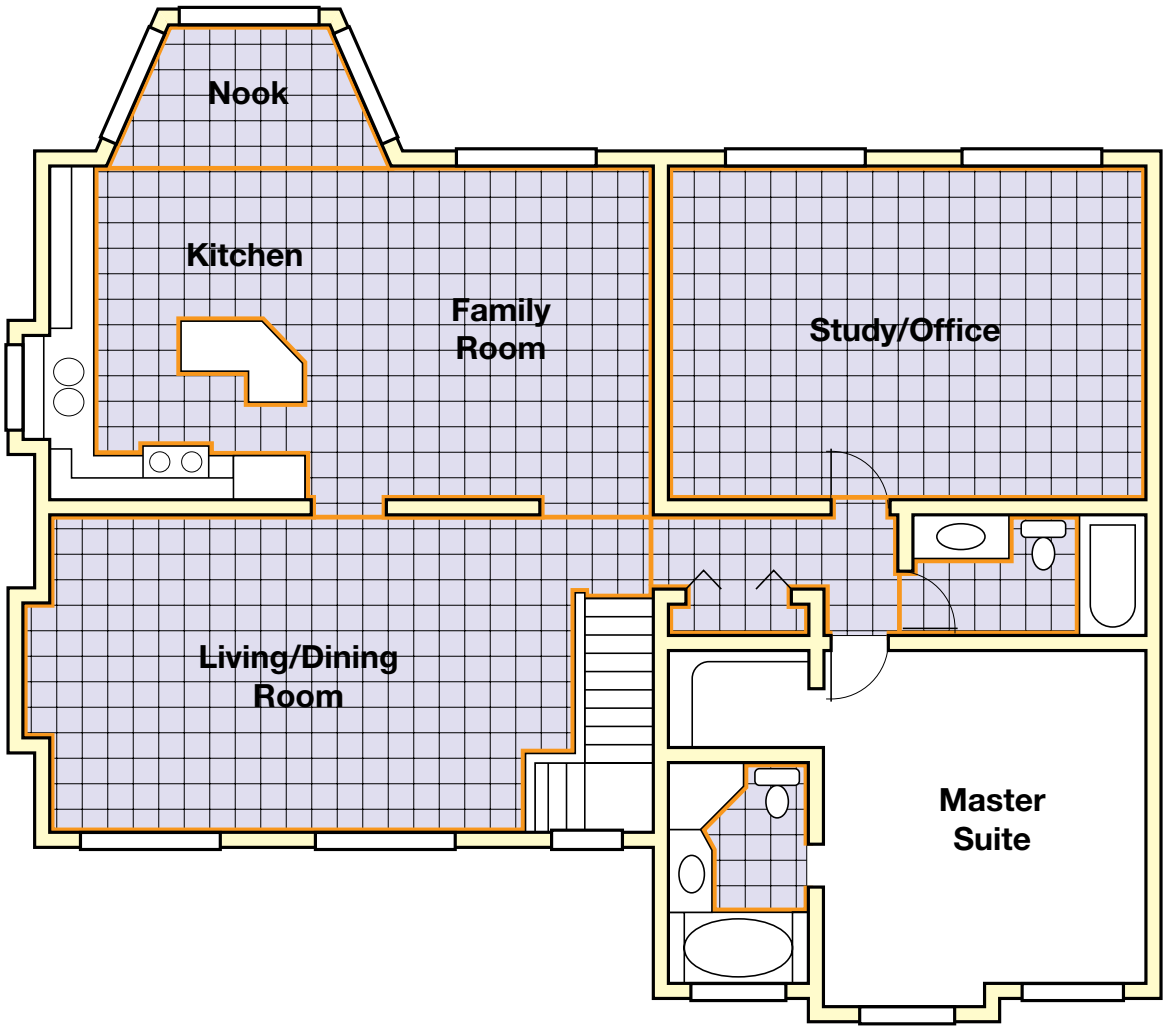
Regarding structural and seismic expansion joints, please contact Schluter®-Systems at 1-800-472-4588 (USA) or 1-800-667-8746 (Canada) for proper installation guidelines.

Note regarding residential applications

Due to the increased popularity of continuous tile installations (i.e., tile continuing from room to room on a given floor), movement joints have become both increasingly important and increasingly difficult to provide. For instance, consider the residential installation shown in Figure 5. It is almost certain that the homeowner will resist the idea of placing movement joints across any of the rooms shown in the figure, despite TCNA, TTMAC, and Schluter®-Systems guidelines. However, the need for movement joints in this installation is undeniable, given the extended size of the field. The question then becomes, "How does one provide the movement joints necessary to ensure a durable installation without compromising the aesthetic qualities of the continuous tile field?"

The easiest way to accomplish this goal is to begin by providing movement joints at the perimeter of the installation. Perimeter joints are absolutely necessary and do not interrupt the tile field. The next step would be to place movement joints at the thresholds between rooms or where a tiled hallway meets a larger tiled room. These locations are relatively inconspicuous and the lines formed by the movement joints are logical in that they reflect the natural perimeter of each room. Finally, determine if any other characteristics of the floor plan invite the placement of additional movement joints. In this example, the intersection of the nook area and kitchen/family room may be a reasonable choice.

Figure 5



Schluter®-Systems understands that the tile setter must take into account the needs of his or her client in determining the placement of movement joints in a tile installation. For example, a client may not wish to interrupt a continuous tile field that spans multiple rooms. However, as indicated by the orange lines above, there are ways to meet industry guidelines that will serve to provide the client with a durable installation that remains aesthetically pleasing.

WOOD UNDERLAYMENT

Plywood/OSB underlayment installation guidelines

DISCUSSION

In some applications referenced in this Handbook, adding a layer of plywood or OSB before installing DITRA-HEAT and the ceramic or stone tile covering is required to reduce deflection and curvature of the sheathing between the joists.

INSTALLATION GUIDE

Place underlayment panels (Exposure 1, plugged-face plywood or OSB) with long dimension perpendicular to floor joists such that the following conditions are met:

1. Abut all underlayment end joints at quarter points between joists.

Example: Abut underlayment panels on either side of the joist centerline at: 4" *(102 mm)* for 16" *(406 mm)* o.c. joists, 5" *(127 mm)* for 19.2" *(488 mm)* o.c. joists, or 6" *(152 mm)* for 24" *(610 mm)* o.c. joists (see figures 1 & 2).

Note: Underlayment end joints should be placed as far away from subfloor end joints as possible.

2. Underlayment to overlap edge joints of subfloor by 1/2 of the width of the subfloor panel (24" - *610 mm*). At restraining surfaces, overlap may be less than 24" *(610 mm)* when the subfloor panel is less than 48" *(1.2 m)*-wide (see figure 1).

3. Gap underlayment panels 1/8" *(3 mm)* on all ends and edges, and 1/4" *(6 mm)* at perimeter walls, cabinetry, or other restraining surfaces.

