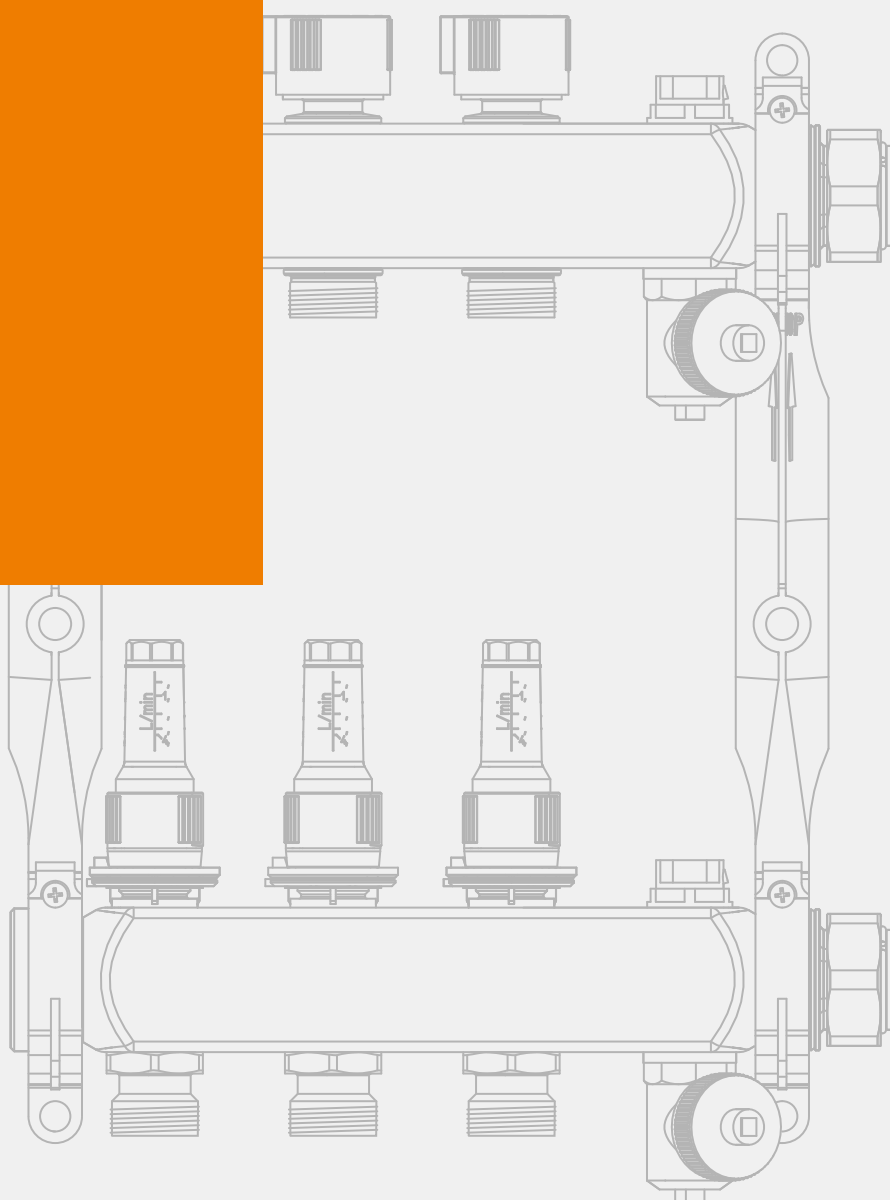


Piping systems

## TECEfloor

TECHNICAL INFORMATION



## Contents

<b>System description</b>	<b>3-4</b>
The complete TECEfloor system	3-5
<b>Planning information</b>	<b>3-6</b>
Standards and guidelines	3-6
Constructional requirements	3-6
<b>Wet floor construction</b>	<b>3-7</b>
General	3-7
Structural sealing	3-7
Thermal and impact sound insulation	3-8
Edge insulation strip requirements	3-8
Load distribution layers	3-8
Cement and conventional calcium sulphate screed	3-8
Calcium sulphate flowing screed	3-8
Movement joints	3-8
Functional heating	3-9
Floor coverings	3-9
Checking the readiness for covering	3-10
<b>Underfloor heating pipes and connectors</b>	<b>3-11</b>
Polyethylene pipes	3-11
TECEfloor SLQ PE-RT 5S underfloor heating pipe	3-12
TECEfloor SLQ PE-MDXc 5S panel heating pipe	3-12
TECEfloor SLQ PE-Xc panel heating pipe	3-13
TECEfloor SLQ PE-RT/Al panel heating pipe	3-13
TECEfloor – Connection technology	3-14
Assembly instructions	3-15
<b>Laying systems for wet construction</b>	<b>3-17</b>
Dimpled panel system	3-17
Staple panel system	3-18
TECEfloor tacker panel 10plus	3-19

