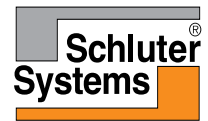


Authorized Distributor:

warmyourfloor™
the radiant floor heating experts™

customer@warmyourfloor.com

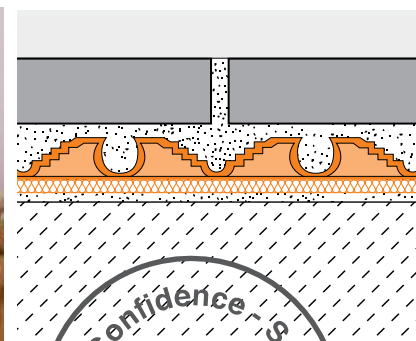
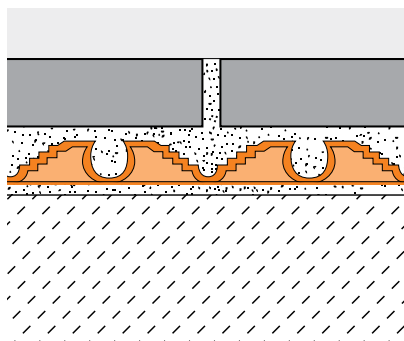
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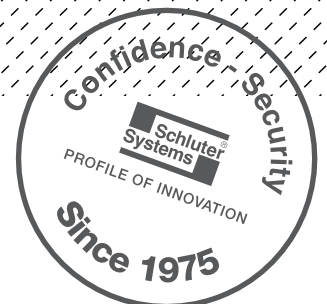
PROFILE OF INNOVATION



Schluter®-DITRA-HEAT Installation Handbook 2017



Electric Floor Warming System
with Integrated Uncoupling Technology



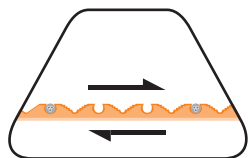
Schluter®-DITRA-HEAT

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.

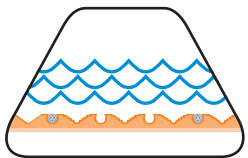
Floor warming systems are a growing trend in tile applications, but none address concerns about cracking. A viable installation system must address the magnified fluctuations in temperature that contribute to increased shear stresses between the substrate and the tile covering. **Schluter®-DITRA-HEAT** 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.



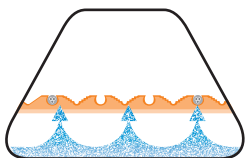
Uncoupling

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.



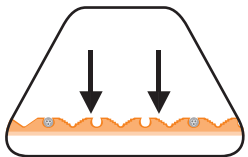
Waterproofing

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

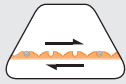
WOOD	4	Floors, Interior – 16, 19.2, & 24-inch o.c. joist spacing
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NATURAL STONE	31	Discussion of natural stone and single-layer wood subfloors
PRODUCT & ORDERING INFO	32	<div>Heating cables must be installed by a qualified person in accordance with 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.</div>
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This installation handbook is subject to change without notice.
Please visit www.schluter.com for the latest version.

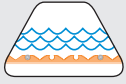
WOOD

Every substrate presents unique challenges

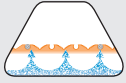
All wood materials, including OSB, plywood, and framing members, are subject to expansion, contraction, bending, and deflection as a result of changes in moisture content and loading. Further, these deformations fluctuate over the life of the building structure.



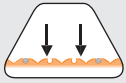
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering from the aforementioned deformations by neutralizing the differential movement stresses between the wood structure and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface. Therefore, 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-17

Ceramic or porcelain tile

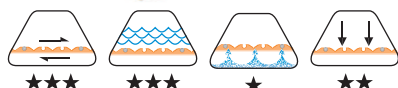
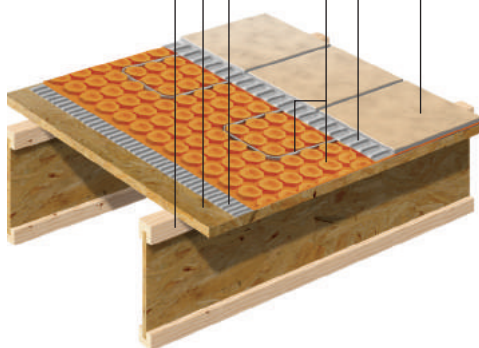
Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar

DITRA-HEAT or **DITRA-HEAT-DUO** uncoupling membrane and heating cables

Schluter ALL-SET™, Schluter FAST-SET™, or modified thin-set mortar

Single layer of plywood or OSB

Joists, I-joists, or trusses



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 31)

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 and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

- ▲ modified thin-set mortar – ANSI A118.11
- ▲ unmodified thin-set mortar – ANSI A118.1
- ▲ grout – ANSI A118.3, A118.6, A118.7, A118.8

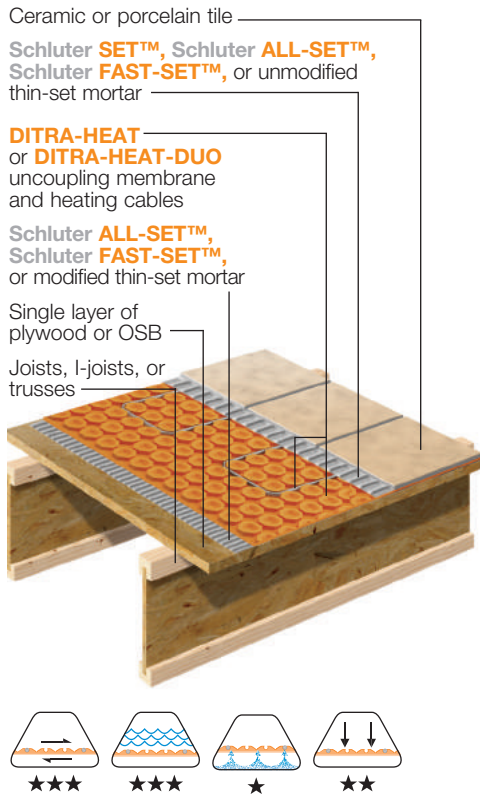
Setting and Grouting Specifications

- ▲ 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 and DITRA-HEAT-DUO.
- ▲ vapor barrier on crawl space floors according to regional building codes.
- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.

DH-W19-T-17



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 31)

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 and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

- ▲ modified thin-set mortar - ANSI A118.11
- ▲ unmodified thin-set mortar – ANSI A118.1
- ▲ grout – ANSI A118.3, A118.6, A118.7, A118.8

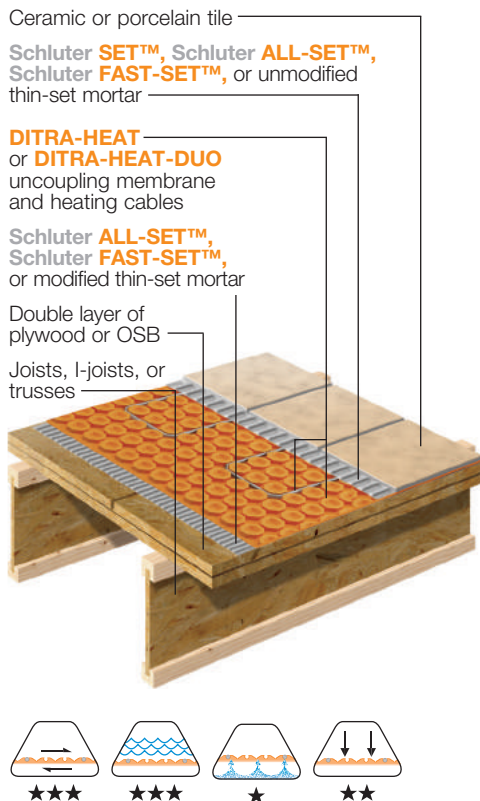
Setting and Grouting Specifications

- ▲ 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 and DITRA-HEAT-DUO.
- ▲ vapor barrier on crawl space floors according to regional building codes.
- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.

DH-W24-T-17



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 16 for underlayment installation guidelines.
- ▲ any leveling of the subfloor must be done prior to installing DITRA-HEAT and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

- ▲ modified thin-set 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 and DITRA-HEAT-DUO.
- ▲ vapor barrier on crawl space floors according to regional building codes.
- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.

DH-W-S-17

Natural stone tile

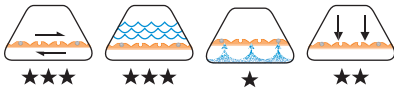
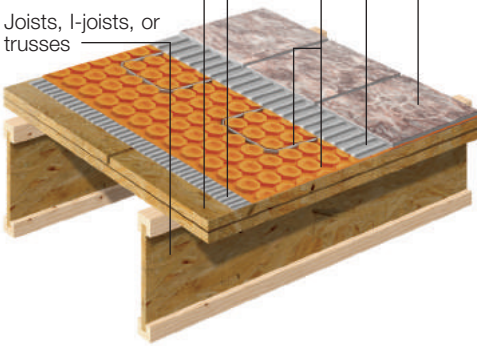
Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar

DITRA-HEAT or DITRA-HEAT-DUO uncoupling membrane and heating cables

Schluter ALL-SET™, Schluter FAST-SET™, or modified thin-set mortar

Double layer of plywood or OSB

Joists, I-joists, or trusses



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 16 for underlayment installation guidelines.
- ▲ any leveling of the subfloor must be done prior to installing DITRA-HEAT and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

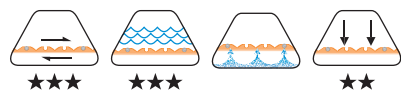
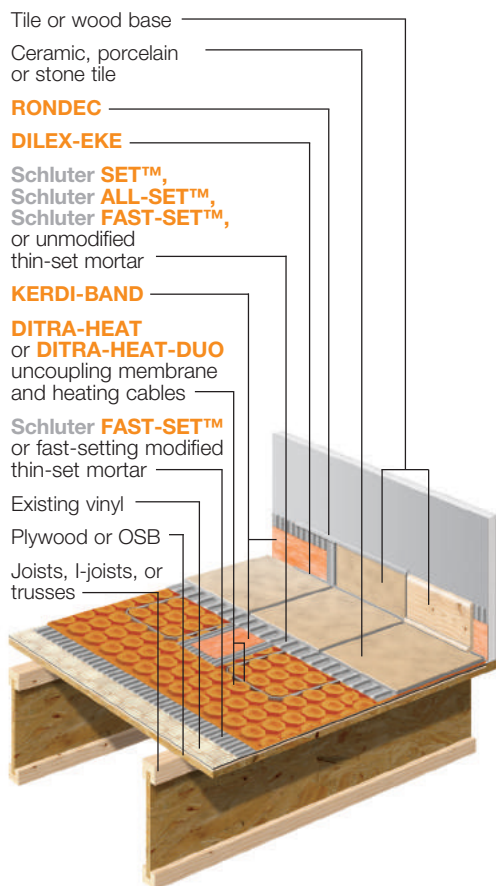
- ▲ modified thin-set mortar - ANSI A118.11
- ▲ unmodified thin-set mortar – ANSI A118.1
- ▲ grout – ANSI A118.3, A118.6, A118.7, A118.8

Setting and Grouting Specifications

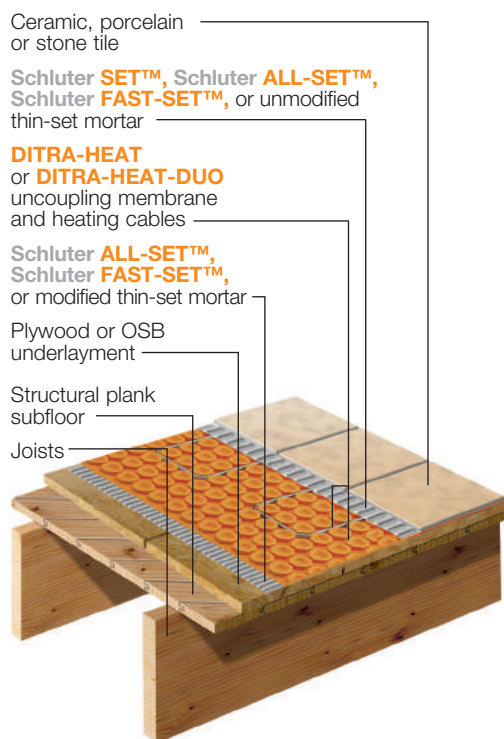
- ▲ tile – ANSI A108.5
- ▲ grout – ANSI A108.6, A108.9, A108.10

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 and DITRA-HEAT-DUO.
- ▲ vapor barrier on crawl space floors according to regional building codes.
- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.