Figures 1 & 2 – Typical Subfloor/Underlayment Detail (Not to Scale)

Figure 2

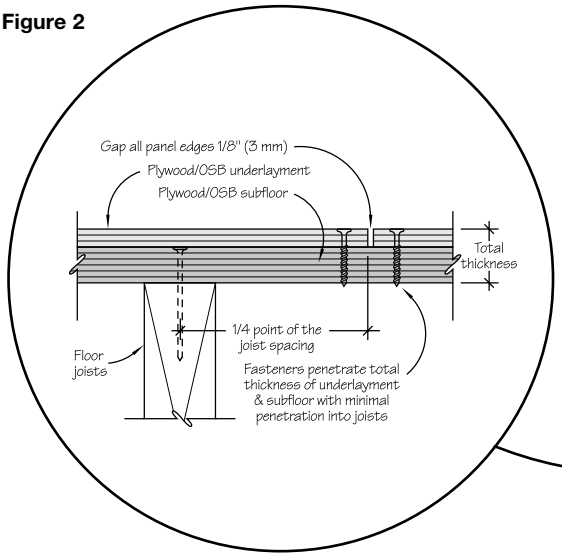
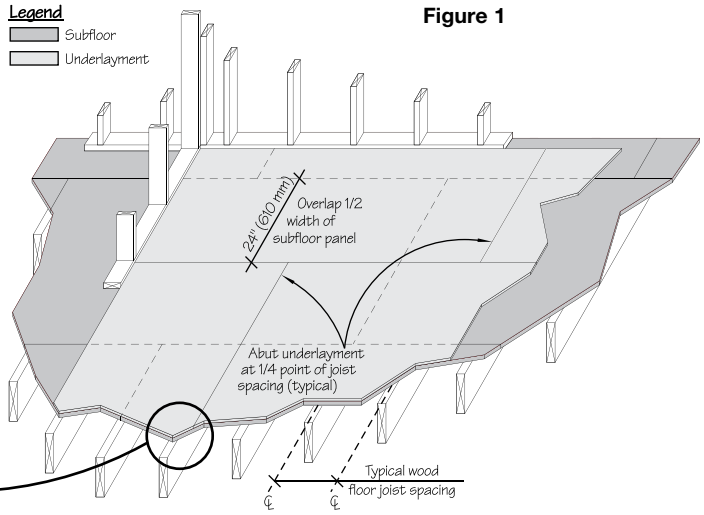


Figure 1



Plywood/OSB Type and Fastener Schedule Guidelines			
Plywood/OSB Grades	Plywood/OSB Thickness - in *(mm)*	Maximum On-Center Fastener Spacing - in *(mm)*	
		Panel Edges	Field
Exposure 1, plugged-face plywood or OSB	3/8 *(10)*	4 *(102)*	6 *(152)*
	1/2 *(13)*	4 *(102)*	6 *(152)*
	Greater than 1/2 *(13)*	6 *(152)*	6 *(152)*

The following guidelines must be followed when fastening underlayment panels:

1. Use ring shank nails (no staples) or wood screws (no drywall screws).

2. Fasteners must pass through entire thickness of underlayment and subfloor panels with minimal penetration into joists (see figure 2).

FINAL WORD

As stated previously, Schluter®-Systems requires that any underlayment panel must have a minimum thickness of 3/8" *(10 mm)*. When in doubt, increase underlayment thickness.

INSTALLATION

Schluter®-DITRA-HEAT membrane and heating cables

Planning

- For access to the DITRA-HEAT Calculation Sheet and DITRA-HEAT Online Calculator, see www.schluter.com.
- Select DITRA-HEAT membrane according to the size of the area to be tiled.
- Select DITRA-HEAT-E-HK heating cable according to the size of the area to be heated. Be sure to measure accurately. The heating cable CANNOT be cut to fit. The allowable heated area is limited by the minimum required spacing from fixed elements such as:
  - Walls or fixtures = 3" *(75 mm)*
  - Heat sources (baseboard heaters, fireplaces, forced air heating ducts, etc.) = 8" *(200 mm)*
  - Floor Drains = 6" *(150 mm)*
- Two or more DITRA-HEAT-E-HK heating cables can be connected and controlled by a single DITRA-HEAT-E-RS thermostat if the total current is less than 16 amps. The heating cable leads must be wired in parallel according to applicable electrical and building codes.
- Multiple DITRA-HEAT-E-HK heating cables over 16 amps cannot be connected to a single DITRA-HEAT-E-RS thermostat. Additional DITRA-HEAT-E-RS thermostats must be used or a control system comprised of relays and low voltage thermostats may be substituted (if the heating cables are in one room). The system must still incorporate a floor temperature sensor and the circuit must be protected by a GFCI.

Preparation

- The substrate must be clean, even, and load bearing. Any leveling of the subfloor must be done prior to installing DITRA-HEAT.
- For wood substrates, verify that panels are properly fastened. Tightly butted and/or tented plywood or OSB seams must be addressed prior to installing DITRA-HEAT. If a plywood/OSB underlayment is to be installed, follow the Wood Underlayment guidelines on page 14.
- For vinyl substrates, ensure that the structure beneath is sound and adequate and that the vinyl is well adhered. Remove any wax and clean the surface. For vinyl over wood structures, nail off floor with ring shank flooring nails every 4" *(102 mm)* o.c. - fasteners must pass through entire thickness of assembly with minimal penetration into joists.
- For concrete substrates, remove any waxy or oily films and curing compounds (if present) by mechanical scarification. When bonding DITRA-HEAT to particularly dry, porous concrete, the slab should be moistened to saturate the concrete and help prevent premature drying or skinning of the bond coat. Excess or standing surface water must be removed prior to installation.
- For gypsum substrates, residual moisture in gypsum screed must be 2.0% or less before installing DITRA-HEAT. Follow gypsum manufacturer's directions for additional substrate preparation.

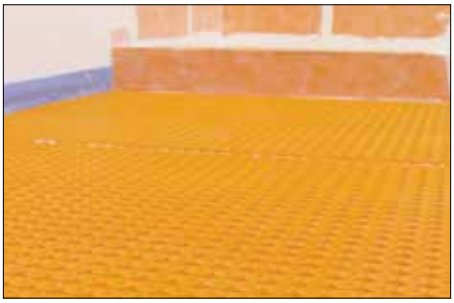
Membrane

1 Using a thin-set mortar that is suitable for the substrate, apply the thin-set mortar (mixed to a fairly fluid consistency, but still able to hold a notch) using a 1/4" x 1/4" *(6 mm x 6 mm)* square-notched trowel.

2 Apply DITRA-HEAT to the floor, fleece side down. Solidly embed the matting into the mortar using a float, screed trowel, or DITRA-ROLLER, making sure to observe the open time of the bonding mortar. If the mortar skins over prior to matting installation, remove and reapply.

When using the DITRA-ROLLER, place a weight (e.g., bags of mortar/grout or box of tile) not to exceed 75 lbs on the DITRA-ROLLER shelf. Slowly move the roller from one end of the matting to the other, slightly overlapping successive passes.

3 Lift up a corner of the matting to check coverage. Proper installation results in full contact between the fleece webbing and the thin-set mortar. **Note:** Coverage may vary with mortar consistency, angle at which the trowel is held, substrate flatness, etc. If full coverage is not achieved, remove and reapply, making sure to verify proper mortar consistency and application.



4 Abut end and side sections of adjacent sheets. **Note:** Aligning the studs on the top of the matting during installation can help make subsequent heating cable installation easier.

ESTIMATED THIN-SET COVERAGE

To bond DITRA-HEAT to the substrate: Use one 50 lb. *(22.68 kg)* bag of mortar per 100 ft² *(9.3 m²)*.

To bond the tile to the DITRA-HEAT, using a 1/4" x 3/8" *(6 mm x 10 mm)* square- or U-notched trowel: Use one 50 lb *(22.68 kg)* bag of mortar per 40 - 50 ft² *(3.7 - 4.6 m²)*.

To bond the tile to the DITRA-HEAT, using a 1/2" x 1/2" *(13 mm x 13 mm)* square- or U-notched trowel: Use one 50 lb *(22.68 kg)* bag of mortar per 30 - 40 ft² *(2.8 - 3.7 m²)*.