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<b>Dry construction systems</b>	<b>3-23</b>
TECEfloor dry construction system TP 30/16	3-23
TECEfloor 16/12 universal panel	3-24
Accessories	3-24
TECEfloor screed accessories	3-25
<b>Heating circuit manifold and manifold housing</b>	<b>3-26</b>
TECEfloor stainless steel heating circuit manifold with flow indicator	3-26
TECEfloor plastic heating circuit manifold with flow indicator	3-27
TECEfloor heat meter installation set	3-28
TECEfloor control valve	3-28
TECEfloor zone control valve	3-28
TECEfloor angled ball valve set	3-28
TECEfloor ball valve	3-28
TECEfloor Eurocone Y-piece	3-28
TECEfloor manifold housings	3-30
<b>Individual room controller</b>	<b>3-32</b>
TECEfloor room thermostat	3-32
TECEfloor room thermostat, analogue	3-32
TECEfloor room thermostat, LC display	3-33
TECEfloor connection unit	3-34
TECEfloor radio-controlled unit for individual room control	3-35
TECEfloor room radio thermostats	3-35
TECEfloor radio-controlled room thermostat, analogue	3-35
TECEfloor radio-controlled room thermostat with LC display	3-36
TECEfloor radio base unit	3-36
<b>TECEfloor design RTL box</b>	<b>3-38</b>
Function	3-38
Instructions for use	3-38
<b>Annex</b>	<b>3-40</b>
Heat output diagram for TECEfloor dimple system	3-40
Heat output diagram for TECEfloor tacker system	3-41
Pressure loss diagram for SLQ panel heating pipes	3-42
Quick design table for TECEfloor dimple system	3-43
Quick design table for TECEfloor tacker system	3-44
Functional heating protocol for TECE panel heating	3-46
Pressure test protocol for TECE underfloor heating	3-47