DH-SP-TS-17



Floors, Interior - Existing Vinyl Floors

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 and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

- ▲ Fast-setting modified thin-set mortar - ANSI A118.4 or ANSI 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 and DITRA-HEAT-DUO are adhered to the vinyl flooring using Schluter FAST-SET™ or fast-setting modified thin-set mortar suitable for bonding to vinyl. As an alternative, a suitable cement-based sanding leveler or Schluter ALL-SET™ or an appropriate modified thin-set mortar can be used to skim coat the vinyl to provide a bonding surface. When skim coat is cured, DITRA-HEAT and DITRA-HEAT-DUO are adhered to the skim coat using Schluter SET™ or unmodified thin-set mortar. See page 23 for discussion on latex-modified thin-set mortars sandwiched between two impervious layers.
- ▲ seaming DITRA-HEAT and DITRA-HEAT-DUO, 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 12.
- ▲ 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

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 16 for underlayment installation guidelines.
- ▲ any leveling of the subfloor must be done prior to installing DITRA-HEAT and DITRA-HEAT-DUO.

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 of this Handbook, TCNA EJ171, and TTMAC 301 MJ.

Setting and Grouting Materials

- ▲ modified thin-set 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 and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.
- ▲ 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.

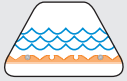
CONCRETE

Every substrate presents unique challenges

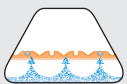
There are various challenges associated with the installation of hard surface coverings on concrete substrates. To begin, the coefficient of thermal expansion of concrete is close to twice that of ceramic tile. Additionally, tile contractors are often expected to install tile over young concrete (concrete 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.



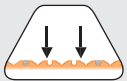
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.



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. DITRA-HEAT-DUO features an integrated thermal break to reduce impact sound transmission through floor-ceiling assemblies, reduce heat loss to concrete substrates, and improve floor warming response times.

Floors, Interior - Ceramic or Stone Tile

DH-C-TS-17

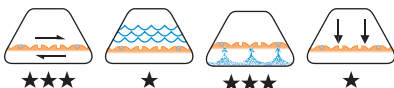
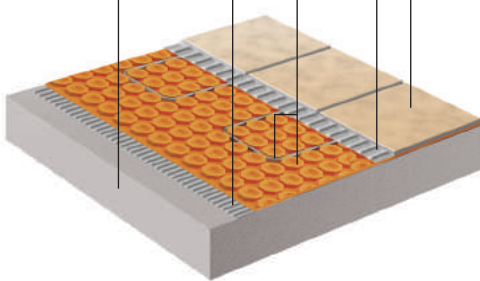
Ceramic, porcelain
or stone tile

Schluter SET™, Schluter ALL-SET™,
Schluter FAST-SET™, or unmodified
thin-set mortar

DITRA-HEAT
or **DITRA-HEAT-DUO**
uncoupling membrane
and heating cables

Schluter SET™,
Schluter ALL-SET™,
Schluter FAST-SET™,
or unmodified thin-set mortar

Concrete



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 and DITRA-HEAT-DUO 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 or DITRA-HEAT-DUO, 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 or DITRA-HEAT-DUO and tile can begin as soon as the slab can be walked upon
- ▲ slab to be free of standing water
- ▲ sound control floors - Schluter perimeter movement joints recommended to help limit sound energy transfer

Substrate Preparation

- ▲ any leveling of the subfloor must be done prior to installing DITRA-HEAT and DITRA-HEAT-DUO

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 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

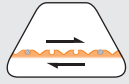
Other Considerations

- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using unmodified thin-set mortar; see page 12.
- ▲ 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
- ▲ consider the use of DITRA-HEAT-DUO to improve the response time of DITRA-HEAT in applications over concrete. See page 28 for more information.

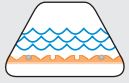
GYPSUM

Every substrate presents unique challenges

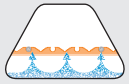
Bonding ceramic or stone tiles directly to gypsum concrete substrates is generally considered questionable or not recommended. The challenges associated with gypsum-based underlayments include the requirement of an extended drying period before installing tile and continued sensitivity to the reintroduction 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.



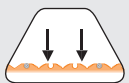
DITRA-HEAT's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the gypsum concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.



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.

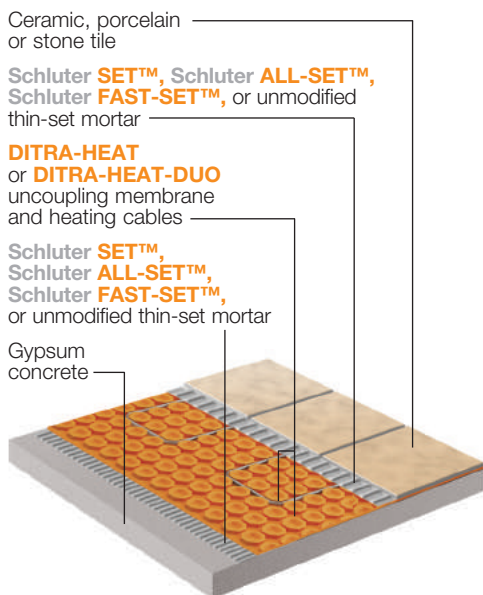


Since **DITRA-HEAT** is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

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-17



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
- ▲ DITRA-HEAT-DUO not recommended over heated floors

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 and DITRA-HEAT-DUO.

Substrate preparation

- ▲ gypsum – follow manufacturer's directions

Movement Joints

- ▲ DITRA-HEAT and DITRA-HEAT-DUO do 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 13 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 and DITRA-HEAT-DUO must bond to the gypsum concrete, follow gypsum manufacturer's directions regarding primers and/or special surface preparation before installing DITRA-HEAT and DITRA-HEAT-DUO.
- ▲ where a waterproof floor is required, all DITRA-HEAT and DITRA-HEAT-DUO seams and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar; see page 12.
- ▲ 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.

SHOWER ASSEMBLY

Showers – Ceramic or stone tile

Schluter®-DITRA-HEAT Shower Application

DH-SH-17



- | | | |
|---|---|--|
| <p>1 Ceramic or stone tile</p> <p>2 Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar</p> <p>3 Schluter®-KERDI waterproofing membrane</p> <p>4 Schluter®-KERDI-BOARD waterproof building panel</p> <p>5 Schluter®-KERDI-BOARD-ZT/-ZS washers and screws</p> <p>6 Schluter®-KERDI-BAND waterproofing strips</p> <p>7 Schluter®-KERDI-KERECK-F waterproofing corners</p> <p>8 Schluter®-KERDI-SEAL-PS/-MV seals or Schluter®-KERDI-FIX sealant and bonding compound</p> | <p>9 Solid backing</p> <p>10 Drain:
a. Schluter®-KERDI-DRAIN
b. Schluter®-KERDI-LINE</p> <p>11 Base:
a. Schluter®-KERDI-SHOWER-ST
b. Schluter®-KERDI-SHOWER-L/-LS</p> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Alternative (not shown):</p> <ul style="list-style-type: none"> • Mortar bed </div> <p>12 Schluter®-KERDI-BOARD-SC curb</p> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Alternatives (not shown):</p> <ul style="list-style-type: none"> • Schluter®-KERDI-SHOWER-SC curb • Schluter®-KERDI-BOARD waterproof building panel • Built-up curb </div> | <p>13 Schluter®-SHOWERPROFILE-WSK/-WSL Shower profile</p> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Alternative (not shown):</p> <ul style="list-style-type: none"> • Schluter®-SHOWERPROFILE-WS/-WSC </div> <p>14 Schluter®-DITRA-HEAT or Schluter®-DITRA-HEAT-DUO Electric floor warming and uncoupling membrane</p> <p>15 Wood or concrete subfloor</p> <p>16 Schluter®-DILEX profile (optional)</p> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Bench (not shown, optional):</p> <ul style="list-style-type: none"> • Schluter®-KERDI-BOARD-SB bench • Schluter®-KERDI-SHOWER-SB bench • Schluter®-KERDI-BOARD bench </div> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Niche (not shown, optional):</p> <ul style="list-style-type: none"> • Schluter®-KERDI-BOARD-SN niche </div> |
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Schluter®-DITRA-HEAT Shower Application

DH-SH-17

Note: Please refer to the Schluter®-Shower System Installation Handbook for installation instructions and warranty criteria for the Schluter®-Shower System.

Areas of Application

- ▲ Interior showers with or without curbless applications.
- ▲ Interior intermittent use steam showers (e.g., residential applications). See details K-SSH-K or K-SSH-KB in the Schluter®-Shower System Installation Handbook for more information.
- ▲ Over wood or concrete subfloors.

Limitations

- ▲ Certain glass tiles may not be compatible with bonded waterproof membranes and/or may require special setting materials. Consult glass tile manufacturer and Schluter®-Systems for more information.
- ▲ Certain moisture sensitive stones, e.g., green marble, or resin-backed tiles may not be appropriate for use in wet areas such as showers or may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.
- ▲ Do not use sawn lumber curbs on concrete subfloors subject to moisture migration.

Requirements

- ▲ Plywood, OSB, or concrete subfloor must be clean, even, and load bearing.
- ▲ For wood substrates, subfloor/underlayment configuration according to detail DH-W16-T, DH-W19-T, DH-W24-T, or DH-W-S.
- ▲ For curbless applications: Recessing the floor of a bathroom must be done in a way that preserves the structural integrity and safety of the construction. This may require the services of a qualified design professional (e.g., architect, engineer, etc.).
- ▲ Solid backing – gypsum wallboard, cementitious backer unit, fiber-cement underlayment, fiber-reinforced water-resistant gypsum backerboard/underlayment, coated glass mat water-resistant gypsum backerboard, Portland cement mortar bed, concrete, or masonry.
- ▲ Minimum KERDI-BOARD thickness – 1/2" (12.5 mm) for studs spaced at 16" (40.6 cm) o.c. and 3/4" (19 mm) for studs spaced at 24" (61.0 cm) o.c.
- ▲ KERDI-BOARD shall be fastened to wood or metal framing with appropriate screws (i.e., coarse thread wood screw for wood studs and self-tapping for metal studs) and corresponding KERDI-BOARD-ZT washers. Screws must reach a depth of at least 3/4" (20 mm) in wood studs and 3/8" (10 mm) in metal studs. Maximum allowable on-center fastener spacing is 12" (30 cm) for walls and 6" (15 cm) for ceilings.
- ▲ KERDI or KERDI-BOARD shall be installed up to the height of the showerhead at minimum.
- ▲ Any protrusions through the KERDI or KERDI-BOARD (e.g., showerhead, mixing valve, etc.) must be treated with KERDI-SEAL-PS/-MV seals, KERDI-FIX or suitable sealant.
- ▲ Base – KERDI-SHOWER-ST/-L/-LS or Portland cement mortar bed.
- ▲ Ramp – KERDI-SHOWER-SR or Portland cement mortar bed.
- ▲ Curb – KERDI-BOARD-SC, KERDI-SHOWER-SC, KERDI-BOARD, concrete, masonry block, or sawn lumber sheathed with solid backing (see above).
- ▲ Bench – KERDI-BOARD-SB, KERDI-SHOWER-SB, KERDI-BOARD, concrete, masonry block, or sawn lumber sheathed with solid backing (see above).
- ▲ KERDI-DRAIN/-LINE shall be properly supported.
- ▲ KERDI-DRAIN/-LINE shall be connected to the waste line; use ABS cement for ABS drains, PVC cement for PVC drains, a no-hub coupling for stainless steel drains with no-hub outlets, and thread sealing compound or tape for stainless steel drains with threaded outlets.
- ▲ When using the stainless steel KERDI-DRAIN bonding flange, use KERDI-FIX to bond KERDI to the drain.
- ▲ DITRA-HEAT heating cables must be installed in the DITRA-HEAT or DITRA-HEAT-DUO membrane. KERDI must be installed over the heating cables and DITRA-HEAT/-DUO in the shower.
- ▲ Due to the installation of the DITRA-HEAT membrane on top of the shower tray, it is necessary to raise the height of the KERDI-DRAIN/LINE. Installation of DITRA-HEAT membrane on the substrate under the detachable center section for KERDI-DRAIN or under the KERDI-LINE channel body support will provide the proper height adjustment.
- ▲ When a curb is used, the heating cables must be installed over the curb in a 3/4" wide x 1/4" deep routed section and encased in thin-set mortar. **DO NOT install the heating cable under the curb or go through the curb, as this could cause damage to the heating cable and curb. After the heating cable is installed, apply KERDI over the routed section of the KERDI-BOARD-SC curb.**
- ▲ A dedicated heating cable is recommended in the shower area to allow for simple disconnection without an impact on the bathroom floor heating in the event that the shower heating cable is damaged. Multiple heating cables may be installed on a single thermostat, up to the 15 amp limit.
- ▲ Heating cables must be installed 3 studs from the edge of the KERDI-LINE flange and 2 studs from the edge of the KERDI-DRAIN flange.