Heating Cables

Warning

- Before installing and operating this product, the user and/or installer must read, understand and follow these instructions and keep them handy for future reference.
- If these instructions are not followed, the warranty will be considered null and void and the manufacturer deems no further responsibility for this product.
- The following instructions must be adhered to in order to avoid personal injuries or property damages, serious injuries and potentially fatal electric shocks.
- This product must be installed by a qualified person in accordance with this installation handbook and with the Canadian Electric Code Part I (Canada) or the National Electric Code (U.S.) as applicable. All electric connections must be made by a qualified electrician, according to the electrical and building codes effective in your region.

- A dedicated circuit is required for each application.
- Ground fault equipment protection (i.e., GFCI) is required for each circuit (included in the DITRA-HEAT thermostats).
- Never install a cable designed for a 120 V power source on a 240/208 V power source.
- This cable must be grounded.
- Mark the appropriate circuit breaker reference label indicating which branch circuit supplies the circuit to the floor warming heating cable system.
- De-energize all power circuits before installation and servicing.

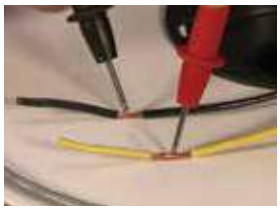
- Very important: **Never CUT the heating cable**. This would change the cable resistance and could lead to a fire.
- Heating cables shall not be altered in the field. If the installer or the user modifies the unit, he will be held responsible for any damage resulting from this modification, and the warranty and the product certification will be void.
- The heating section of the cable must be entirely installed under the floor covering. The installation is characterized as a Type C (Embedded Floor Warming) application. In order to prevent a fire hazard, do not install it anywhere else (e.g. in a wall).
- Do not run the heating cable under a wall, from one room to another; an individual cable must not heat more than one room.
- Never install the heating cable under vanities, bathtub platforms, kitchen cabinets and islands or any other fixtures. Excessive heat will build up in these confined spaces and may cause a fire.
- Never use the heating cable for any purpose other than heating a floor INSIDE a building.

- Always keep a 3 stud (3-1/2" – *9 cm*) spacing between cable runs. A narrower spacing may cause a fire or damage the floor covering. A wider spacing may not provide sufficient power to warm the floor.
- Heating cables may not touch, cross over, or overlap one another.
- Minimum spacing from walls or fixtures (e.g., cabinets) is 3" *(75 mm)*.
- Minimum spacing from other heat sources (baseboard heaters, fireplaces, forced air heating ducts, etc.) is 8" *(200 mm)*.
- Minimum spacing from any plumbing drain is 6" *(150 mm)*.
- It is helpful to plan the location of a buffer zone, as it is not possible to predict where the heating cable will end. The buffer zone is an area where heating is not essential, typically behind a toilet or adjacent to a door opening. This area allows for placement of excess heating cable.

- Heating cable testing is required while the heating cable is on the spool and at two subsequent steps during installation to ensure cable quality and for warranty purposes. **A megohmmeter is required for the insulation resistance testing of the heating cables.**
- Never energize the cable while it is on the spool. This would lead to overheating that could damage the cable and may cause a fire.
- The minimum temperature at which the cable should be installed is 32˚ F (0˚ C).
- Avoid folding the heating cable on itself, a radius of curvature less than 0.0625 inch *(1.6 mm)* could damage its sheath.
- The minimum installed bending radius of the heating cable is 0.5 inches *(12.7 mm)*.

To avoid damaging the DITRA-HEAT-E-HK heating cable spool due to handling, we recommend turning the box over to remove the spool from the packaging box. Then pick up the spool from underneath the heating cable coil, but not by the cardboard washers.

Heating Cable Tests




Test 1: Conductor resistance test

In order to perform the resistance test, you must set your multimeter for resistance measurement and take an ohms reading between the two power leads. If the ohms reading taken on the two power leads varies significantly (10% or more) from the value printed on the spool, it either means that the cable has been damaged, or that the measuring instrument is not set properly, or that it is simply out of calibration. The ohms measurement must be recorded in your heating cable tests log (page 26).


Test 2: Continuity between the braid and the two conductors

The heating cable is protected by a ground braid. An electrical insulator prevents any contact between the braid and the two conductors. To make sure there is no contact between the braid and the two conductors, you must perform a continuity test. Using the continuity test (buzzer logo) function of your multimeter, test your cable between the braid and one of the two power leads. If there is no continuity (if the test is successful), the multimeter will display, depending on the instrument used, either “OL ” for “over load” or “I” for “infinity”. Otherwise, if the test fails, neither “OL ”, nor “I” will be displayed and a warning tone will be heard. The test result must be recorded in your heating cable tests log (page 26).


Test 3: Insulation resistance test

This test is meant to detect very small breaks throughout the cable insulation. These breaks often remain undetected during the continuity test since they are not necessarily short circuits between the conductor and the ground braid. Even though they are small, these breaks are likely to cause a current leakage to ground. Such a leakage is usually detected by the mandatory ground-fault circuit interrupter “GFCI” (thermostat with integrated GFCI or panel mount GFCI). When a current leakage is detected, the GFCI trips the circuit, thus disabling the floor heating system. In order to perform the insulation resistance test, you must, using a megohmeter (Mohm logo), take an insulation measurement between the braid and one of the two power leads. Make sure the megohmeter range is set at 1000 V. The insulation resistance measurement must be equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 M ohms = 1000 Mega ohms). The insulation resistance measurement must be recorded in your heating cable tests log (page 26).

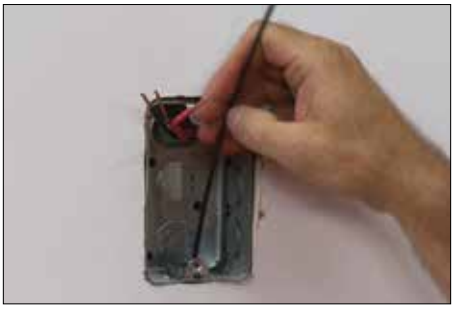
DITRA-HEAT Thermostat Floor Temperature Sensor Testing

Test the floor temperature sensors using a multimeter to verify accuracy of the sensors. Set the multimeter for resistance at 10K Ω +/- 2 (at room temperature) and take a reading between the sensor leads. The resistance will vary according to the temperature (i.e., the colder the sensor, the higher the resistance). Compare the measured values with the table of expected values and record in the heating cable tests log on page 26.

Installation

It is recommended that the installation of the DITRA-HEAT system is photographed (e.g., heating cable layout, floor temperature sensor placements, transition splice location, end splice location, and wide view of the room) for reference with future renovation work and troubleshooting. The homeowner/end user should retain these photos for their records.

1 Before the heating cable is removed from the spool, conduct the first set of required tests and record values in the heating cable tests log (page 26). If a break or damage is detected during the tests, return the heating cable to the original place of purchase.



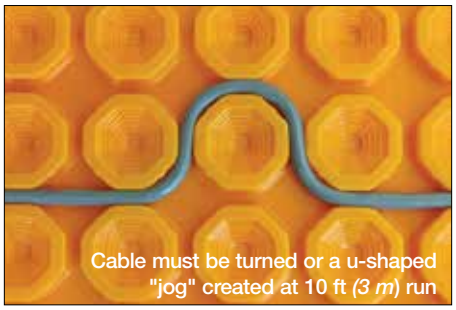
2 Thread the heating cable cold lead and remote sensors through a conduit from the base of the wall to the thermostat electrical box. The heating cable cold lead must not be cut.