## System description

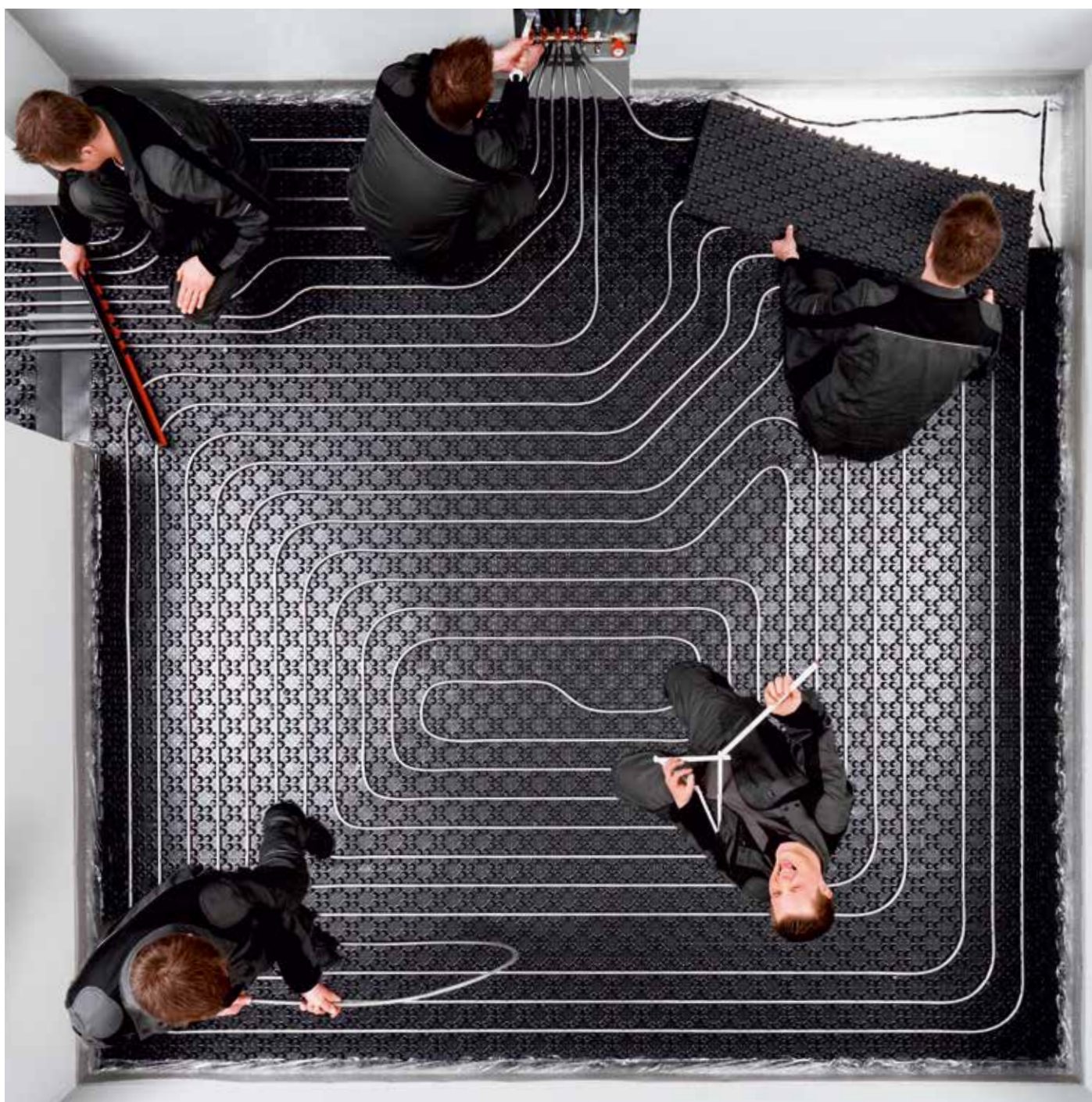
### System description

The TECEfloor underfloor heating system is a low-temperature heat distribution system for heating living spaces in new buildings and renovations. Heat is evenly distributed across the entire floor construction, creating an optimum indoor climate. Due to the high level of heat radiation compared to static heating systems, an optimum level of comfort is maintained even at significantly lower room temperatures. This enables energy savings of 6 to 12%.

Considerable advantages

- Low investment and operating costs
- High degree of comfort
- Free scope for interior design
- Low-temperature system (more efficient use with renewable energies)

The TECEfloor underfloor heating system ensures comfort, energy and economic efficiency, all at once. It is distinguished by high flexibility and straightforward assembly. The consistently high quality standards of the individual components and the entire system meet the respective standard requirements.



### The complete TECEfloor system

#### TECEfloor, the new underfloor heating system from TECE

TECE has long been a specialist when it comes to underfloor heating: In the 1980s, the company introduced the first diffusion-tight aluminium composite pipes to the market. TECE is now back with the TECEfloor range for underfloor heating.

#### TECEfloor is a complete system

It comprises heating pipes, installation accessories, manifolds and controls.

#### TECEfloor emphasises quality

All components are carefully selected and have been tested for 100% compatibility.

#### “Silver Line Quality” (SLQ)

The high quality standard is manifested by the “Silver Line Quality” (SLQ) label, which stands for tested quality and guaranteed compatibility of all components.

#### SLQ standard – for water-bearing and functional parts

With TECEfloor, the narrow manufacturing tolerances of the heating pipes are perfectly matched to the support body and clamping ring of the compression fitting. The O-ring on the compression fitting provides accurately dimensioned sealing in the manifold's Eurocone. In the actuator, not only the union nut but also the lifting and closing dimensions are adjusted to match the manifold's valve insert.



## Planning information

### Planning information

#### Standards and guidelines

When it comes to planning and installing TECEfloor underfloor heating systems, the applicable legal requirements, guidelines and standards must be taken into account.

#### Constructional requirements

Before installing the TECEfloor underfloor heating system, the following constructional requirements must be met:

- The rooms are roofed, windows and doors are installed
- Interior plastering must have been completed
- A metre level must be marked in all rooms
- Electricity and water connections must be available
- The load-bearing subsurface must be sufficiently firm and dry
- Flatness tolerances in accordance with DIN 18202 are observed
- Recesses must be available for heating circuit manifolds and heating pipes
- Any necessary joint plans must be available

Note: The specifications defined by the Bundesverband Flächenheizungen (Federal Association for Surface Heating) in its technical information "Interface coordination for heated floor constructions" can be used to clearly distribute tasks and avoid overlapping trades.

## Wet floor construction

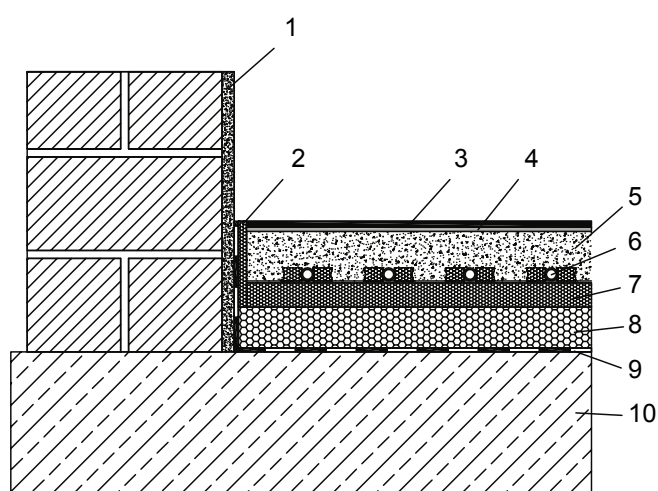
### General

TECEfloor underfloor heating can be used for all building types specified in EN 1264 - residential, office and commercial buildings, as well as other buildings whose use corresponds or is at least similar to that of residential buildings.