Safety

- ▲ Repairs to the DITRA-HEAT heating cable in the shower may not be approved. Verify with the local inspector or authority having jurisdiction (AHJ). Flood testing the shower is recommended before re-tiling.
- ▲ Heating cable factory splice (i.e., cold lead splice) must not be installed in the shower area.

Substrate Preparation

- ▲ Verify that subfloor panels and solid backing are properly fastened to framing members.
- ▲ Any leveling of the subfloor must be done prior to installing KERDI-SHOWER-ST/-L/-LS/-SB/-SC/-SR, KERDI-BOARD-SC/-SB, DITRA-HEAT, and DITRA-HEAT-DUO membranes.

Solid Backing Materials

- ▲ Gypsum wallboard – ASTM C1396/C1396M
- ▲ Cementitious backer unit – ANSI A118.9 or ASTM C1325
- ▲ Fiber-cement underlayment – ASTM C1288
- ▲ Fiber-reinforced water-resistant gypsum backerboard/underlayment – ASTM C1278
- ▲ Coated glass mat water-resistant gypsum backerboard – ASTM C1178
- ▲ Portland cement mortar – ANSI A108.1B
- ▲ Concrete
- ▲ Masonry

Setting and Grouting Materials

- ▲ Unmodified thin-set mortar – ANSI A118.1
- ▲ Grout – ANSI A118.3, A118.6, A118.7

Installation Specifications

- ▲ Solid backing panels – follow manufacturer's instructions
- ▲ Portland cement mortar bed – ANSI A108.1B
- ▲ Tile – ANSI A108.5
- ▲ Grout – ANSI A108.6, A108.10

Other Considerations

- ▲ Acceptance of electric floor warming in a shower and this detail must be verified by the local inspector or authority having jurisdiction (AHJ).
- ▲ KERDI is required on top of DITRA-HEAT installations in the shower. Schluter®-Systems chooses to be conservative and to ensure everything is protected. Note: DITRA-HEAT-E-HK heating cables are rated for wet applications per CAN/CSA-C22.2 No.130-03. DITRA-HEAT membranes have been found to meet or exceed the requirements of ANSI A118.10.
- ▲ Curbless tiled showers rely on the slope of the floor to effectively contain water in the immediate shower area and direct water to the drain. Given the wide range of potential configurations, it isn't possible to address them all in this Handbook.
- ▲ For curbless applications: waterproofing must be installed in all areas subject to water exposure.
- ▲ Schluter®-SHOWERPROFILE-WS/-WSK system profiles can be used to form a splashguard at the entrance of curbless showers.
- ▲ Various building codes and other sources, such as the Americans with Disabilities Act, include specific requirements for disabled access in public buildings and must be consulted when applicable. Areas of interest may include degree of slope, clearance, and supporting structures such as grab bars.
- ▲ Shower grab bars must be anchored in the structure or solid blocking behind KERDI-BOARD.
- ▲ When KERDI-SHOWER-ST/-L/-LS tray dimensions do not match the dimensions of the shower compartment, the tray may be cut or extended with dry pack mortar.
- ▲ When KERDI or KERDI-BOARD and tile are installed on the ceiling, the solid backing and fasteners must be able to support the load of the tile and setting and grouting materials.
- ▲ A water test is recommended before setting tile to verify a successful installation. Wait 24 hours minimum after the membrane installation is complete to allow for final set of thin-set mortar and ensure waterproof performance at seams and connections. For curbless showers a temporary dam (e.g., a 2x4 and silicone sealant, plastic sheeting and sand, etc.) must be provided at the threshold to perform the water test.
- ▲ Schluter®-Systems profiles may be used to finish and protect outside corners and eliminate the use of sealant at inside corners.
- ▲ Schluter®-SHOWERPROFILE-S/-R profiles eliminate the need for cutting wedges of tile by covering the exposed wall area where the floor slopes to KERDI-LINE.

WATERPROOFING

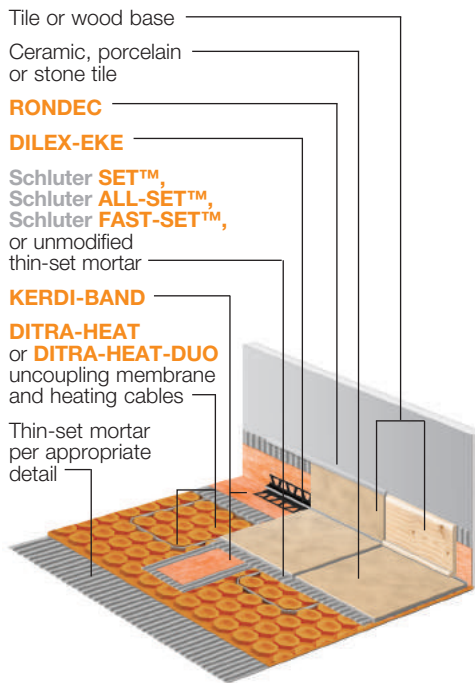
Every substrate presents unique challenges

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 covering 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** and **DITRA-HEAT-DUO** 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 Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or 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 and DITRA-HEAT-DUO installations.

DH-WP-17



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 and DITRA-HEAT-DUO matting and floor/wall transitions must be sealed with KERDI-BAND using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or 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 and DITRA-HEAT-DUO, 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 and DITRA-HEAT-DUO applications. DITRA-HEAT and DITRA-HEAT-DUO are sealed to the fleece-laminated KERDI-DRAIN bonding flange with a section of KERDI membrane using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar. KERDI-FIX is used to seal the section of KERDI to the stainless steel KERDI-DRAIN bonding flange. DITRA-HEAT and DITRA-HEAT-DUO are sealed to the KERDI waterproofing collar on KERDI-LINE using Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or 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.

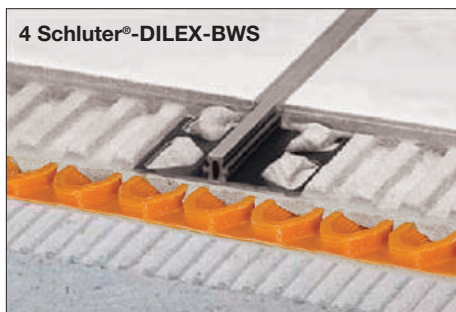
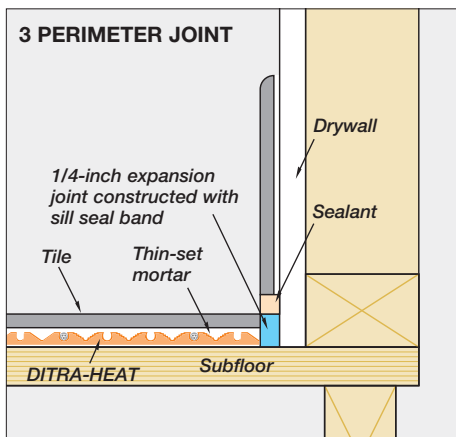
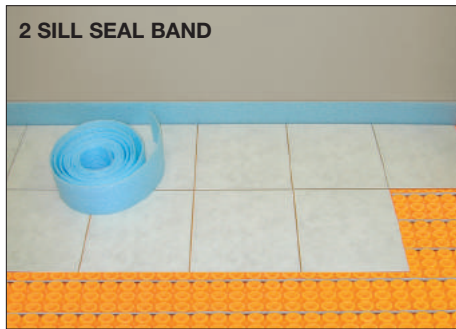
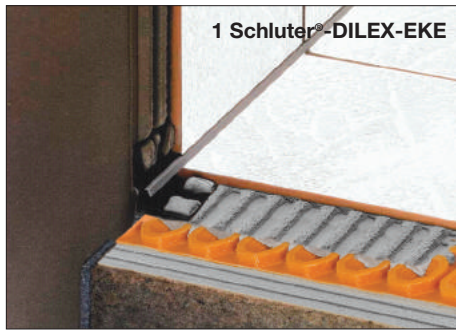
TECHNICAL NOTES

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



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, DITRA-HEAT-DUO, 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 and DITRA-HEAT-DUO membranes are 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 and DITRA-HEAT-DUO are 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 and DITRA-HEAT-DUO are 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.

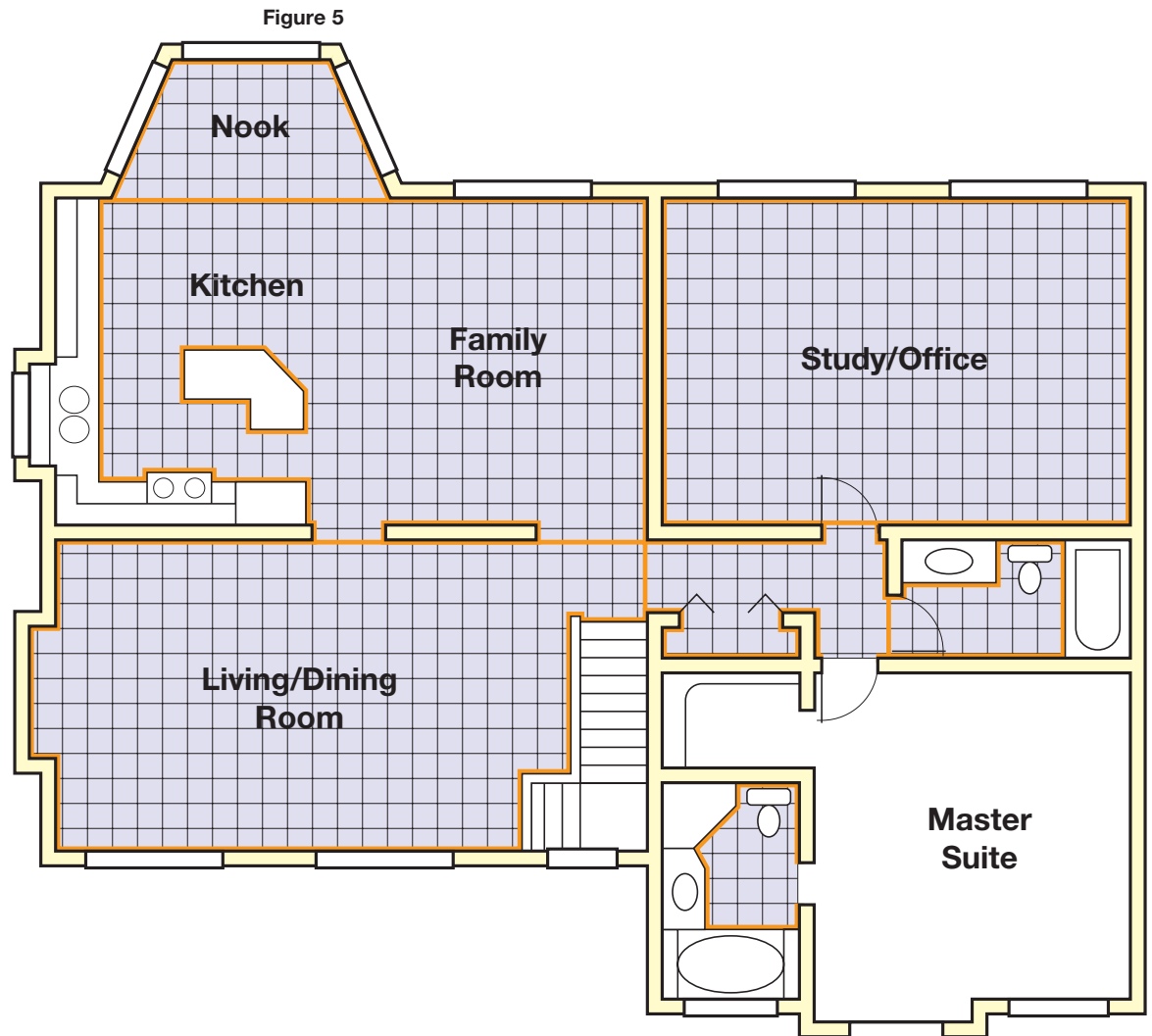
Structural or Seismic Joints

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.