3 Mark where the cold/hot splice will be placed, cut the DITRA-HEAT matting, and insert the splice. It may be necessary to temporarily secure the splice to the floor with thin-set mortar or adhesive (e.g., KERDI-FIX or hot glue).

Once the heating cable cold lead and remote sensors are threaded to the thermostat electrical box, install a metal protection plate at the base of the wall. This will help prevent any damage from fasteners (e.g., nails, screws, etc.) in the future.

4 Embed the heating cables between studs, at a spacing of 3 studs (3-1/2" – *9 cm*). Closer spacing may result in overheating and damage to building structures. A wider spacing may not provide sufficient power to warm the floor.

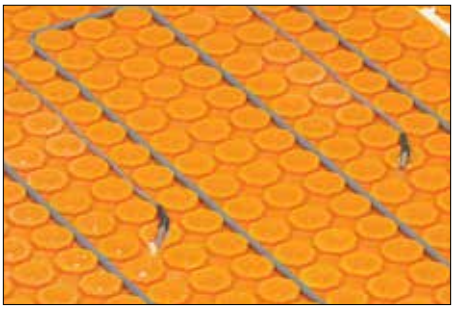
5 Use care not to damage the cables during installation, particularly before the cables are embedded in the matting.



Notes:

- Make sure to leave space for inserting the floor temperature sensor(s).
- Heating cables may not touch, cross over, or overlap one another.
- The maximum allowable length of a single run is 10 ft *(3 m)*; the cable must be turned or a u-shaped "jog" created at this point *(see image above)*.
- Minimum spacing from:
  - Walls or fixtures (e.g., cabinets) is 3" *(75 mm)*
  - Other heat sources (baseboard heaters, fireplaces, forced air heating ducts, etc.) is 8" *(200 mm)*
  - Plumbing drains is 6" *(150 mm)*

6 Install the thermostat sensors between two cable runs, at a distance of at least 24" *(610 mm)* from the wall. Mark the sensor location on the DITRA-HEAT and cut the matting to house the sensor. It is recommended to temporarily remove the heating cable from the area while cutting the matting. It may be necessary to temporarily secure the sensor to the floor with thin-set mortar or adhesive (e.g., KERDI-FIX or hot glue). Embed the sensor wire in the matting without overlapping or crossing the heating cable.



7 Once the heating cable and floor temperature sensor installation is complete, retest and record values in the heating cable tests log (page 26).

Waterproofing

The following steps are required for waterproofing only:

Note: While the heating cable is protected by the DITRA-HEAT matting, be careful when applying the mortar to not damage the cable with the notched trowel.

1 At the joints, fill the matting with unmodified thin-set mortar, approximately 8" *(203 mm)* wide, centered over the joint.

2 Comb additional unmodified thin-set mortar over the joint using a 1/4" x 3/16" *(6 mm x 5 mm)* V-notched trowel or the KERDI-TROWEL, which features a 1/8" x 1/8" *(3 mm x 3 mm)* square-notched design.

3 Apply 5" *(127 mm)*-wide KERDI-BAND, centered over the joint. Using the flat side of the trowel, firmly press the banding into the mortar to ensure 100% coverage and to remove excess mortar and air pockets.

4 At all wall junctions, apply KERDI-BAND as described in steps 1-3, centered where the wall and floor meet. In some applications the vertical section of the floor/wall transition will not accept a bond to unmodified thin-set mortar. Connections to such elements can be achieved using KERDI-FIX sealant and bonding compound or suitable trowel-applied waterproofing materials, such as those that require atmospheric moisture to cure (e.g., urethane sealant).

Note: KERDI-BAND must lap DITRA-HEAT at seams and at floor/wall transitions by a minimum of 2" *(50 mm)* in order to maintain waterproof integrity.

Tiles

Note: While the heating cable is protected by the DITRA-HEAT matting, be careful when applying the mortar to not damage the cable with the notched trowel.

1 Tile can be installed over DITRA-HEAT immediately; no need to wait for the mortar to cure. Fill the matting with unmodified thin-set mortar and comb additional mortar over the matting using a trowel that is appropriate for the size of the tile.

2 Solidly embed the tiles in the setting material, making sure to observe the open time of the bonding mortar. If the mortar skins over prior to tile installation, remove and reapply.

3 Periodically remove and check a tile to ensure that full coverage is being attained.

Note: Coverage may vary with mortar consistency, angle at which the trowel is held, substrate flatness, etc. If full coverage is not achieved, remove and reapply, making sure to verify proper mortar consistency and application. For large-format tiles, e.g., 12" x 12" *(305 mm x 305 mm)* and larger, back-buttering the tiles with a skim coat of thin-set mortar is a useful way to help ensure proper coverage. The skim coat can fill in the concave area on the back of the tile (ceramic tiles are not perfectly flat) and improve contact with the mortar combed on the substrate.

4 Once the tile installation is complete, retest the heating cable and record values in the heating cable tests log (page 26).

Allow the assembly to cure for 7 days after grouting before putting the floor warming into service.

ESTIMATED THIN-SET COVERAGE

To bond DITRA-HEAT to the substrate:
Use one 50 lb. *(22.68 kg)* bag of mortar per 100 ft^2 *(9.3 m^2)*.

To bond the tile to the DITRA-HEAT, using a 1/4" x 3/8" *(6 mm x 10 mm)* square- or U-notched trowel:
Use one 50 lb *(22.68 kg)* bag of mortar per 40 - 50 ft^2 *(3.7 - 4.6 m^2)*.

To bond the tile to the DITRA-HEAT, using a 1/2" x 1/2" *(13 mm x 13 mm)* square- or U-notched trowel:
Use one 50 lb *(22.68 kg)* bag of mortar per 30 - 40 ft^2 *(2.8 - 3.7 m^2)*.

Operating Tips

- Do not place furniture or mats over the floor temperature sensor. They can act as insulation and raise the floor temperature reading at the thermostat. This may cause the heating to turn off before the remainder of the floor reaches the desired temperature.
- Area rugs are not recommended over the DITRA-HEAT system.
- Futons, mattresses, floor-level furniture, pillows, etc. must not be placed directly onto the heated floor. Placement of items directly onto the heated floor will prevent heat diffusion (i.e., air circulation) and could result in damage.

THIN-SET FACTS

Discussion of thin-set mortars and Schluter®-DITRA-HEAT installations

QUESTION: Can ceramic tile, including porcelain tile, be set on **DITRA-HEAT** with unmodified thin-set mortar?

ANSWER: YES. In fact, we recommend it. Here's why:

Portland cement-based unmodified thin-set mortars are dependent on the presence of moisture for hydration in order to gain strength. Since DITRA-HEAT is impervious, it does not deprive the mortar of its moisture. This allows the cement to properly hydrate, resulting in a strong, dense bond coat. In fact, after the mortar has reached final set (usually within 24 hours), unmodified thin-set mortars achieve higher strengths when cured in continually moist conditions.

QUESTION: Can ceramic tile, including porcelain tile, be set on DITRA-HEAT with latex-modified thin-set mortar?

ANSWER: We DON'T recommend it. Here's why:

Latex-modified mortars must air dry for the polymers to coalesce and form a hard film in order to gain strength. When sandwiched between two impervious materials such as DITRA-HEAT and ceramic tile, including porcelain tile, drying takes place very slowly through the open joints in the tile covering. [According to the TCNA Handbook for Ceramic, Glass, and Stone Tile Installation, this drying period can fluctuate from 14 days to over 60 days, depending on the geographic location, the climatic conditions, etc.]. Therefore, extended cure times would be required before grouting if using modified thin-set mortars between DITRA-HEAT and ceramic tile, including porcelain tile. If extended cure times were not observed, the results could be unpredictable.