As well as the thermal and sound insulation requirements, the static requirements for the floor structure must also be taken into account during planning. Depending on the type of use, the suitable TECEfloor system, any necessary additional insulation materials as well as the screed thickness and qualities for the respective type of use must be taken into account. The following table provides an overview of the usual payloads for different types of use.

Category	Utilisation	Examples	qK kN/m <sup>2</sup>	Qk kN	
A	A1	Attics	Roof space not suitable for living purposes but accessible up to 1.80 m clear height	1.0	1.0
	A2	Living rooms and lounge areas	Rooms with sufficient transverse load distribution. Rooms and corridors in residential buildings, bed rooms in hospitals, hotel rooms including associated kitchens and bathrooms	1.5	-
	A3		As for A2, but without sufficient transverse distribution of loads	2.0	1.0
B	B1	Office areas, work areas, corridors	Corridors in office buildings, office spaces, doctors' surgeries, ward rooms, recreation rooms including corridors, small livestock stables	2.0	2.0
	B2		Corridors in hospitals, hotels, old people's homes, boarding schools, etc.; kitchens and treatment rooms including surgery theatres without heavy equipment	2.0	3.0
	B3		As for B2, but with heavy equipment	5.0	4.0
C	C1	Rooms, assembly rooms and areas which can be used for the gathering of people (except for categories defined under A, B, D and E)	Areas with tables; e.g. school rooms, cafés, restaurants, dining rooms, reading rooms, reception rooms	3.0	4.0
	C2		Areas with fixed seating; e.g. areas in churches, theatres or cinemas, congress halls, lecture halls, meeting rooms, waiting rooms	4.0	4.0
	C3		Freely accessible areas; e.g. museum areas, exhibition areas, etc. and entrance areas in public buildings and hotels, non-trafficable courtyard cellar ceilings	5.0	4.0
	C4		Sports and play areas; e.g. dance halls, gymnasiums, gymnastics and rafting rooms, stages	5.0	7.0
	C5		Areas for large gatherings of people; e.g. in buildings such as concert halls, terraces and entrance areas as well as grandstands with fixed seating	5.0	4.0

Live loads - extract from DIN 1055-3 (10.02)



- |                          |                                     |
|--------------------------|-------------------------------------|
| 1 Interior plaster       | 6 Heating pipe                      |
| 2 Edge insulation strips | 7 System board                      |
| 3 Floor covering         | 8 Additional thermal insulation     |
| 4 Mortar bed/adhesive    | 9 Structural sealing (if necessary) |
| 5 Screed                 | 10 Raw ceiling (floor board)        |

General structure of underfloor heating in wet construction

### Structural sealing

Floors that border onto the ground must be sealed according to the load case. The type and arrangement of structural sealing must be determined by the structural planner. When using PVC and solvent-based sealings under polystyrene insulation materials, a separating layer (e.g. PE film) must always be placed between these construction layers to prevent any plasticiser migration, which can result in destruction of the polystyrene insulation materials.

If sealing against surface water is provided on site in wet rooms (bathrooms, showers, etc.), the sealing must be provided above the load distribution layer. This automatically protects the screed and ensures the clear separation of the trades.

## Wet floor construction

### Thermal and impact sound insulation

#### Impact sound insulation requirements

Sound-proofing in a building has a significant influence on the quality of living. It is therefore necessary to plan and implement measures for impact sound insulation. The minimum requirements for sound insulation are specified in DIN 4109.

Suggestions for increased sound insulation can be taken from Supplement 2 of DIN 4109. If they are applied, this must be expressly agreed between the building owner and the designer.

If the adjusted, weighted standard impact noise level of the ceiling construction meets the requirements of DIN 4109 or VDI 4100, the use of the selected impact sound insulation is sufficient.

#### Further notes on thermal and impact sound insulation

- It is not allowed to use more than two impact sound insulation layers in one floor projection.
- The compressibility of all insulation layers used must not exceed 5 mm for surface loads of 3 kN/m<sup>2</sup> or 3 mm for surface loads of 5 kN/m<sup>2</sup>
- Empty pipes or other pipelines must be laid in the levelling insulation layer. The height of the levelling insulation layer corresponds to the height of the empty pipes or pipelines.
- Empty pipes or other pipelines must not interrupt the required impact sound insulation layer.

### Edge insulation strip requirements

Edge insulation strips have an important function between screed and adjoining building components. As well as absorbing the thermal expansion of the load distribution layer, an improvement of the impact sound insulation properties of the floating heating screed as well as a suppression of the cold bridge/heat bridge to adjacent building components is achieved when the edge insulation strip is properly installed.