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

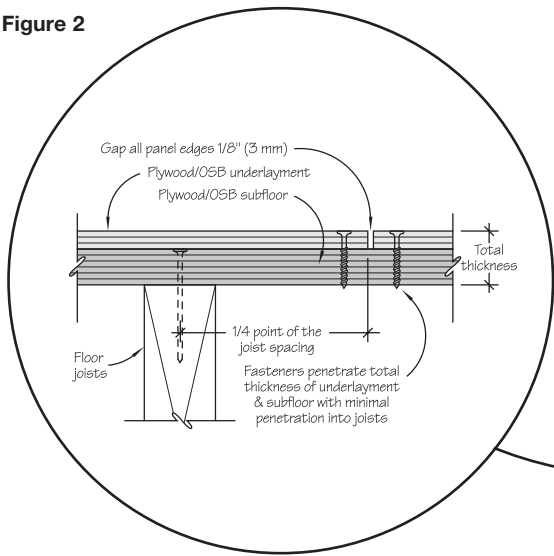
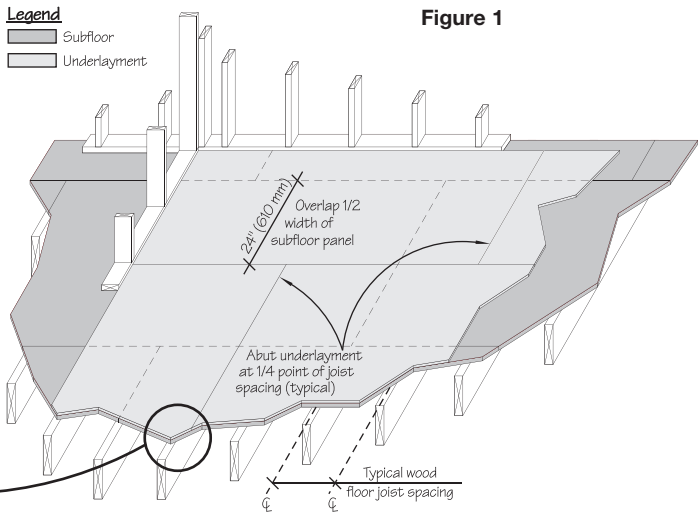


Figure 1



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 and DITRA-HEAT-DUO 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:
 - Minimum spacing from:
 - Walls, partitions, and fixed cabinets = 2" (50 mm)
 - Heat sources (baseboard heaters, fireplaces, forced air heating ducts, etc.) = 8" (200 mm)
 - Plumbing drains = 4" (100 mm)
 - Centerline of toilet drains = 7" (180 mm)
 - It is helpful to plan the location of a buffer zone, as it is not possible to predict exactly where the heating cable will end. The buffer zone is an area where floor warming is not essential and heating cable installation is not planned (e.g., behind a toilet or adjacent to a door opening). This area allows for placement of excess heating cable. Heating cables may also be installed 6" (150 mm) from the wall to create a buffer zone.
 - For more information on installing DITRA-HEAT-E-HK heating cables on 208 V circuits, please see page 27.
- Two DITRA-HEAT-E-HK heating cables can be connected and controlled by a single DITRA-HEAT-E-RT/-RSD/-R thermostat if the total current is less than 15 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 15 amps cannot be connected to a single DITRA-HEAT-E-RT/-RSD/-R thermostat. Additional DITRA-HEAT-E-RT/-RSD/-R thermostats must be used or the DITRA-HEAT-E-RT thermostat may be combined with the DITRA-HEAT-E-RR power modules.

Preparation

- The substrate must be clean, even, and load bearing. Any leveling of the subfloor must be done prior to installing DITRA-HEAT and DITRA-HEAT-DUO.
- 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 and DITRA-HEAT-DUO. If a plywood/OSB underlayment is to be installed, follow the Wood Underlayment guidelines on page 16.
- 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 and DITRA-HEAT-DUO 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 and DITRA-HEAT-DUO. 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 the DITRA-HEAT trowel, or other 1/4" x 1/4" (6 mm x 6 mm) square-notched trowel.



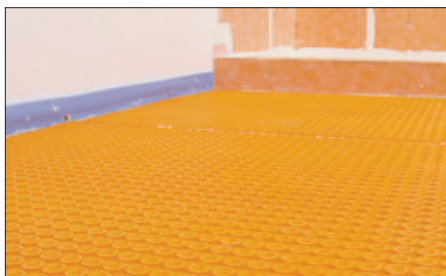
- 2 Apply DITRA-HEAT or DITRA-HEAT-DUO to the floor, fleece side down. Solidly embed the matting into the mortar using a float, screed trowel, or DITRA-ROLLER, making sure to observe the open time of the bonding mortar. If the mortar skins over prior to matting installation, remove and reapply. **Note:** It may be helpful to back roll the DITRA-HEAT matting before installation to help the membrane to lay flat.



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. DITRA-HEAT-DUO fleece may not pull up as much mortar from the floor as DITRA-HEAT when lifted, but full contact can be achieved as shown. **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 you have a question, please contact Customer Service by phone 800-472-4588 (USA) or 800-667-8746 (Canada) or from our website at www.schluter.com.
- 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.
- A ground fault circuit interrupter (GFCI) is required for each circuit. The DITRA-HEAT-E-RT/-RSD/-R thermostats include a GFCI, thus a GFCI circuit breaker is not required when using these thermostats.
- NEVER install a cable designed for a 120 V power source on a 240/208 V power source.
- This cable must be grounded. Connect the heating cable ground to the ground wire from the electrical panel.
- Mark the circuit breaker in the electrical panel that is dedicated to the DITRA-HEAT floor warming system using the identification sticker provided. Additional stickers provided may be placed on the electrical panel door.
- For installations requiring a cold lead trim or splice, the electrical rating label shall be fixed to the cold lead and visible at the termination junction box. Removing the label will void the warranty.
- De-energize all power circuits before installation and servicing.
- Very important: **Never CUT or modify the heating cable in any way.** This would change the cable resistance, will cause damage to the cable, and could cause cable overheating.
- 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, free standing bathtubs, kitchen cabinets and islands or any other fixtures or in closets. Excessive heat will build up in these confined spaces and may cause cable overheating.
- 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 (e.g., 4 studs) may not provide sufficient power to warm the floor to the desired temperature. Exception: a two stud spacing is used when connecting the 240 V cable to a 208 V power supply. See page 31 for more information.
- Heating cables may not touch, cross over, or overlap one another.
- Minimum spacing from walls, partitions, and fixed cabinets is 2" (50 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 4" (100 mm).
- Minimum spacing from the centerline of toilet drain is 7" (180 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 and heating cable installation is not planned (e.g., behind a toilet or adjacent to a door opening). This area allows for placement of excess heating cable. Heating cables may also be installed 6" (150 mm) from the wall to create a buffer zone.
- NEVER install the factory splice (i.e., black plastic junction between the cold lead and gray heating cable) in the wall. This will cause overheating, system failure, and could cause a fire. This splice must be installed entirely under the floor covering, as shown in the heating cable installation instructions.
- Install the two thermostat temperature sensors within the tile assembly. Two floor temperature sensors are provided - one with the DITRA-HEAT thermostats and one with the DITRA-HEAT-E-HK heating cables.
- 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.
- If a break or damage is detected during the heating cable testing, return the cable to the original place of purchase. Do not proceed with heating cable installation into the DITRA-HEAT or DITRA-HEAT-DUO matting or with the tile covering installation.
- 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.
- Keep ends of heating devices and kit components dry before and during installation.
- 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

To qualify for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty for ten (10) years, complete the following tests:

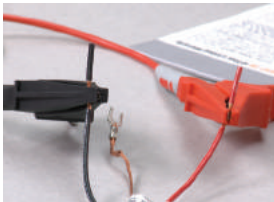
- Test 1: Conductor Resistance
- Test 2: Conductor and Ground Braid Continuity
- Floor Temperature Sensor Test

(Test 3: Insulation Resistance is recommended, but not required)

To extend the term for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty from ten (10) years to fifteen (15) years, complete all tests as follows:

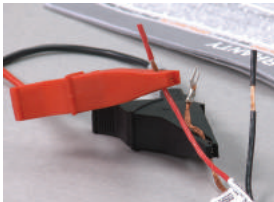
- Test 1: Conductor Resistance
- Test 2: Conductor and Ground Braid Continuity
- Test 3: Insulation Resistance
- Floor Temperature Sensor Test

Please refer to the Heating Cable Tests Log on page 36 of this Handbook and Warranty on page 39 of this Handbook for further information.



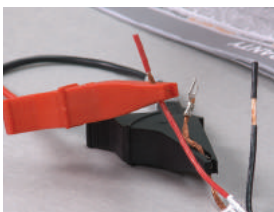
Test 1: Conductor resistance (required)

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 36).



Test 2: Conductor and ground braid continuity (required)

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 36).



Test 3: Insulation resistance (recommended)

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 megohmmeter (Mohm logo), take an insulation measurement between the braid and one of the two power leads. Make sure the megohmmeter range is set at 1000 V. The insulation resistance measurement must be equal to or greater than 1 Gigohms (1 Gigohms = 1 G ohms = 1000 M ohms = 1000 Mega ohms). The insulation resistance measurement must be recorded in your heating cable tests log (page 36).



DITRA-HEAT Thermostat Floor Temperature Sensor Test (required)

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 36.

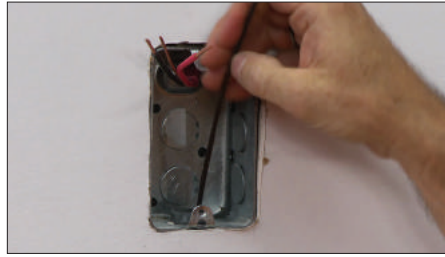
Installation

Check to ensure the heating cable(s) purchased match the power supply (i.e., 120 V with 120 V or 240 V with 240 V, or 240 V with 208 V). Check to ensure you are not exceeding the 15 amp limit of the thermostat. Compare the purchased cable area to the floor area to be heated. Important: The cable area purchased should be as close to the heated area as possible, without going over. The heating cable CANNOT be trimmed or shortened to fit.

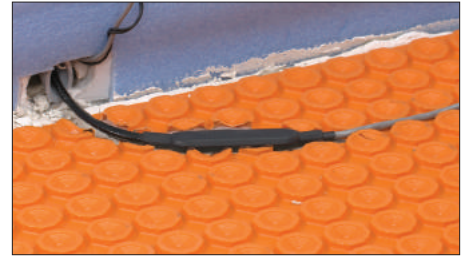
It is recommended that the installation of the DITRA-HEAT system is photographed (e.g., heating cable layout, floor temperature sensor placements, transition splice location, end splice location, and wide view of the room) for reference with future renovation work and troubleshooting. The homeowner/end 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 36). If a break or damage is detected during the tests, return the heating cable to the original place of purchase.

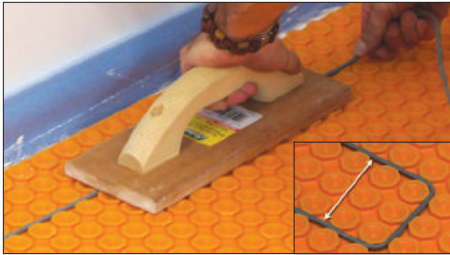


- 2 Thread the heating cable cold lead through a conduit (where required by code) from the base of the wall to the thermostat electrical box. Floor temperature sensors may not be threaded through the same conduit as the cold lead.



- 3 Mark where the cold/hot splice will be placed, cut the DITRA-HEAT or DITRA-HEAT-DUO matting and subfloor (if needed to accommodate the thickness of the splice), 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 (e.g., 4 studs) will not provide sufficient power to warm the floor to the desired temperature. Exception: a two-stud spacing is used when connecting the 240 V cable to a 208 V power supply. See page 29 for more information.