ADDITIONAL NOTES

25 years of field experience and testing by the Tile Council of North America (TCNA) support the efficacy of using unmodified thin-set mortars to bond ceramic tile, including porcelain tile, to uncoupling membranes.

Remember, the type of mortar used to apply DITRA-HEAT depends on the type of substrate. The mortar must bond to the substrate and mechanically anchor the fleece on the underside of the DITRA-HEAT. For example, bonding DITRA-HEAT to wood requires latex-modified thin-set mortar. When bonding DITRA-HEAT to particularly dry, porous concrete with unmodified thin-set mortar, the slab should be moistened to saturate the concrete and help prevent premature drying of the mortar. Excess or standing surface water must be removed prior to installation. Additionally, all mortars (modified and unmodified) have an acceptable temperature range that must be observed during application and curing.

TESTING & CERTIFICATIONS

Product Evaluation

Schluter®-Systems is committed to providing reliable installation systems for ceramic and stone tile. As part of this commitment, we have invested considerable resources in testing our products and obtaining certifications where applicable to provide our customers and local code officials with relevant data that supports the efficacy of our systems. All the testing referenced below was performed by independent laboratories.

Uncoupling and Support/Load Distribution

The method used to establish the overall performance of a tile assembly under loading is the ASTM C627 “Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson Type Floor Tester.” The assembly is tested in cycles using a loaded, revolving carriage. Load, wheel hardness, and number of revolutions vary with each cycle. Once a specified level of damage is exceeded, the test is stopped. The TCNA Handbook for Ceramic, Glass, and Stone Tile Installation assigns performance levels to an assembly based on the number of cycles successfully completed. The ratings include residential, light, moderate, heavy, and extra heavy, in order of improving performance.

Report Number	Substrate	Joist Spacing	Tile	Rating
Schluter®-DITRA-HEAT				
TCNA-415-13	OSB	19.2" o.c.	12" x 12" porcelain	Extra Heavy
TCNA-415-13	OSB	24" o.c.	12" x 12" carrara marble	Light
TTMAC-UFT09-2013	Concrete	N/A	12" x 12" porcelain	Moderate
TCNA-415-13	Concrete	N/A	2" x 2" porcelain	Light

Assembly Notes:

1. All plywood and OSB subfloors were 23/32" (3/4" nom.) -thick; 11/32" (3/8" nom.) -thick OSB underlayment added for carrara marble test
2. DITRA-HEAT bonded to OSB with modified thin-set mortar (ANSI A118.11)
3. DITRA-HEAT bonded to concrete with unmodified thin-set mortar (ANSI A118.1)
4. Tile bonded to DITRA-HEAT with unmodified thin-set mortar (ANSI A118.1)
5. Polymer-modified cement grout (ANSI A118.7)

The test results above demonstrate that DITRA-HEAT performs extremely well under load while at the same time providing flexibility within the shear plane.

Waterproofing

DITRA-HEAT matting provides reliable waterproofing in interior applications. The product has been found to meet or exceed the requirements of the American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation A118.10.

Certifications

Heating cables – The DITRA-HEAT-E-HK heating cables sets are certified or listed to the following standards and usage:

- CAN/CSA-C22.2 No. 130-03 "Requirements for Electrical Resistance Heating Cables and Heating Device Sets" under usage markings GXW for general use (G) with a wet rating (W), but specifically (X) for embedded indoor floor warming applications.
- UL 1673 "Electric Space Heating Cables" for installation in poured masonry floors within enclosed structures.
- ANSI/IEEE 515.1-2005 "IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications" for installation Type C embedded floor warming within enclosed structures.

Thermostat – The DITRA-HEAT-E-RS digital thermostats are certified or listed to the following standards:

- Certified to CSA C22.2 No. 24-93 (Reaffirmed 2003) “Temperature-Indicating and Regulating Equipment”.
- Listed to UL 873 “Temperature-Indicating and Regulating Equipment” 11th Edition, containing revisions through and including April 18th, 2006.

Membrane

- ICC-ES Report No. ESR-2467
- ICC-ES PMG Report No. PMG-1204
- U.S. Pat. No. 8,950,141, and U.S. DES. PAT. No. D706459 Canada Ⓓ Schluter Systems L.P. and other patents pending

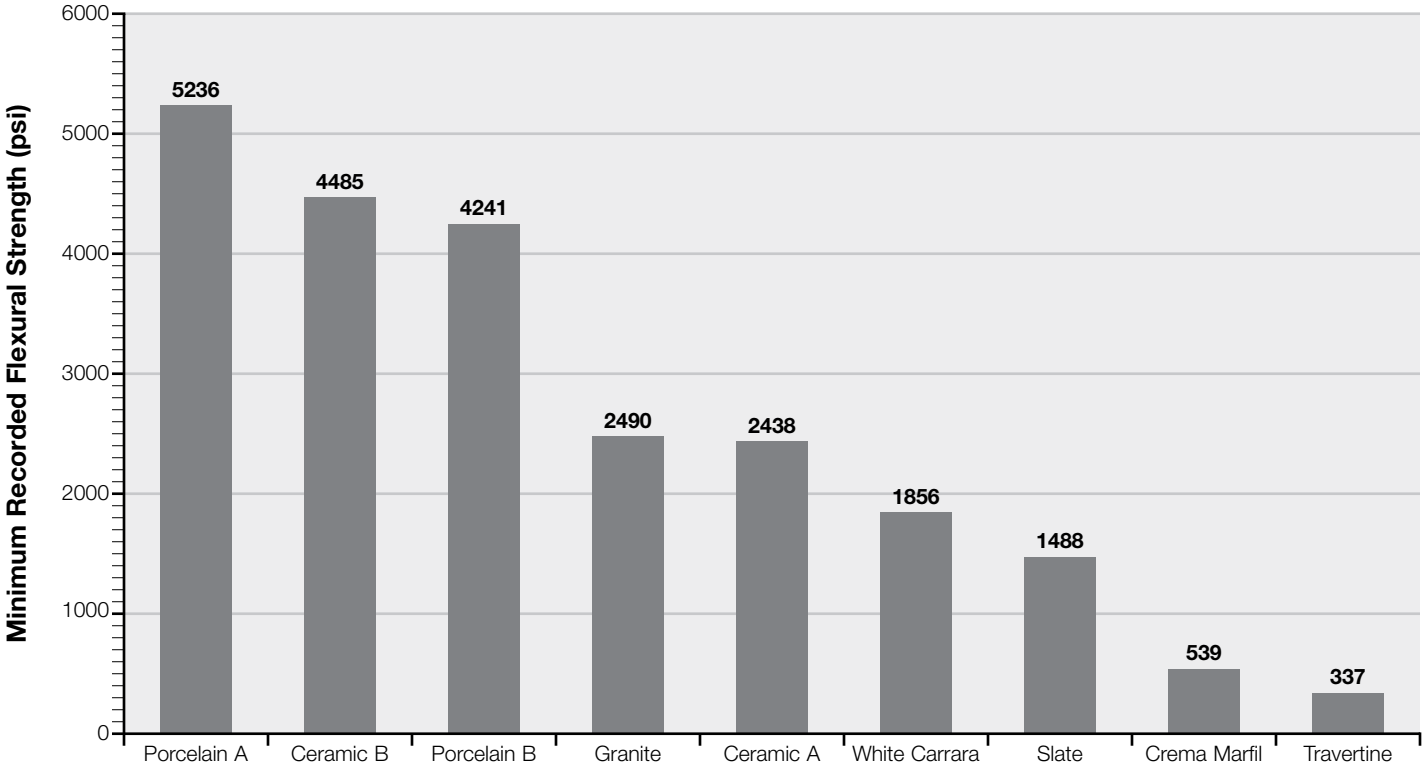
Certifications and listings may be accessed via our website at www.schluter.com

NATURAL STONE

Discussion of natural stone and single-layer wood subfloors

Natural stone is a product of nature with a wide variety of colors, patterns, and textures that come together to distinguish it as one of the premiere surface coverings available on the market. Some of stone's characteristics, which add to its beauty and uniqueness, are veins, fissures, starts, and dry-seams. While these characteristics enhance its aesthetic appeal, they're also indicators that point to the inherent variability of the flexural strength of natural stone, which can have detrimental effects on serviceability. This variability is underscored by examining the range of typical flexural (bending) strengths of ceramic tile compared to the range of strength for some common natural stones.