Edge insulation strips must be placed on the last additional insulation layer. Ensure that there are no gaps along door frames, steps or supports and all fixtures (pillars, etc.). Any protruding remains of the edge insulation strip should only be removed after the floor coverings have been laid.

### Load distribution layers

The screeds of heated floor constructions do not differ in any way in their mortar technological composition from non-heated screeds in residential construction.

In addition, heating screeds must offer good pipe enclosure (for safe heat transfer) and temperature resistance of up to 55°C.

### Cement and conventional calcium sulphate screed

Cement screeds and conventional calcium sulphate screeds should be laid in a soft-plastic consistency to ensure an even and full-surface enclosure of the heating pipe and hence optimum heat transfer. The plasticity of screeds with an earth-moist consistency can be improved by using suitable additives.

### Calcium sulphate flowing screed

Flowing screeds are used in both residential and commercial construction. They are quick and easy to apply due to their high flowability. However, it must be noted that due to the thin consistency, careful sealing of the edge joint area as well as the insulation panel joints must be ensured. Calcium sulphate flowing screeds must be produced in accordance with DIN 18560 and installed according to the manufacturer's instructions. The manufacturer's processing guidelines must be observed in particular for the planning of joint field sizes, the application in damp and wet rooms as well as the temperature resistance. As a general rule, no additive is added to calcium sulphate flowing screed.

### Movement joints

Movement joints are joints in the screed that separate it completely up to the insulation layer.

As well as the surrounding separation by edge insulation strips, heated screeds must also be separated by joints at the following points:

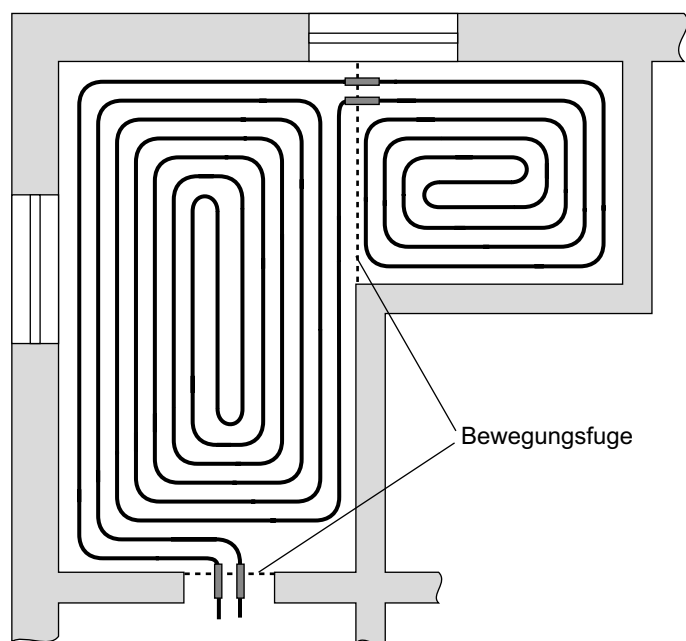
- For screed areas > 40 m<sup>2</sup> or
- For side lengths > 8 m or
- For aspect ratios a/b > 1/2
- Over movement joints of the structure
- For strongly offset panels
- In door reveals and passages

Movement joints must be designed in such a way that at least 5 mm compressible space is provided between the screed fields. They should not be bridged by reinforcement mats or support masses. After completion, they must be filled elastically or sealed with joint profiles. When plan-



ning heating screeds, the heating circuits and the movement joints must be coordinated as follows:

- Pipe registers are to be planned and laid in such a way that they do not run through joints under any circumstances.
- Only connection pipes may cross the joints.
- In these areas, the heating pipes must be protected from any shear stress beyond the joint by a protective pipe approx. 15 cm on each side.



Position of the movement joints and location of the protective pipes

### Functional heating

Cement screeds and calcium sulphate flowing screeds must be heated in accordance with EN 1264, Part 4, before the floor coverings are laid. The following minimum time interval must elapse between screed application and functional heating:

- 21 days for cement screeds,
- 7 days for calcium sulphate flowing screeds,
- or as specified by the manufacturer.

When switching off the underfloor heating after the heating phase, the screed must be protected from draughts and from cooling down too quickly.

### Floor coverings

Before starting the installation, switch off the heating or reduce the flow temperature so that the screed surface temperature is no more than 15 to 18°C.

As primers, knifing fillers and adhesives, only use materials that are designated by the manufacturer as “suitable for underfloor heating systems” and are resistant to heat ageing. These materials must be resistant to a continuous temperature load of 50°C.

The following types of floor covering can be laid on a heating screed if a maximum thermal conductivity resistance of  $R_{\lambda,B} 0.15 \text{ (m}^2\cdot\text{K)/W}$  is complied with and the manufacturer's approval is obtained.