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



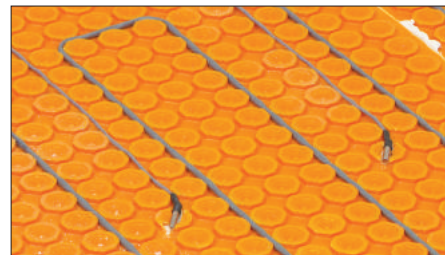
The maximum allowable length of a single run is 10 ft (3 m); the cable must be turned or a u-shaped "jog" created at this point (see image above).

Notes:

- Make sure to leave space for inserting the floor temperature sensor(s).
- Heating cables may not touch, cross over, or overlap one another.
- Minimum spacing from:
 - Walls, partitions, and fixed cabinets is 2" (50 mm)
 - Plumbing drains is 4" (100 mm)
 - Centerline of toilet drain is 7" (180 mm)
 - Other heat sources (baseboard heaters, fireplaces, forced air heating ducts, etc.) is 8" (200 mm)



- 6 Install the two thermostat sensors evenly spaced 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 recess 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 36).

Extending the heating cable cold lead

The cold lead is made up of two 14 AWG conductors with a copper braided shield, that is used as the grounding conductor. The extension must be made with building wire that is suitable for this application and complies with applicable building and electrical codes. The cold lead itself is not made of building wire and therefore cannot pass through studs unless run through a conduit. Extension of the cold lead requires the addition of a "code compliant" junction box that must be accessible at all times. The maximum length for extending the cold lead is 75 ft (23 m).

Extending the floor temperature sensor

The floor temperature sensor can be extended using an 18 AWG, 2-wire cable. The sensor wire itself is not made of building wire and therefore cannot pass through studs unless run through a conduit. We recommend twisting and soldering the wires and using electrical tape to insulate them. There is no maximum length that is recommended, however the longer the extension the greater the possibility that the quality of the signal (and resulting temperature sensing) will be skewed. Regardless of the method used, the resulting splice must comply with applicable building and electrical codes. A loose connection between the extension and the sensor will result in a false reading or an error code.

Waterproofing

The following steps are required for waterproofing only:

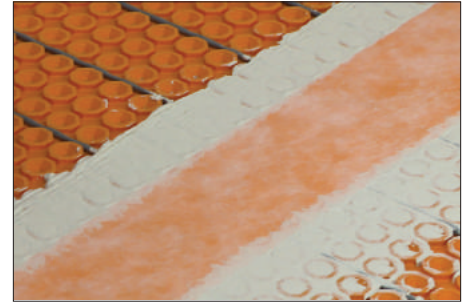
Note: While the heating cable is protected by the DITRA-HEAT and DITRA-HEAT-DUO matting, be careful when applying the mortar to not damage the cable with the notched trowel.



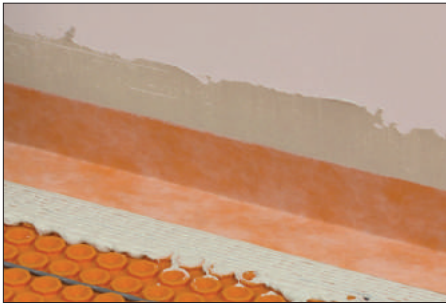
- 1 At the joints, fill the matting with Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or unmodified thin-set mortar, approximately 8" (203 mm) wide, centered over the joint.



- 2 Comb additional Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or 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 and DITRA-HEAT-DUO 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 and DITRA-HEAT-DUO matting, be careful when applying the mortar to not damage the cable with the notched trowel.



- 1 Tile can be installed over DITRA-HEAT and DITRA-HEAT-DUO immediately; no need to wait for the mortar to cure. Fill the matting with Schluter SET™, Schluter ALL-SET™, Schluter FAST-SET™, or 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 36).

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 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).

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

Schluter®-Systems offers thin-set mortars designed for use with Schluter® membranes and boards. All Schluter®-Systems' thin-set mortars, including the Schluter ALL-SET™ and Schluter FAST-SET™ modified varieties, can be used to set tile over Schluter®-DITRA, DITRA-HEAT, KERDI, KERDI-BOARD, etc. non absorptive substrates. If Schluter® thin-set mortars are not used, we require unmodified thin-set mortar when setting ceramic or porcelain tile over DITRA-HEAT.

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: In general, we DON'T recommend it. Here's why:

Latex-modified mortars must 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 could 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.

QUESTION: Can Schluter ALL-SET™ and Schluter FAST-SET™ modified thin-set mortars be used to set tile over Schluter boards and membranes?

ANSWER: Yes.

All Schluter® thin-set mortars, including the Schluter ALL-SET™ and Schluter FAST-SET™ modified varieties can be used to set tile over DITRA, DITRA-HEAT, KERDI, KERDI-BOARD, etc. non absorptive substrates.

QUESTION: How is this possible?

ANSWER: The key is predictability.

Schluter Systems' modified thin-set mortars have been specifically formulated to set and gain strength in a timeframe that fits typical installation practice, even when sandwiched between Schluter® membranes or boards and porcelain tile. The proportions of cement, water-retention agents, polymers, and other components in the mixtures were balanced to ensure that extended dry times are not required. This was validated through both laboratory and practical testing. Now, the installer can select from either unmodified or modified thin-set mortar to install tiles within our systems according to his or her preference.

QUESTION: Why did Schluter Systems change its position on thin-set mortar?

ANSWER: We haven't changed our position on thin-set mortar use within our systems.

Developing our own setting materials has given us the ability to guarantee consistently positive results. And since we control the formulas, we can be sure no changes will be made that have a negative impact on setting times and strength gain in these environments.

QUESTION: Does this mean I can use other manufacturers' modified thin-set mortars to install tile over Schluter boards and membranes?

ANSWER: No.

Our position on thin-set mortar use within our systems in general has not changed. We have no control over the formulation of other manufacturers' products and therefore cannot guarantee consistently positive results with their modified thin-set mortars.

QUESTION: Can I still use other manufacturers' unmodified thin-set mortars to install tile over Schluter boards and membranes?

ANSWER: Yes.

We still warrant the use of unmodified thin-set mortar meeting ANSI A118.1 to install tile within our systems because we have confidence in the performance of this product category. This is based on the science of cement hydration and years of positive testing and field experience.

Please note, if Schluter® thin-set mortars are used with Schluter membranes an extended system warranty is available.

ADDITIONAL NOTES

Pre-mixed thin-set mortars and mastics are not suitable for use in conjunction with DITRA-HEAT and DITRA-HEAT-DUO.

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
Schluter®-DITRA-HEAT-DUO				
TCNA-455-15 (1)	Concrete	N/A	12" x 12" porcelain	Light
TCNA-455-15 (2)	Concrete	N/A	2" x 2" porcelain	Light
TCNA-455-15 (3)	Concrete	N/A	12" x 12" marble	Residential
TCNA-455-15 (4)	Plywood	19.2" o.c.	12" x 12" 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. Modified thin-set mortar (ANSI A118.11) to bond membrane to plywood and OSB
3. Unmodified thin-set mortar (ANSI A118.1) to bond membrane to concrete
4. Unmodified thin-set mortar (ANSI A118.1) to bond tile to membrane
5. High Performance 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. DITRA-HEAT-DUO was found to be suitable for residential and light commercial traffic, depending on the substrate and tile chosen.

Waterproofing

DITRA-HEAT and DITRA-HEAT-DUO provide reliable waterproofing in interior applications. The products have 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 Stone Installation A118.10.

Sound Control

DITRA-HEAT-DUO reduces impact sound transmission through floor-ceiling assemblies and supports the covering to ensure a lasting installation.

Report Number	Test	Substrate	Tile	Results
Schluter®-DITRA-HEAT-DUO				
NGC 7016078	ASTM E2179	Concrete	12" x 12" porcelain	$\Delta IIC = 20$
IN17-007	ASTM E492	Concrete*	12" x 12" porcelain	IIC = 50

*8" -thick slab, no ceiling below

DITRA-HEAT-DUO has been found to meet or exceed the requirements of the American National Specifications for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation A118.13.

Vapor Management

The free space under the DITRA-HEAT and DITRA-HEAT-DUO mattings allow the substrate to breathe, while the material composition provides for a very low water vapor permeance, which prevents any significant vapor intrusion in the tile assembly from below.

Product	Test Method	Performance
Schluter®-DITRA-HEAT	ASTM E96*	0.21 perms
Schluter®-DITRA-HEAT-DUO		0.48 perms

*Using the water method at 73°F (23°C) and 50% RH

The result is the DITRA-HEAT and DITRA-HEAT-DUO effectively manage vapor and prevent damage to the tile covering as a result.

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-RSD digital thermostat is:

- 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.

The DITRA-HEAT-E-RT/-R digital thermostats are UL listed according to the following standards:

- UL 60730-1 "Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements"
- UL 60730-2-9 "Automatic Electrical Controls for Household and Similar Use – Part 2-9: Particular Requirements for Temperature Sensing Controls"
- CSA E60730-1:13 "Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements"
- CSA E60730-2-9 "Automatic Electrical Controls for Household and Similar Use – Part 2-9: Particular Requirements for Temperature Sensing Controls"
- UL 943 4th ed. "Ground-Fault Circuit Interrupters"
- CSA C22.2 No. 144.1-06 "Ground-Fault Circuit Interrupters"

Membrane

DITRA-HEAT:

- 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

DITRA-HEAT-DUO:

- ICC-ES Report No. ESR-2467
- ICC-ES PMG Report No. PMG-1204
- Patent pending

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

Green Building

DITRA-HEAT and DITRA-HEAT-DUO have been evaluated according to the "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1" for California Specification 01350 and found to comply with the VOC requirements. California Specification 01350 is referenced by various green building standards and rating systems.

SOUND CONTROL

Discussion of sound control in conjunction with ceramic & stone tile

Controlling sound transmission through floor/ceiling assemblies in multi-story construction can present challenges to architects and design professionals, particularly when hard surface coverings, including ceramic and stone tiles, are used. This is because sound control materials tend to be compressible and may not provide adequate support for the tile layer in thin-set applications. However, there are practical methods that allow for the use of tile and stone while providing sound transmission control.

Sound transmission categories, evaluation, and code requirements

The first category is airborne sound, such as speaking, music, etc. Airborne sound transmission is measured using standard test methods. For example, the ASTM E90 and ASTM E336 test methods are commonly used for laboratory and field measurement of airborne sound transmission, respectively. The results from these tests are then used to calculate a single-number rating per ASTM E413 that is called sound transmission class (STC) or apparent sound transmission class (ASTC)

The second category is impact sound, such as foot traffic, dropped items, etc. The ASTM E492 and ASTM E1007 test methods are commonly used for laboratory and field measurement of impact sound transmission, respectively. The results from these tests are then used to calculate a single-number rating per ASTM E989 that is called impact insulation class (IIC) or apparent impact insulation class (AIIC). The ASTM E2179 test method was developed to provide a means of evaluating the flooring assembly's contribution to a concrete floor. The contribution of the flooring assembly to the IIC of the slab is calculated and reported as the Δ IIC (delta IIC).

Building codes typically contain requirements for both STC and IIC. For example, the International Building Code (IBC) calls out minimum values of 50 for STC and IIC or 45 for ASTC and AIIC as an alternative to laboratory testing. The International Residential Code (IRC) calls out minimum values of 45 for STC and IIC. Condominium associations may have their own minimum requirements, typically higher, for sound attenuation as well.

Factors affecting performance

Airborne sound transmission through floor/ceiling assemblies can be reduced effectively by increasing the mass of the assembly and introducing suspended ceilings with sound insulation in the cavities. In general, STC ratings are largely independent of the choice of floor covering. Furthermore, the methods used to improve STC ratings as called out above do not have adverse effects on the floor covering. Thus, airborne sound transmission control is not a challenge to be addressed by the tile industry.

Impact sound control performance is dependent upon both the floor/ceiling structure and the floor covering itself. In general, impact sound control with hard surface coverings is best achieved with floating systems that incorporate resilient layers.