Schluter®-Systems contracted the Tile Council of North America (TCNA) to perform flexural strength testing on various commercially available ceramic tiles and dimension stones guided by the ASTM C880 Standard Test Method for Flexural Strength of Dimension Stone. Five samples of each tile and stone were tested, with the minimum recorded values displayed in the figure below. We have chosen to show only minimum values since these represent the weakest samples, which would be most prone to cracking in service over a bending substrate.



It is clear from the figure that the minimum recorded flexural strengths of these dimension stones tend to be significantly less than those of the ceramic tiles. In some cases, the differences are dramatic. For example, the minimum recorded flexural strength of the weakest travertine sample (337 psi) was only 14% of the minimum flexural strength of the weakest ceramic sample (2438 psi). In other words, the weakest ceramic sample was more than 7 times as strong as the weakest travertine sample. As another example, the minimum recorded flexural strength of the weakest porcelain sample is more than 12 times as strong as the minimum recorded flexural strength of the weakest travertine sample.

Q. Why does Schluter®-Systems recommend a double-layer wood floor for installing natural stone over DITRA-HEAT?

A. There are three principle reasons: 1) As illustrated above, the fact that most stone products have a minimum flexural strength that is substantially lower than what is typical for ceramic tile; 2) Stones are products of nature and complex heterogeneous materials with naturally occurring regions of discontinuity, such as veins and fissures. Such features can be weaker than the surrounding stone fabric and act as "stress risers," concentrating bending stresses within the region of discontinuity; and 3) When wood floor assemblies are subjected to forces such as loading – both live and dead loads – they produce flexural stresses in the surface covering which can cause weak and brittle materials to break or crack.

Engineering mechanics as well as field observations show that the location of maximum flexural stresses in the floor assembly is directly over the floor joists and at seams in the subfloor panels. Therefore, we recommend double-layer wood floors when installing natural stone in order to increase the stiffness of the sheathing assembly and position underlayment seams away from the joists to minimize flexural stresses in the stone covering directly above the joists and at seams. Refer to page 14 for underlayment installation guidelines. For more information on the development of these guidelines, please refer to the article titled "Position of Underlayment to Prevent Cracked Tile and Grout" on our website at www.schluter.com/5138.aspx.

PRODUCT & ORDERING INFO

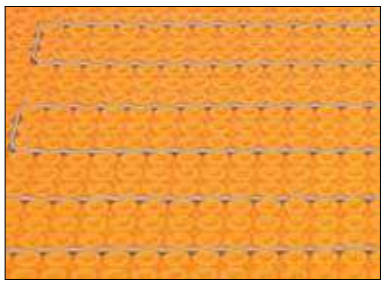
The ordering information for the **Schluter®-DITRA-HEAT** and **KERDI** components outlined in this Handbook is located below. For technical support, Illustrated Price List, or to receive additional information on our complete product line, please call **800-472-4588 (USA)** or **800-667-8746 (Canada)**, or visit our comprehensive website at **www.schluter.com**.

Schluter®-DITRA-HEAT

DITRA-HEAT is a polypropylene membrane with a cut-back stud structure and an anchoring fleece laminated to the underside. The matting is 1/4" *(5.5 mm)* thick. The stud structure is specifically designed to secure DITRA-HEAT-E-HK electric floor heating cables. DITRA-HEAT integrates customizable electric floor warming with the functions associated with DITRA: uncoupling, waterproofing, vapor management and support to ensure a long lasting installation.

Uncoupling and waterproofing membrane (1/4" – *5.5 mm*)		
Item No.	**Item**	**Dimensions**
DH5 12M	Roll	3' 3" x 41' 1" = 134.5 ft² *(1 m x 12.5 m = 12.5 m²)*
DH5 MA	Sheet	3' 3" x 2' 7" = 8.6 ft² *(1 m x 0.8 m = 0.8 m²)*

U.S. Pat. No. 8,950,141, and U.S. DES. PAT. No. D706459
Canada Ⓓ Schluter Systems L.P. and other patents pending



Schluter®-DITRA-HEAT-E-HK

DITRA-HEAT-E-HK are twisted pair heating cables designed for integration with the DITRA-HEAT uncoupling membrane in interior floor warming applications. The cables can be installed without returning to the thermostat and produce virtually zero electromagnetic fields.

Item No.	Length	Area	Total Power	Average Power (Watts/ft² – Watts/m²)	Current (Amps)
Heating cable (120 V)					
DHE HK 120 16	52.9 ft *(16.1 m)*	16.0 ft² *(1.5 m²)*	203 W	12.7 - *136.3*	1.7
DHE HK 120 27	88.2 ft *(26.9 m)*	26.7 ft² *(2.5 m²)*	338 W	12.7 - *136.3*	2.8
DHE HK 120 32	105.8 ft *(32.2 m)*	32.0 ft² *(3.0 m²)*	405 W	12.7 - *136.3*	3.4
DHE HK 120 38	124.1 ft *(37.8 m)*	37.5 ft² *(3.5 m²)*	475 W	12.7 - *136.3*	4.0
DHE HK 120 43	141.1 ft *(43.0 m)*	42.7 ft² *(4.0 m²)*	540 W	12.7 - *136.3*	4.5
DHE HK 120 64	212.9 ft *(64.9 m)*	64.4 ft² *(6.0 m²)*	815 W	12.7 - *136.3*	6.8
DHE HK 120 83	275.5 ft *(84.0 m)*	83.3 ft² *(7.7 m²)*	1055 W	12.7 - *136.3*	8.8
DHE HK 120 92	303.0 ft *(92.4 m)*	91.7 ft² *(8.5 m²)*	1160 W	12.7 - *136.3*	9.7
DHE HK 120 102	336.9 ft *(102.7 m)*	101.9 ft² *(9.5 m²)*	1290 W	12.7 - *136.3*	10.7
Heating cable (240 V)					
DHE HK 240 21	70.6 ft *(21.5 m)*	21.4 ft² *(2.0 m²)*	270 W	12.7 - *136.3*	1.1
DHE HK 240 32	105.8 ft *(32.2 m)*	32.0 ft² *(3.0 m²)*	405 W	12.7 - *136.3*	1.7
DHE HK 240 53	176.3 ft *(53.7 m)*	53.3 ft² *(5.0 m²)*	675 W	12.7 - *136.3*	2.8
DHE HK 240 75	248.2 ft *(75.7 m)*	75.1 ft² *(7.0 m²)*	950 W	12.7 - *136.3*	4.0
DHE HK 240 129	425.8 ft *(129.8 m)*	128.8 ft² *(12.0 m²)*	1630 W	12.7 - *136.3*	6.8
DHE HK 240 167	551.0 ft *(167.9 m)*	166.7 ft² *(15.5 m²)*	2110 W	12.7 - *136.3*	8.8
DHE HK 240 204	673.8 ft *(205.4 m)*	203.8 ft² *(18.9 m²)*	2580 W	12.7 - *136.3*	10.7
DHE HK 240 269	888.0 ft *(270.7 m)*	268.6 ft² *(25.0 m²)*	3400 W	12.7 - *136.3*	14.2

Each heating cable includes a floor temperature sensor compatible with the DITRA-HEAT-E-RS thermostat and features an approximately 7 ft *(2.1 m)* long cold lead.
Heating cable repair kits are available. Please contact Customer Service for more information.