#### Stone, clinker, ceramic

Stone, clinker or other ceramic top floors are most suitable for underfloor heating. The usual installation methods used in the tiling trade can be used without restriction:

- Thin-bed method on hardened screed
- Thick-bed method on hardened screed
- Mortar bed on separating layer

#### Parquet

It is appropriate to bond wood parquet coverings suitable for underfloor heating. Care must be taken to ensure that the wood and screed moisture content during installation corresponds to the value permitted by the standard and that the adhesive remains permanently elastic.

#### Plastic coverings

Plastic coverings are also generally suitable for underfloor heating. The bonding of plastic sheets or plastic membranes is recommended.

#### Textile floor covering

Carpeting should generally be glued down to achieve better heat transfer. The thickness of the carpet should not exceed 10 mm.

Floor covering material	Thickness in mm	Thermal conductivity $\lambda$ in W/mK	Thermal conductivity resistance $R_{\lambda,B}$ in $(\text{m}^2\cdot\text{K)/W}$
Ceramic tiles	13	1.05	0.012
Natural stone tiles	12	1.20	0.010
Marble	15	2.10	0.007
Carpet			0.070-0.170
Needle fleece	6.5	0.54	0.120
Linoleum	2.5	0.17	0.015
PVC flooring	2.0	0.20	0.010
Mosaic parquet	8.0	0.20	0.040
Strip parquet	16.0	0.20	0.080
Laminate	9.0	0.17	0.053

Planning guidelines for fully adhered floor coverings

## Wet floor construction

### Checking the readiness for covering

The residual moisture content of the screed required for readiness for covering must be determined by a specialist flooring company using suitable measuring methods. If necessary, the client must request that the material be heated to obtain the required residual moisture.

Maximum permissible moisture content of the screed in % for the readiness for covering of the floor coverings, determined with the CM device:

Top floor	Target cement screed (%)	Target calcium sulphate screed (%)
Textile coverings and elastic coverings	1.8	0.3
Parquet	1.8	0.3
Laminate flooring	1.8	0.3
Ceramic tiles or natural/concrete stones	2.0	0.3

The technical information “Interface coordination for heated floor constructions” provides information on the preparatory measures for the installation of top floor coverings, CM measurement and the ready-to-use heating of the screed with certain requirements on the maximum moisture content.

## Underfloor heating pipes and connectors

### Polyethylene pipes

There is good reason why polyethylene has become an indispensable material in pipeline construction. The specific properties of polyethylene have decisive advantages over other materials. PE pipes are generally characterised by their high flexibility and durability. With their low weight, the possibility of delivery as a practically endless pipes and the various connection techniques, PE pipes can be laid easily and economically.

Chemical and physical properties:

- High chemical resistance
- Corrosion resistant
- Low thermal conductivity
- Low material weight

Mechanical properties:

- Flexible due to tough-elastic behaviour
- Frost-resistant due to high elasticity
- Simple and economical installation

Surface finish:

- Low coefficient of friction and high flow properties due to smooth surfaces
- High abrasion resistance

The quality of panel heating systems therefore depends largely on the quality of the heating pipes used. They must be resistant to cracking caused by stress, be oxygen-tight and free of corrosion.

Quality assurance through external monitoring

Thanks to permanent quality control by independent institutes (DIN CERTCO / KOMO) as well as internal tests in our in-house laboratory, TECE offers the highest level of safety for all heating pipes and hence the guarantee that the heating pipes will continue to function perfectly even after many years of operation.



### Operating conditions

The operating conditions for piping systems made of solid plastic or multi-layer aluminium composite are described and specified in the relevant standards. The piping systems are divided into application classes. These specify the maximum operating temperatures over a defined period (based on a life cycle of 50 years). This reflects the normal operation of a heating system (with different operating temperatures during the heating period, e.g. summer/ winter operation).

#### Application class 4 = panel heating and low-temperature radiator heating

Operating temperature	20°C for 2.5 years
	40°C for 20 years
	60°C for 25 years
Max. operating temperature	70°C for 2.5 years
Total operating time	50 years
Incident temperature	100°C for 100 hours

#### Application class 5 = High-temperature radiator heating

Operating temperature	20°C for 14 years
	60°C for 25 years
	80°C for 10 years
Max. operating temperature	90°C for 1 year
Total operating time	50 years
Incident temperature	100°C for 100 hours

Four types of heating pipes are available for use in area heating systems:

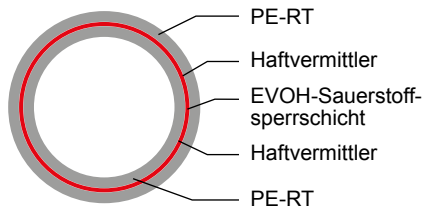
- SLQ PE-RT 5-layer all-plastic pipes
- SLQ PE-MDXc 5-layer all-plastic pipes
- SLQ PE-RT/ Al multi-layer composite pipes
- SLQ PE-Xc all-plastic pipes

These four types of pipes are characterised, for example, by durability, freedom from corrosion and incrustation, chemical resistance and flexibility, and are particularly easy to install.