A 6" (152 mm) -thick concrete slab will produce an IIC rating of approximately 28 without the floor covering or ceiling assembly. The direct application of tile will not improve the IIC rating. When flexible underlayments (membranes) are used in a thin-bed assembly the IIC rating can be improved, though the use of additional sound attenuation methods (e.g., sound-rated ceilings) are often necessary to meet required minimums. As resilient layers within a thin-bed assembly are made thicker and more flexible sound control tends to improve, while load-bearing capacity is reduced. However, relatively thick and resilient sound underlayments can be combined with a load-distribution layer (e.g., mortar bed, lightweight concrete topping, poured gypsum underlayment) to meet code minimums without a sound-rated ceiling and still provide good support for the tile assembly. For example, a 1-3/8" (35 mm) -thick concrete topping over 1" (25 mm) -thick mineral fiber board on a 6" (152 mm) -thick concrete slab will produce an average IIC rating of approximately 60 to 65 without a ceiling assembly, which far exceeds code minimums.

Wood-frame construction typically consists of a plywood or OSB subfloor supported on joists with a gypsum board ceiling underneath. The first step in improving impact sound control is to use resilient channels to provide isolation between the gypsum board and the joists. Sound insulation batts are placed in the cavities between joists as well. This type of assembly will produce an IIC rating of approximately 45 before the flooring assembly is installed. This rating can be improved by increasing the mass of the assembly (e.g., adding another layer of gypsum board to the ceiling or plywood/OSB to the floor). The direct application of tile over the subfloor can actually lower the IIC rating of this assembly. Using flexible underlayments may mitigate this effect or even improve the IIC rating, but currently there is no standard test method available to quantify the contribution of a flooring assembly to wood-frame construction in general. Thus, it is important to obtain full assembly sound testing for these applications. Again, the use of relatively thick and resilient sound underlayments can be combined with a load-distribution layer to provide significant sound control and a solid base for tile installation.

DITRA-HEAT-DUO

DITRA-HEAT represents a revolutionary method for the installation of electric floor warming for ceramic and stone tile coverings. DITRA-HEAT-DUO, with its dual functionality, builds on this legacy by integrating two additional benefits: reducing impact sound transmission through floor-ceiling assemblies and providing faster warm-up times. While sound control materials tend to be compressible, DITRA-HEAT-DUO supports the covering to ensure a lasting installation. This versatility makes the system an ideal solution for ceramic and stone tile floor installations in many applications, such as multi-story residential construction, hotel guest rooms, and many more.

Test Results

DITRA-HEAT-DUO has been tested for sound control and loading, the results are listed below. Wood construction sound tests are in progress. Cement-based setting materials (thin-set mortars and grouts) were used in all tests.

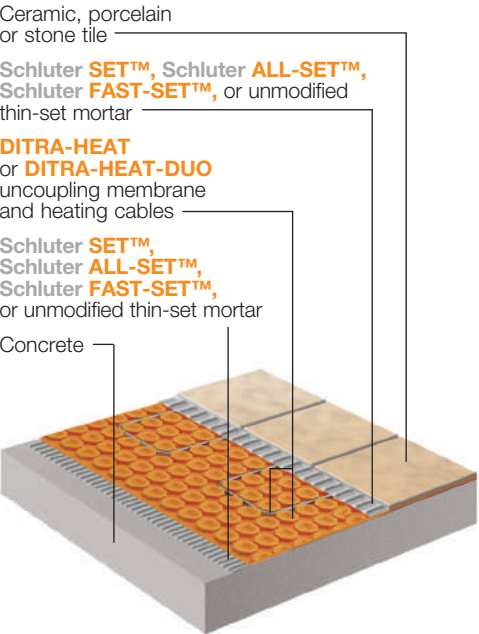
Report Number	Test	Substrate	Tile	Results
Schluter®-DITRA-HEAT-DUO				
NGC 7016078	ASTM E2179	Concrete	12" x 12" porcelain	$\Delta IIC = 20$
IN17-007	ASTM E492	Concrete*	12" x 12" porcelain	IIC = 50
TCNA-455-15 Test #1	ASTM C627	Concrete	12" x 12" porcelain	Light

*8" -thick slab, no ceiling below

Installation Considerations

In laboratory testing, sound energy transmission is directed through the test specimen only, with negligible transfer through other paths. The values recorded provide an accurate picture of the sound control characteristics of the test specimen itself. However, in construction, floor/ceiling assemblies may not perform as expected in the field with respect to both airborne and impact sound control if they are not isolated from adjacent walls to prevent sound energy transfer. Thus, perimeter joints are not only necessary to accommodate expansion of the tile assembly, but to also prevent “flanking” sound transfer. Schluter®-Systems provides a range of prefabricated movement joint profiles that can be used for these purposes.

DH-C-TS



DITRA-HEAT-DUO

Solution to improve floor warming response time

The challenge of concrete substrates

Concrete substrates can absorb enough heat energy to significantly increase the time it takes for floors to warm up, particularly when there is no insulation layer below the concrete. In some cases, floors may never reach the desired temperature. There are solutions to address this challenge, such as installing the heating cables at closer spacing for increased energy output or installing a thermal break prior to heating cable installation to reduce heat loss into the substrate. However, both of these solutions increase material and labor costs.

A one-step solution

Schluter®-DITRA-HEAT-DUO offers the same functions as the Schluter®-DITRA-HEAT membrane, but also features an integrated thermal break in the form of a thicker bonding fleece. The thermal break reduces heat loss to the substrate and improves the floor warming response time at the standard three stud cable spacing. Since an effective thermal break can be created with a relatively low R-value, the DITRA-HEAT-DUO membrane is only 5/16" (8 mm)-thick, compared to DITRA-HEAT at 1/4" (5.5 mm)-thick.

Thermal resistance

The DITRA-HEAT-DUO thermal break was tested according to the ASTM C518 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus" and determined to have an R-value of 0.35. This value may seem low, but it is sufficient to improve the system warm up time. Increased thermal resistance may be required if improving overall energy efficiency is also desired and the floor warming system is to be used for extended periods instead of limited hours during the morning and at night.

Floor warming performance

In laboratory testing, DITRA-HEAT-DUO reduced floor warming response time from 68°F (20°C) to 78°F (25.5°C) by approximately 80% (90 minutes) compared to DITRA-HEAT over a concrete substrate.

Wood substrates act as insulators and typically do not pose the same challenges as concrete substrates. In the same laboratory testing, DITRA-HEAT-DUO only reduced floor warming response time from 68°F (20°C) to 78°F (25.5°C) by approximately 20% (5 minutes) compared to DITRA-HEAT over a plywood substrate.

Figure 1 - DITRA-HEAT-DUO Performance over Concrete

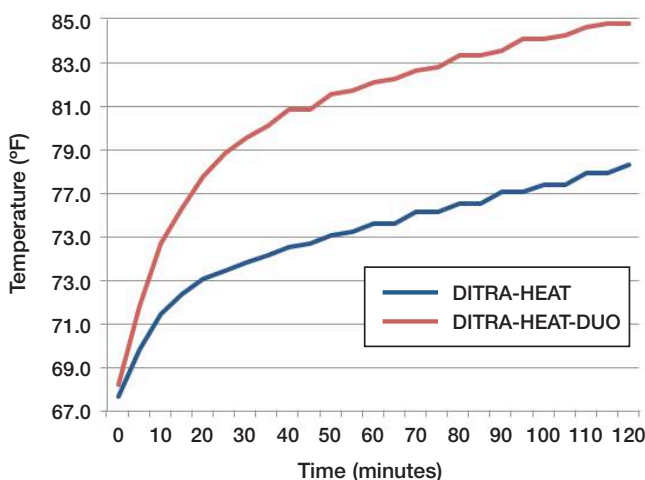
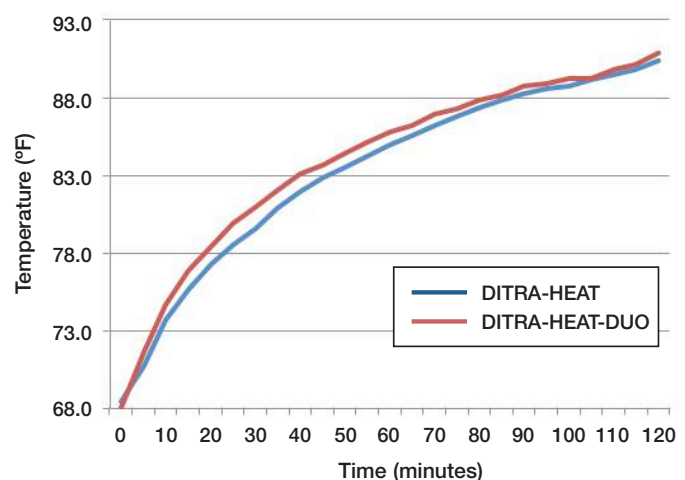


Figure 2 - DITRA-HEAT-DUO Performance over Wood



Schluter®-DITRA-HEAT-E-HK heating cables were spaced at three studs in all of the above tests.

Results above are based upon laboratory testing. Actual results may vary depending on various factors, including concrete substrate thickness, concrete substrate temperature, room temperature, heat losses, etc.

208 V APPLICATIONS

Discussion of Schluter®-DITRA-HEAT-E-HK Heating Cables in 208 V Applications

Schluter®-DITRA-HEAT offers complete flexibility when creating warm floors in any application. Schluter®-DITRA-HEAT-E-HK heating cables are designed for use with common 120 V and 240 V power sources. 208 V power sources are used in some cases to handle larger loads (e.g., HVAC equipment, motors, etc.) or to improve energy efficiency.

Schluter®-Systems recommends using the DITRA-HEAT-E-HK 240 V heating cables when a 208 V power source is present. However, this will reduce the heating power by 25% to 9.5 W/ft² at the standard 3-stud cable spacing, which may not be sufficient power to warm the floor in these applications. To offset the effect of the lower voltage, we recommend installing the heating cable at a 2-stud spacing in these applications. This results in an increased heating power of 14.2 W/ft², which will ensure adequate performance.

The heating cable will cover 33% less area when spaced at 2 studs compared to 3 studs. Therefore, a longer heating cable must be selected to cover a given area in these applications. Coverage for each 240 V heating cable spaced at 2 studs can be found in the table below.

DITRA-HEAT-E-HK 240 V Heating Cables in 208 V Applications at 2 Stud Spacing

Item No.	Length (ft - m)	Area (ft ² - m ²)	Power (W)	Average Power (W/ft ² - W/m ²)	Current (A)
DHE HK 240 11	35.3 – 10.8	7.1 – 0.7	101	14.2 - 152.8	0.5
DHE HK 240 16	53.1 – 16.2	10.7 – 1.0	152	14.2 - 152.8	0.7
DHE HK 240 21	70.5 – 21.5	14.2 – 1.3	203	14.2 - 152.8	1.0
DHE HK 240 27	88.2 – 26.9	17.8 – 1.7	254	14.2 - 152.8	1.2
DHE HK 240 32	105.8 – 32.2	21.3 – 2.0	304	14.2 - 152.8	1.5
DHE HK 240 38	124.1 – 37.8	25.0 – 2.3	356	14.2 - 152.8	1.7
DHE HK 240 43	141 – 43.0	28.4 – 2.6	405	14.2 - 152.8	1.9
DHE HK 240 53	176.3 – 53.7	35.5 – 3.3	506	14.2 - 152.8	2.4
DHE HK 240 64	211.6 – 64.5	42.7 – 4.0	608	14.2 - 152.8	2.9
DHE HK 240 75	248.2 – 75.7	50.0 – 4.7	713	14.2 - 152.8	3.4
DHE HK 240 85	282.1 – 86.0	56.9 – 5.3	810	14.2 - 152.8	3.9
DHE HK 240 103	339.4 – 103.4	68.4 – 6.4	975	14.2 - 152.8	4.7
DHE HK 240 129	425.8 – 129.8	85.8 – 8.0	1223	14.2 - 152.8	5.9
DHE HK 240 145	480.5 – 146.5	96.9 – 9.0	1380	14.2 - 152.8	6.6
DHE HK 240 167	551 – 167.9	111.1 – 10.3	1583	14.2 - 152.8	7.6
DHE HK 240 183	605.9 – 184.7	122.1 – 11.4	1740	14.2 - 152.8	8.4
DHE HK 240 204	673.8 – 205.4	135.8 – 12.6	1935	14.2 - 152.8	9.3
DHE HK 240 225	744.4 – 226.9	150.1 – 13.9	2138	14.2 - 152.8	10.3

We recommend consulting with a qualified electrician for design and installation of your DITRA-HEAT system on a 208 V power source. Keep in mind during design of the system that the DITRA-HEAT-E-RT/-RSD/-R thermostats have an electrical current limit of 15 A.