Non-programmable

Programmable

Schluter®-DITRA-HEAT-E-RS

DITRA-HEAT-E-RS are digital thermostats to control the DITRA-HEAT-E-HK heating cables (either 120 V or 240 V). The thermostats feature a 5 mA built-in ground fault circuit interrupter (GFCI) with indicator light. The DITRA-HEAT-E-RS thermostats have an electrical current limit of 16 amps. A floor temperature sensor is included. The programmable version features more than 250 pre-set programs and anticipated start function. The non-programmable version features simple on/off and a smart mode acts like a programmable thermostat by automatically lowering the temperature once per 24 hour period.

Digital thermostat with remote floor temperature sensor	
Item No.	**Description**
DHE RS/BW	Non-programmable thermostat with floor temperature sensor in bright white
DHE RS D/BW	Programmable thermostat with floor temperature sensor in bright white

Schluter®-DITRA-HEAT-E-KIT

The **DITRA-HEAT-E-KIT** is an all-inclusive package containing the DITRA-HEAT uncoupling membrane, heating cable, and programmable thermostat.

Kit containing all necessary components		
Item No.	DHE K 120 40	DHE K 120 56
Matting	5 sheets – 43.1 ft² *(4.0 m²)*	7 sheets – 60.3 ft² *(5.6 m²)*
Heating cable	88' 3" – 26.7 ft² *(26.9 m – 2.5 m²)*	124' 0" - 37.5 ft² *(37.8 m - 3.5 m²)*
Thermostat	1 – white, programmable	1 – white, programmable

Schluter®-KERDI-BAND

KERDI-BAND is a waterproofing strip used to seal butt joints and floor/wall connections with the KERDI and DITRA membranes.

Waterproofing strip			
Item No.	**Width**	**Length**	**Thickness**
KEBA 100/125/5M	5" - *125 mm*	16' 5" - *5 m*	4 mil
KEBA 100/125/10M	5" - *125 mm*	33' - *10 m*	4 mil
KEBA 100/185/5M	7-1/4" - *185 mm*	16' 5" - *5 m*	4 mil
KEBA 100/250/5M	10" - *250 mm*	16' 5" - *5 m*	4 mil
KEBA 100/125	5" - *125 mm*	98' 5" - *30 m*	4 mil
KEBA 100/185	7-1/4" - *185 mm*	98' 5" - *30 m*	4 mil
KEBA 100/250	10" - *250 mm*	98' 5" - *30 m*	4 mil

Note: 1 mil = 1 one-thousandth of an inch

Schluter®-KERDI-FLEX

KERDI-FLEX is a flexible polyethylene waterproofing strip used to seal movement joints over DITRA-HEAT in specialty applications where large movements are expected (e.g., over expansion joints).

Waterproofing strip for use above movement joints			
Item No.	**Width**	**Length**	**Thickness**
FLEX 125/5M	5" - *125 mm*	16' 5" - *5 m*	12 mil
FLEX 250/5M	10" - *250 mm*	16' 5" - *5 m*	12 mil
FLEX 125/30	5" - *125 mm*	98' 5" - *30 m*	12 mil
FLEX 250/30	10" - *250 mm*	98' 5" - *30 m*	12 mil

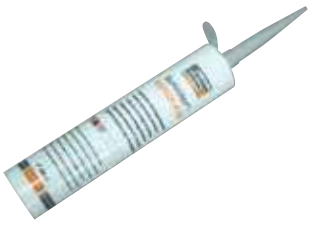
Note: 1 mil = 1 one-thousandth of an inch

Schluter®-KERDI-KERECK-F

KERDI-KERECK-F are preformed, seamless corners made of KERDI for waterproofing inside and outside corners.

Waterproofing for corners		
Item No.	**Thickness**	**Packaging**
KERECK/FI 2	4 mil	2 Inside corners
KERECK/FI 10	4 mil	10 Inside corners
KERECK/FA 2	4 mil	2 Outside corners
KERECK/FA 10	4 mil	10 Outside corners

Note: 1 mil = 1 one-thousandth of an inch



Schluter®-KERDI-FIX

KERDI-FIX is a single-component sealing and bonding compound with a silane-modified polymer base. It is odor-neutral, UV- and weather-resistant, and contains no solvents. KERDI-FIX is elastomeric and bonds well to most materials, such as wood, stone, concrete, metal, glass, and many plastics. KERDI-FIX is suitable for the bonding of KERDI waterproofing membrane to vertical sections of floor/wall transitions that will not accept a bond to unmodified thin-set mortar.

Sealing and bonding compound	
Item No.	**Description**
KERDIFIX/**color***	Cartridge – 9.81 oz *(290 ml)*

***Color Codes**	
BW Bright white	**G** Grey

Schluter®-DITRA-ROLLER

Used to embed DITRA membranes in the bond coat during membrane installation. The lightweight **DITRA-ROLLER** features a 14-1/2" *(37 cm)* wide roller and a shelf for placing 50 to 75 lbs of weight (e.g., bag of thin-set mortar or grout, box of tiles, etc.). Between uses, it can be conveniently disassembled for transport and storage.

Used to embed uncoupling membranes in the bond coat	
Item No.	Width
DIRO	14-1/2" *(37 cm)*

HEATING CABLE TESTS LOG

Validation for warranty coverage

Each heating cable is subject to factory quality control. However, damage to the cables may happen after the product leaves the factory. In order to ensure that the cable quality remains unchanged throughout the installation process and for warranty purposes, tests must be conducted while the cable is still on the spool and during two specific subsequent steps. Measurements must be recorded in the table below and compared to initial measurements taken when the cable was on the spool in order to enable you to detect any changes related to the electrical property of the cable. Any installation-related cable damages are not covered by the warranty.

Homeowner/end user must retain this heating cable tests log for warranty purposes.

Heating Cable Tests Log

Project: _____ **Date of installation:** _____

Certified electrician: _____ **Date of start-up:** _____

Identification	Factory Value		Before Installation	After Cable Installation	After Tile Installation
Conductor Resistance Test					
Conductor and Ground Braid Continuity Test					
	Infinity (I) or Overload (OL)				
Insulation Resistance Test					
	Equal to or greater than 1 Gigaohms*				
Floor Temperature Sensors Test					
	Temperature		Resistance		
	°C	**°F**	**Kohms**		
	10	50	18.1		
	15	59	14.8		
	20	68	12.1		
	25	77	10.0		
	30	86	8.3		