## Underfloor heating pipes and connectors

### TECEfloor SLQ PE-RT 5S underfloor heating pipe

Five-layer all-plastic heating pipe to DIN EN ISO 21003 made of high-density polyethylene with higher temperature resistance (PE-RT type 2). Oxygen-tight to DIN 4726 with co-extruded EVOH coating. Suitable for particularly rough installation conditions thanks to the 5-layer technology; SLQ quality-monitored and compatibility tested. DIN CERTCO 3V423 MVR (P)



Classification in accordance with DIN EN ISO 22391-2, application class 4 and 5: 6 bar, Tmax 90°C

SLQ PE-RT 5 S pipe technical data:

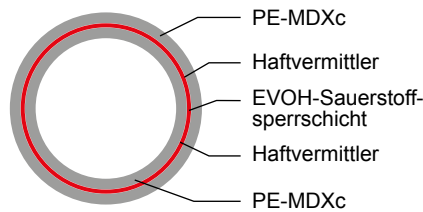
Colour	Silver-grey
Thickness	0.93 g/cm <sup>3</sup>
Thermal conductivity	0.4 W/mK
Coefficient of linear expansion	1.9 x 10 <sup>-4</sup> 1/K
Oxygen-tight	Yes acc. to DIN 4726
Smallest bending radius	≥ 5 x D
Application class	4 and 5
Max. operating temperature	90°C
Max. operating pressure	6 bar
Water content l/m	
12 x 1.5 mm	0.06 l/m
16 x 2.0 mm	0.11 l/m
17 x 2.0 mm	0.13 l/m
20 x 2.2 mm	0.20 l/m
25 x 2.5 mm	0.31 l/m

PE-RT 5S panel heating pipe ring collar dimensions:

Dimension	Delivery unit	A	B	C
12 x 1.5	200 m	770	400-450	100
	300 m	790	400-450	300
16 x 2.0	600 m	790	400-450	500
	300 m	790	400-450	300
17 x 2.0	500 m	790	400-450	500
	300 m	790	400-450	400
20 x 2.2	600 m	1100	400-450	360
	400 m	1100	400-450	360

### TECEfloor SLQ PE-MDXc 5S panel heating pipe

Five-layer all-plastic pipe to DIN 16894/16895 made of highly flexible, cross-linked polyethylene of medium density (PE-MDXc). Oxygen-tight to DIN 4726 with co-extruded EVOH coating. Suitable for particularly rough installation conditions thanks to the 5-layer technology; SLQ quality-monitored and compatibility tested. DIN CERTCO 3V373 MVR (P).



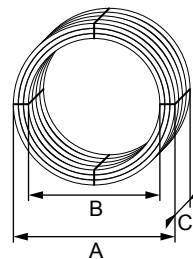
Classification according to BRL 5603 or BRL 5606: Application class 4 and 5: 6 bar, Tmax 90°C

Technical data PE-MDXc 5S pipe:

Colour	Mother-of-pearl
Thickness	0.93 g/cm <sup>3</sup>
Thermal conductivity	0.4 W/mK
Coefficient of linear expansion	1.5 x 10 <sup>-4</sup> 1/K
Oxygen-tight	Yes acc. to DIN 4726
Smallest bending radius	≥ 5 x D
Application class	4 and 5
Max. operating temperature	90°C
Max. operating pressure	4 (6) bar
Water content l/m	
16 x 2.0 mm	0.11 l/m

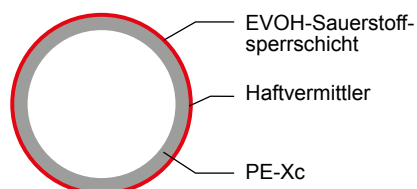
PE-MDXc 5S panel heating pipe ring collar dimensions:

Dimension	Delivery unit	A	B	C
16 x 2.0	120 m	790	400-450	115
	300 m	790	400-450	300
	600 m	790	400-450	500



## TECEfloor SLQ PE-Xc panel heating pipe

All-plastic pipe to DIN 16892/16893 made of cross-linked medium density polyethylene. Oxygen-tight to DIN 4726 with co-extruded EVOH coating. SLQ quality-monitored and compatibility-tested. DIN CERTCO 3V355 PE-Xc.