SPACE HEATING

Discussion on use of Schluter®-DITRA-HEAT for space heating

QUESTION: Can I use DITRA-HEAT to heat my bathroom, kitchen, or other areas in the home?

ANSWER: It is possible, but full analysis of the application by a HVAC professional is required:

Schluter®-DITRA-HEAT is intended to warm tile floors and make them more comfortable underfoot, but can contribute to space heating. As the tile covering warms up, it will radiate heat to the surrounding objects in the room and increase the ambient temperature.

The amount of heat required to achieve a comfortable room temperature depends on many variables, including but not limited to the following.

- Starting temperature and target temperature
- Size of room and height of the ceiling
- Heat loss through walls, windows, and doors according to size and R-value of the components
- Total area heated

All of these variables must be considered to calculate the required heat output of the system and determine if the system can meet the needs of the owner.

Schluter Systems does not perform heating load calculations as a service for customers and recommends that a HVAC professional is consulted to perform such an analysis. However, Schluter Systems does provide the heating cable output to aid in these calculations, as shown below.

Heating cables			
Item No.	Total Power	Area*	Power* (BTU/hr)
120 V			
DHE HK 120 11	135 W	10.7 ft ² (0.99 m ²)	460.64
DHE HK 120 16	203 W	16.0 ft ² (1.5 m ²)	692.66
DHE HK 120 21	270 W	21.3 ft ² (1.98 m ²)	921.28
DHE HK 120 27	338 W	26.7 ft ² (2.5 m ²)	1153.30
DHE HK 120 32	405 W	32.0 ft ² (3.0 m ²)	1381.92
DHE HK 120 38	475 W	37.5 ft ² (3.5 m ²)	1620.77
DHE HK 120 43	540 W	42.7 ft ² (4.0 m ²)	1842.56
DHE HK 120 51	650 W	51.4 ft ² (4.78 m ²)	2217.89
DHE HK 120 64	815 W	64.4 ft ² (6.0 m ²)	2780.90
DHE HK 120 73	920 W	72.7 ft ² (6.75 m ²)	3139.17
DHE HK 120 83	1055 W	83.3 ft ² (7.7 m ²)	3599.81
DHE HK 120 92	1160 W	91.7 ft ² (8.5 m ²)	3958.08
DHE HK 120 102	1290 W	101.9 ft ² (9.5 m ²)	4401.66
DHE HK 120 113	1425 W	112.6 ft ² (10.46 m ²)	4862.30
DHE HK 120 134	1700 W	134.3 ft ² (12.48 m ²)	5800.64

*Values based on specified 3-stud cable spacing

Heating cables			
Item No.	Total Power	Area*	Power* (BTU/hr)
240 V			
DHE HK 240 11	135 W	10.7 ft ² (0.99 m ²)	460.64
DHE HK 240 16	203 W	16.1 ft ² (1.50 m ²)	692.66
DHE HK 240 21	270 W	21.4 ft ² (2.0 m ²)	921.28
DHE HK 240 27	338 W	26.7 ft ² (2.48 m ²)	1153.30
DHE HK 240 32	405 W	32.0 ft ² (3.0 m ²)	1381.92
DHE HK 240 38	475 W	37.5 ft ² (3.48 m ²)	1620.77
DHE HK 240 43	540 W	42.6 ft ² (3.96 m ²)	1842.56
DHE HK 240 53	675 W	53.3 ft ² (5.0 m ²)	2303.20
DHE HK 240 64	810 W	64.0 ft ² (5.95 m ²)	2763.83
DHE HK 240 75	950 W	75.1 ft ² (7.0 m ²)	3241.53
DHE HK 240 85	1080 W	85.3 ft ² (7.92 m ²)	3685.11
DHE HK 240 103	1300 W	102.7 ft ² (9.54 m ²)	4435.78
DHE HK 240 129	1630 W	128.8 ft ² (12.0 m ²)	5561.79
DHE HK 240 145	1840 W	145.3 ft ² (13.50 m ²)	6278.34
DHE HK 240 167	2110 W	166.7 ft ² (15.5 m ²)	7199.62
DHE HK 240 183	2320 W	183.3 ft ² (17.03 m ²)	7916.17
DHE HK 240 204	2580 W	203.8 ft ² (18.9 m ²)	8803.33
DHE HK 240 225	2850 W	225.2 ft ² (20.92 m ²)	9724.60

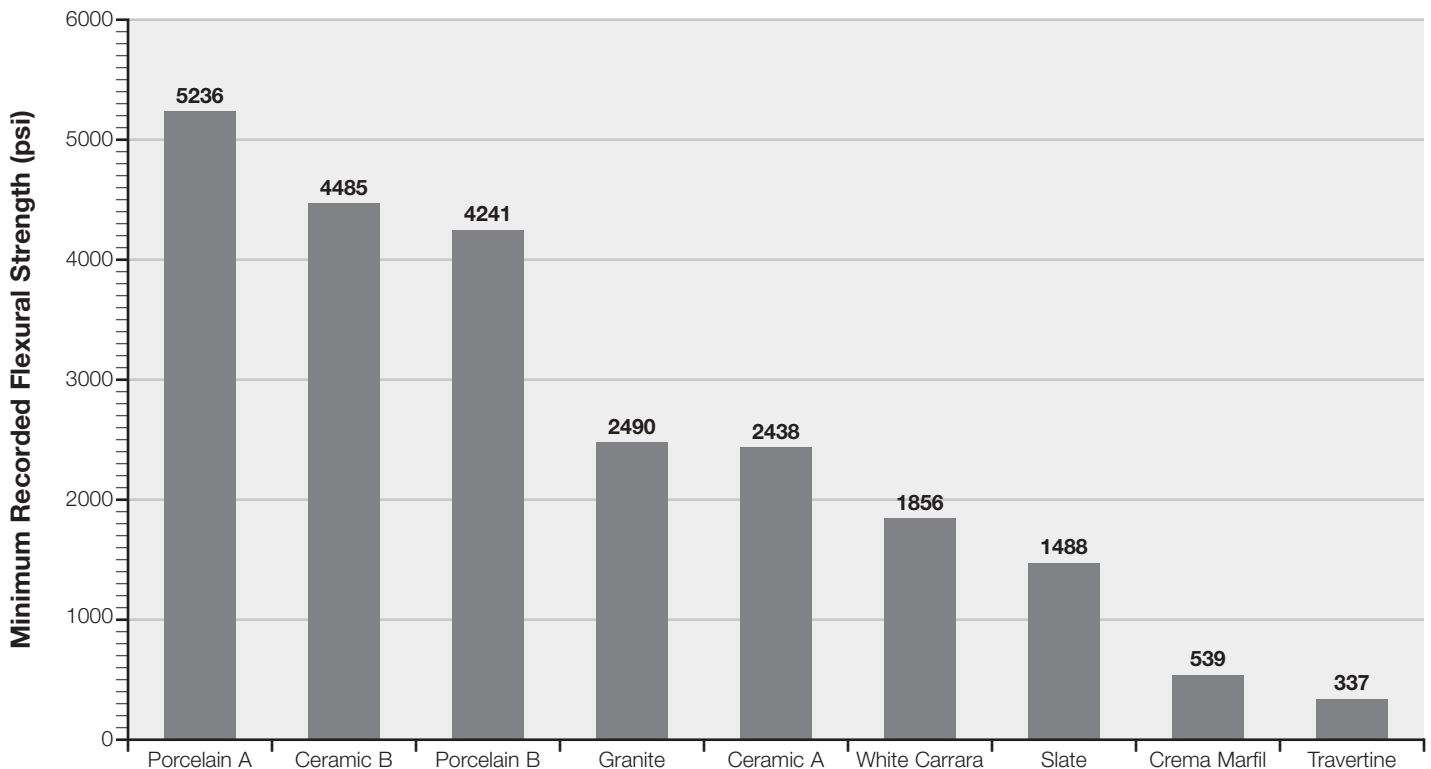
*Values based on specified 3-stud cable spacing

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 and DITRA-HEAT-DUO?

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 16 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**, **DITRA-HEAT-DUO**, 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 ft ² (1 m x 12.5 m = 12.5 m ²)
DH5 MA	Sheet	3' 3" x 2' 7" = 8.6 ft ² (1 m x 0.8 m = 0.8 m ²)

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

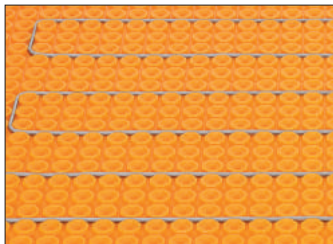


Schluter®-DITRA-HEAT-DUO

DITRA-HEAT-DUO is a polypropylene membrane with a cut back stud structure and a thermal break anchoring fleece laminated to the underside. The matting is 5/16" (8 mm) thick. The stud structure is specifically designed to secure DITRA-HEAT-E-HK electric floor heating cables. The thermal break fleece reduces heat loss to the substrate while improving floor warming response time. 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 with thermal break (5/16" - 8 mm)		
Item No.	Item	Dimensions
DHD810M	Roll	3' 3" x 33' = 108 ft ² (1 m x 10 m = 10 m ²)
DHD8MA	Sheet	3' 3" x 2' 7" = 8.6 ft ² (1 m x 0.8 m = 0.8 m ²)

Patent pending



Schluter®-DITRA-HEAT-E-HK

DITRA-HEAT-E-HK are twisted pair heating cables designed for integration with the DITRA-HEAT and DITRA-HEAT-DUO uncoupling membranes 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/ft ² – Watts/m ²)	Current (Amps)
Heating cable (120 V)					
DHE HK 120 11	35.3 ft (10.8 m)	10.7 ft ² (1.0 m ²)	135 W	12.6 - 135.8	1.1
DHE HK 120 16	52.9 ft (16.1 m)	16.0 ft ² (1.5 m ²)	203 W	12.7 - 136.3	1.7
DHE HK 120 21	70.5 ft (21.5 m)	21.3 ft ² (2.0 m ²)	270 W	12.7 - 136.3	2.3
DHE HK 120 27	88.2 ft (26.9 m)	26.7 ft ² (2.5 m ²)	338 W	12.7 - 136.3	2.8
DHE HK 120 32	105.8 ft (32.2 m)	32.0 ft ² (3.0 m ²)	405 W	12.7 - 136.3	3.4
DHE HK 120 38	124.1 ft (37.8 m)	37.5 ft ² (3.5 m ²)	475 W	12.7 - 136.3	4.0
DHE HK 120 43	141.1 ft (43.0 m)	42.7 ft ² (4.0 m ²)	540 W	12.7 - 136.3	4.5
DHE HK 120 51	169.8 ft (51.8 m)	51.4 ft ² (4.8 m ²)	650 W	12.7 - 136.3	5.4
DHE HK 120 64	212.9 ft (64.9 m)	64.4 ft ² (6.0 m ²)	815 W	12.7 - 136.3	6.8
DHE HK 120 73	240.2 ft (73.2 m)	72.7 ft ² (6.8 m ²)	920 W	12.7 - 136.3	7.7
DHE HK 120 83	275.5 ft (84.0 m)	83.3 ft ² (7.7 m ²)	1055 W	12.7 - 136.3	8.8
DHE HK 120 92	303.0 ft (92.4 m)	91.7 ft ² (8.5 m ²)	1160 W	12.7 - 136.3	9.7
DHE HK 120 102	336.9 ft (102.7 m)	101.9 ft ² (9.5 m ²)	1290 W	12.7 - 136.3	10.7
DHE HK 120 113	372.2 ft (113.4 m)	112.6 ft ² (10.5 m ²)	1425 W	12.7 - 136.3	11.9
DHE HK 120 134	444.0 ft (135.3 m)	134.3 ft ² (12.5 m ²)	1700 W	12.7 - 136.3	14.2
Heating cable (240 V)					
DHE HK 240 11	35.3 ft (10.8 m)	10.7 ft ² (1.0 m ²)	135 W	12.6 - 135.8	0.6
DHE HK 240 16	53.1 ft (16.2 m)	16.1 ft ² (1.5 m ²)	203 W	12.6 - 135.8	0.8
DHE HK 240 21	70.6 ft (21.5 m)	21.4 ft ² (2.0 m ²)	270 W	12.7 - 136.3	1.1
DHE HK 240 27	88.2 ft (26.9 m)	26.7 ft ² (2.5 m ²)	338 W	12.7 - 136.3	1.4
DHE HK 240 32	105.8 ft (32.2 m)	32.0 ft ² (3.0 m ²)	405 W	12.7 - 136.3	1.7
DHE HK 240 38	124.1 ft (37.8 m)	37.5 ft ² (3.5 m ²)	475 W	12.7 - 136.3	2.0
DHE HK 240 43	141.0 ft (43.0 m)	42.6 ft ² (4.0 m ²)	540 W	12.7 - 136.3	2.3
DHE HK 240 53	176.3 ft (53.7 m)	53.3 ft ² (5.0 m ²)	675 W	12.7 - 136.3	2.8
DHE HK 240 64	211.6 ft (64.5 m)	64.0 ft ² (5.9 m ²)	810 W	12.7 - 136.3	3.4
DHE HK 240 75	248.2 ft (75.7 m)	75.1 ft ² (7.0 m ²)	950 W	12.7 - 136.3	4.0
DHE HK 240 85	282.1 ft (86.0 m)	85.3 ft ² (7.9 m ²)	1080 W	12.7 - 136.3	4.5
DHE HK 240 103	339.4 ft (103.4 m)	102.7 ft ² (9.5 m ²)	1300 W	12.7 - 136.3	5.4
DHE HK 240 129	425.8 ft (129.8 m)	128.8 ft ² (12.0 m ²)	1630 W	12.7 - 136.3	6.8
DHE HK 240 145	480.5 ft (146.5 m)	145.3 ft ² (13.5 m ²)	1840 W	12.7 - 136.3	7.7
DHE HK 240 167	551.0 ft (167.9 m)	166.7 ft ² (15.5 m ²)	2110 W	12.7 - 136.3	8.8
DHE HK 240 183	605.9 ft (184.7 m)	183.3 ft ² (17.0 m ²)	2320 W	12.7 - 136.3	9.7
DHE HK 240 204	673.8 ft (205.4 m)	203.8 ft ² (18.9 m ²)	2580 W	12.7 - 136.3	10.7
DHE HK 240 225	744.4 ft (226.9 m)	225.2 ft ² (20.9 m ²)	2850 W	12.7 - 136.3	11.9