*1 Gigaohms = 1 G ohms = 1000 M ohms = 1000 Mega ohms

WARRANTY

Schluter®-DITRA-HEAT 10-Year Limited Warranty

COVERAGE AND CONDITIONS: Subject to the conditions and limitations as stated hereinafter, **Schluter®-Systems*** warrants that the **Schluter®-DITRA-HEAT system** (the "Products")** will meet all composition and performance criteria for a period of ten (10) years from the date of purchase only when the Products are used and installed in accordance with the terms and conditions of the Schluter®-DITRA-HEAT Installation Handbook and industry standard guidelines that are not in conflict with the Handbook in effect at the time of installation. Further, efflorescence is considered to be a natural occurrence with cementitious materials and is therefore not considered to be a defective condition and is not covered by this warranty. It is the responsibility of the owner/ builder/ installer to ensure the suitability of all building materials and all associated building materials for the owner's intended use. It is recommended that the owner consult with an experienced and professional installer. **This warranty is conditioned and will be considered null and void and Schluter®-Systems will have the right to refuse any claims if:** (a) the Products have been improperly stored or installed, (b) any Schluter product comprising the system has been altered or otherwise modified in any way without the prior written authorization of Schluter®-Systems, (c) the Products are subject to abusive or abnormal use, lack of maintenance, or use other than that for which the Products were manufactured, and (d) the nameplate numbers have been removed or modified from any applicable parts (wire), and **(e) the homeowner/end user fails to return a copy of the completed heating cable tests log with the warranty registration card. Homeowner/end user(s) is responsible to return the warranty registration card with the logs, which may be by mail or www.schluter.com/registerwarranty. (It is AN INSTALLATION REQUIREMENT THAT the heating cable tests log be completed by the installer at time of installation and a copy returned with the registration card. We recommend the original logs be retained by homeowner/end users.)**

RESOLUTION: Upon return of the registration card with the heating cable logs and compliance with all the aforementioned conditions, if the Products fail to meet this warranty, then the owner's exclusive remedy and the sole obligation of Schluter®-Systems, at its election, shall be to a) reinstall or replace the failed portion of the floor covering assembly or b) pay an amount not to exceed the original square foot cost of the installation of the floor covering assembly verified to be defective. Floor covering assembly is defined to include all DITRA-HEAT materials (e.g., matting and heating cables), non-reusable flooring surfaces, and the appropriate setting and grouting materials. Further, due to conditions beyond the control of Schluter®-Systems (e.g., color and shade availability, discontinuation, normal wear and tear), Schluter®-Systems cannot guarantee or warrant an exact match to the specific tile, stone, or other flooring materials used in the installation. In such events, substantially similar materials may be substituted. This warranty does not cover scratches, dents, corrosion or discoloration caused by excessive heat, chemical cleaning products and abrasive agents. This warranty does not cover the cost of disconnection or installation.
In the event that the registration card and or heating cable tests log is not completed and returned then the resolution for failure of the Products to meet this warranty shall be replaced with a twenty-five (25) year Limited warranty that each Schluter Heating Cable purchased shall be free from defects in material and workmanship effective on the date of the purchase by or for the original purchaser. The warranty shall remain effective for a period of twenty-five (25) years from the date said original purchase. The maximum liability of the company is limited to the cost of the original Cable multiplied by the percentage of the warranty period remaining.

DISCLAIMER: THERE ARE NO WARRANTIES BEYOND THIS EXPRESSED WARRANTY AS STATED ABOVE. ALL OTHER WARRANTIES, REPRESENTATIONS OR CONDITIONS, EXPRESSED OR IMPLIED, ARE DISCLAIMED AND EXCLUDED, INCLUDING WARRANTIES, REPRESENTATIONS OR CONDITIONS OF **MERCHANTABILITY** OR FITNESS FOR A PARTICULAR PURPOSE ARISING BY STATUTE OR OTHERWISE BY LAW OR FROM A COURSE OF DEALING OR USAGE OF TRADE. SCHLUTER-SYSTEMS EXCLUDES AND IN NO EVENT SHALL HAVE ANY LIABILITY FOR LOST PROFITS OR ANY OTHER INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE, EXEMPLARY, OR CONSEQUENTIAL DAMAGES, ARISING OUT OF OR OTHERWISE CONNECTED TO FAILURE OF THE PRODUCTS OR FLOORING SYSTEM OF WHICH THEY ARE PART, NOR MISUSE OF THE PRODUCTS OR FLOORING SYSTEM, REGARDLESS OF ANY STRICT LIABILITY, ACTIVE OR PASSIVE NEGLIGENCE OF SCHLUTER SYSTEMS, AND REGARDLESS OF THE LEGAL THEORY (CONTRACT OR TORT OR EXTRA-CONTRACTUAL OR OTHER), NOR FROM ACTS OF WAR, TERRORISM, OVERVOLTAGE, FAULTY AND NEGLIGENT PENETRATION OF THE SYSTEM, FIRES, EXPLOSIONS, ACTS OF GOD, INTENTIONAL ACTS OF DESTRUCTION OR ANY LOSSES DUE TO STRUCTURAL FAILURE OR OTHER CAUSES UNRELATED TO THE PRODUCTS OR DELAYS, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS WARRANTY IS GIVEN IN LIEU OF ANY OTHER WARRANTY EXPRESSED OR IMPLIED. THE REMEDIES CONTAINED HEREIN ARE THE ONLY REMEDIES AVAILABLE FOR BREACH OF THIS WARRANTY. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS; SOME STATES AND PROVINCES DO NOT ALLOW DISCLAIMERS OR OTHER RESTRICTIONS OF IMPLIED WARRANTIES, SO SOME OF THE ABOVE DISCLAIMERS MAY NOT APPLY TO YOU.

TRANSFERABILITY: This Limited Warranty extends ONLY to the original end user (defined as original intended owner and user of the property/unit in which the installation is incorporated - herein referred to as "Owner") and is not transferable or assignable, unless approved in writing by the Technical Director or an Officer of Schluter®-Systems or otherwise prohibited by specific state or provincial law.

MODIFICATIONS TO WARRANTY: No changes or modification of any terms or conditions of this warranty are allowed unless authorized by written agreement and signed by the Technical Director or an Officer of Schluter®-Systems.

EFFECTIVE DATE: This warranty shall supersede and replace any and all prior oral or written warranties, agreements, or other such representations made by or on behalf of Schluter®-Systems relative to the Products or the application of the Products and shall apply to any installation occurring on or after April 1, 2015.

CLAIMS ON THIS LIMITED WARRANTY: To make a claim under this Limited Warranty, the Owner must provide Schluter®-Systems with written notice within 30 days of any alleged defect in the Products covered by this Limited Warranty, together with date and proof of purchase of the Products, proof of the costs of the original installation and name and address of all installers and completed heating cable tests log, failing which this Limited Warranty shall be of no legal effect. Schluter®-Systems reserves the right at its election and as a condition of this Limited Warranty to inspect the alleged failed and defective condition.

All U.S. Claims shall be sent to:

Schluter Systems L.P.
Attn: Warranty Claims Dept.
194 Pleasant Ridge Road
Plattsburgh, NY 12901

All Canadian Claims shall be sent to:

Schluter Systems (Canada), Inc.
Attn: Warranty Claims Dept.
21100 chemin Ste-Marie
Ste-Anne-de-Bellevue, QC H9X 3Y8

*For the purpose of this warranty **Schluter Systems, L.P.** shall provide the warranty for all products for end users located in the United States, and **Schluter Systems (Canada) Inc.** shall provide the warranty for all products for end users located in Canada. This warranty is limited to sales of the Products made in and intended for use in the United States and Canada.

**Schluter®-DITRA-HEAT System ("the Products"): The products are defined to include Schluter®-DITRA-HEAT matting and DITRA-HEAT heating cables.

Schluter Systems®

Schluter Systems L.P. • 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841 • Tel.: 800-472-4588 • Fax: 800-477-9783
Schluter Systems (Canada) Inc. • 21100 chemin Ste-Marie, Ste-Anne-de-Bellevue, QC H9X 3Y8 • Tel.: 800-667-8746 • Fax: 877-667-2410

www.schluter.com

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