Each heating cable includes a floor temperature sensor compatible with the DITRA-HEAT-E-RT/-RSD/-R thermostats and features an approximately 7 ft (2.1 m) long cold lead.



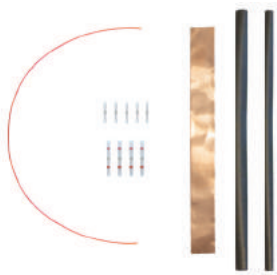


Schluter®-DITRA-HEAT-E-HK-RK

The **DITRA-HEAT-E-HK-RK** heating cable repair kit is used to make one repair to the heating portion (gray section) of the DITRA-HEAT-E-HK cable in the event of damage such as cuts by other trades.

Repair kit for Schluter®-DITRA-HEAT-E-HK Heating Cables

Item No.	Description
DHEHKRK	DITRA-HEAT-E-HK Repair Kit



Schluter®-DITRA-HEAT-E-HK-SK

DITRA-HEAT-E-HK-SK is a splice kit for DITRA-HEAT-E-HK heating cables. The kit contains all the material to replace one factory splice of the heating cable.

Splice kit for Schluter®-DITRA-HEAT-E-SK Heating Cables

Item No.	Description
DHEHKS	DITRA-HEAT-E-HK Splice Kit



Schluter®-DITRA-HEAT-E-RSD

DITRA-HEAT-E-RSD is a digital thermostat to control the DITRA-HEAT-E-HK heating cables (either 120 V or 240 V). The thermostat features a 5 mA built-in ground fault circuit interrupter (GFCI) with indicator light. DITRA-HEAT-E-RSD features more than 250 pre-set programs and anticipated start function. A floor temperature sensor is included. Multiple heating cables may be connected to the thermostat, up to the total heating load limit of 15 amps.

Digital thermostat with remote floor temperature sensor

Item No.	Description
DHE RS D/BW	Programmable thermostat with floor temperature sensor in bright white



Programmable



Non-programmable



Power module

Schluter®-DITRA-HEAT-E-RT/-R/-RR

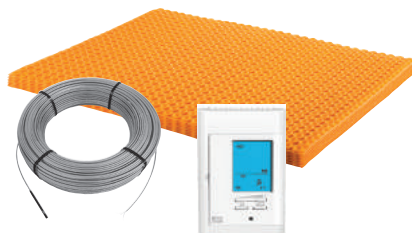
DITRA-HEAT-E-RT/-R are digital thermostats to control the DITRA-HEAT-E-HK heating cables (either 120 V or 240 V). The thermostats feature a 5 mA built-in ground fault circuit interrupter (GFCI) with indicator light. The programmable thermostat features LCD touchscreen controls and comes with a pre-set schedule, but may be adjusted to fit any schedule. The non-programmable version features a simple on/off function. Multiple heating cables may be connected to the thermostats, up to the total heating load limit of 15 amps. The DITRA-HEAT-E-RR power module may be used in conjunction with the thermostat when the heating load exceeds 15 amps (e.g., in large floor applications). A floor temperature sensor is included.

Digital thermostat with remote floor temperature sensor

Item No.	Description
DHE RT 102/BW	Touchscreen programmable thermostat in white with floor temperature sensor
DHE RT 103/BW	Non-programmable thermostat in white with floor temperature sensor
DHE RR 1/BW	Power module for use with DHE RT thermostats

Schluter®-DITRA-HEAT-E-KIT

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



Kit containing all necessary components

Item No.	DHE K 120 40	DHE K 120 56
Matting	5 sheets – 43.1 ft ² (4.0 m ²)	7 sheets – 60.3 ft ² (5.6 m ²)
Heating cable	88' 3" – 26.7 ft ² (26.9 m – 2.5 m ²)	124' 0" – 37.5 ft ² (37.8 m – 3.5 m ²)
Thermostat	1 – white, programmable	1 – white, programmable



Kit containing all necessary components

Item No.	DHE K RT 120 40	DHE K RT 120 56
Matting	5 sheets – 43.1 ft ² (4.0 m ²)	7 sheets – 60.3 ft ² (5.6 m ²)
Heating cable	88' 3" – 26.7 ft ² (26.9 m – 2.5 m ²)	124' 0" – 37.5 ft ² (37.8 m – 3.5 m ²)
Thermostat	1 – white, programmable touchscreen	1 – white, programmable touchscreen



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

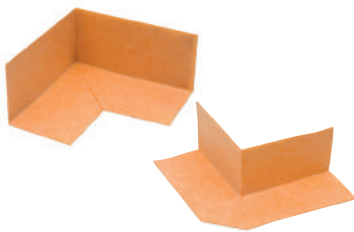


Schluter®-KERDI-FLEX

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



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)



Schluter®-DITRA-HEAT/-DITRA-XL-TROWEL

The **DITRA-HEAT/-DITRA-XL-TROWEL** features a 1/4" x 1/4" (6 mm x 6 mm) square-notched design, and is used to install the DITRA-HEAT and DITRA-XL membranes.

Trowel used to install DITRA-HEAT and DITRA-XL membranes		
Item No.	Notch Size	Packaging
TRL-DHXL	1/4" x 1/4" (6 mm x 6 mm)	1 unit
TRL-DHXL6	1/4" x 1/4" (6 mm x 6 mm)	6 units



Schluter SET™

Schluter SET™ is a premium unmodified thin-set mortar specifically formulated for use with Schluter® membranes and boards. It is sag-resistant, smooth and creamy, and easy to handle and spread. Schluter SET™ is suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter®-Systems' uncoupling and waterproofing membranes (e.g., DITRA, DITRA-HEAT, and KERDI), the Schluter®-Shower System, and Schluter®-KERDI-BOARD.

Schluter SET™ meets the requirements of ANSI A118.1T, and is available in both grey and white.

Premium unmodified mortar		
Item No.	Color	Weight
SET50G	Grey	50 lbs - 22.7 kg
SET50W	White	50 lbs - 22.7 kg



Schluter ALL-SET™

Schluter ALL-SET™ is a specialized modified thin-set mortar specifically formulated for use with Schluter® membranes and boards. It is engineered for use both under and over all DITRA and KERDI products. It is sag-resistant, smooth and creamy, and easy to handle and spread. Schluter ALL-SET™ is suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter®-Systems' uncoupling and waterproofing membranes (e.g., DITRA, DITRA-HEAT, and KERDI), the Schluter®-Shower System, and Schluter®-KERDI-BOARD.

Schluter ALL-SET™ meets the requirements of ANSI A118.4T, A118.11, and A118.15T, and is available in both grey and white.

Specialized modified mortar		
Item No.	Color	Weight
SETA50G	Grey	50 lbs - 22.7 kg
SETA50W	White	50 lbs - 22.7 kg



Schluter FAST-SET™

Schluter FAST-SET™ is a specialized rapid-setting modified thin-set mortar specifically formulated for use with Schluter® membranes and boards. It is engineered for use both under and over all DITRA and KERDI products. Schluter FAST-SET™ is ready to grout in 4 hours for fast-track projects. It is sag-resistant, smooth and creamy, and easy to handle and spread. Schluter FAST-SET™ is suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter®-Systems' uncoupling and waterproofing membranes (e.g., DITRA, DITRA-HEAT, and KERDI), the Schluter®-Shower System, and Schluter®-KERDI-BOARD.

Schluter FAST-SET™ meets the requirements of ANSI A118.4TF, A118.11, and A118.15TF, and is available in both grey and white.

Specialized rapid-setting mortar		
Item No.	Color	Weight
SETF50G	Grey	50 lbs - 22.7 kg
SETF50W	White	50 lbs - 22.7 kg

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. See page 19 in this DITRA-HEAT Installation Handbook for complete heating cable testing instructions.

The homeowner/end user must submit a copy of the completed heating cable tests log, including "Test 1: Conductor Resistance," "Test 2: Conductor and Ground Braid Continuity," and "Floor Temperature Sensors Test", with the warranty registration card within 14 days of installing the product to qualify for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty for ten (10) years. Completion of "Test 3: Insulation Resistance," in addition to those listed above, will extend the term for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty from ten (10) years to fifteen (15) years. **Registration can be completed by mail or online at www.schluter.com/registerwarranty.**

Completion of warranty registration qualifies customers for the system warranty, in which Schluter®-Systems shall 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.

Failure to complete this warranty registration will result in a twenty-five (25) year Limited Product Warranty that the Schluter®-DITRA-HEAT-E-HK heating cable purchased shall be free from defects in material and workmanship effective on the date of purchase by or for the original purchaser. The maximum liability of the company, in this case is limited to the cost of the original cable multiplied by the percentage of the warranty period remaining.

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

Heating Cable Tests Log

Location/Homeowner: _____ Date of installation: _____

Certified electrician: _____ Date put into service*: _____

Identification	Factory Value	Before Installation	After Cable Installation	After Tile Installation
Test 1: Conductor Resistance Test				
Readings must fall within 10% of the factory value printed on the silver heating cable identification tag.				
Test 2: Conductor and Ground Braid Continuity Test				
	Infinity (I) or Overload (OL)			
Test 3: 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	

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

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

Notes :

[illegible]

WARRANTY

Schluter®-DITRA-HEAT and Schluter®-DITRA-HEAT-DUO 10-Year Limited System 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 Schluter®-DITRA-HEAT-E-HK heating cable shall be subject to a twenty-five (25) year Limited Product 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 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 March 1, 2016.

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 end users located in the United States, and **Schluter Systems (Canada) Inc.** shall provide the warranty 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 and DITRA-HEAT-DUO matting and DITRA-HEAT heating cables.

***To qualify for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty for ten (10) years, complete "Test 1: Conductor Resistance," "Test 2: Conductor and Ground Braid Continuity," and "Floor Temperature Sensors Test". Completion of "Test 3: Insulation Resistance," in addition to those listed above, will extend the term for resolution for failure of the Schluter®-DITRA-HEAT-E-HK heating cables within the Schluter®-DITRA-HEAT & Schluter®-DITRA-HEAT-DUO Limited System Warranty from ten (10) years to fifteen (15) years.



System warranty!

Labor and materials are covered when Schluter® heating cables are installed with DITRA-HEAT.

See complete warranty on page 35.

warm*your***floor**TM
the radiant floor heating expertsTM