Classification to DIN EN ISO 15875-2: Application class 4 and 5: 6 bar, Tmax 90°C

SLQ PE-Xc pipe technical data:

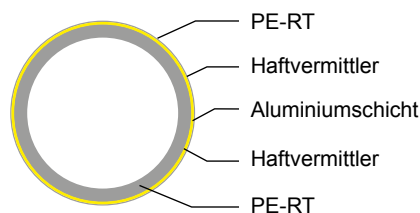
Colour	Silver-grey
Thickness	0.94 g/cm <sup>3</sup>
Thermal conductivity	0.4 W/mK
Coefficient of linear expansion	1.5 x 10 <sup>-4</sup> 1/K
Oxygen-tight	Yes acc. to DIN 4726
Smallest bending radius	≥ 5 x D
Application class	4 and 5
Max. operating temperature	90°C
Max. operating pressure	6 bar
Water content l/m	
16 x 2.0 mm	0.11 l/m
17 x 2.0 mm	0.13 l/m
20 x 2.0 mm	0.20 l/m

Coil dimensions PE-Xc panel heating pipe:

Dimension	Delivery unit	A	B	C
16 x 2.0	120 m	790	400-450	115
	300 m	790	400-450	300
	600 m	790	400-450	500
17 x 2.0	120 m	790	400-450	115
	300 m	790	400-450	300
	560 m	790	400-450	500
20 x 2.0	300 m	790	400-450	400
	600 m	1100	400-450	360

## TECEfloor SLQ PE-RT/Al panel heating pipe

Five-layer aluminium composite pipe made of high-density polyethylene with greater temperature resistance (PE-RT type 2), manufactured according to DIN 16836. 100% oxygen diffusion-tight due to butt-welded aluminium sheath. Specially developed for radiant heating systems with soft aluminium sheath. Particularly flexible to lay as a consequence, but nevertheless sufficiently dimensionally stable. DIN CERTCO 3V377 MVR (M).



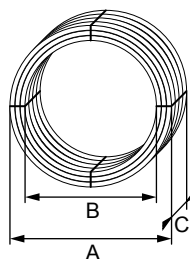
Classification acc. to DIN EN ISO 21003: Application class 4: 6 bar, Tmax 70°C

SLQ PE-RT/Al pipe technical data:

Colour	Silver-grey
Thickness	1.11 g/cm <sup>3</sup>
Thermal conductivity	0.4 W/mK
Coefficient of linear expansion	0.25 x 10 <sup>-4</sup> 1/K
Oxygen-tight	Yes acc. to DIN 4726
Smallest bending radius	≥ 5 x D
Application class	4
Max. operating temperature	70°C
Max. operating pressure	6 bar
Water content l/m	
16 x 2.0 mm	0.11 l/m

Coil dimensions PE-RT/Al panel heating pipe:

Dimension	Delivery unit	A	B	C
16x2.0	120 m	790	400-450	115
	300 m	790	400-450	300
	600 m	790	400-450	500



## Underfloor heating pipes and connectors

### TECEfloor – Connection technology

All fittings and screw connections for connecting and fastening the SLQ underfloor heating pipes are carefully designed and adapted, and have been extensively tested according to all the applicable test requirements. Of course, pipe and connection technology is quality-monitored on a continual basis by external institutes. Long-term and dependable functionality is therefore assured in the best possible way.

The following connection technologies are available for connecting SLQ pipes:

- SLQ Eurocone compression fitting, Dim. 12, 16, 17, 20



- SLQ PPSU sleeve coupling, Dim. 16



- SLQ brass sleeve coupling, Dim. 16, 17, 20, 25



- TECElogo-Push fittings, Dim. 16, 20, 25



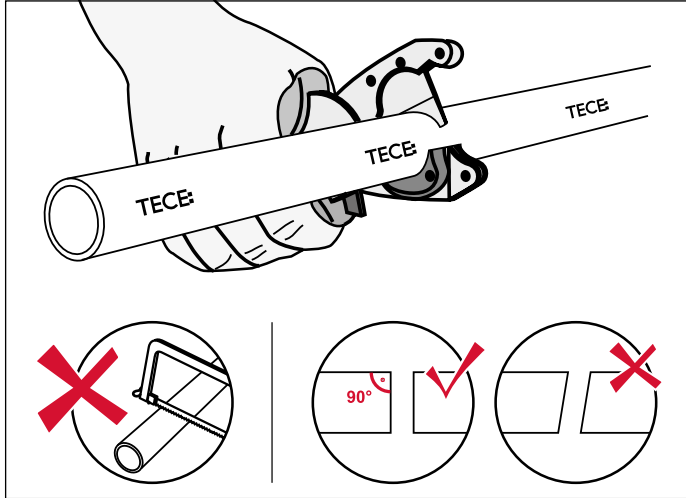
The following table shows the correct connection technology for all available SLQ panel heating pipes:

Connection technology	Pipe construction SLQ PE-RT 5S 7711 xx xx	SLQ PE-Xc 7712 xx xx	SLQ MDXc 5S 7714 xx xx	SLQ AI/PE-RT 7715 xx xx
Eurocone compression fitting	✓	✓	✓	✓
Brass pressure sleeve coupling	✓	✓	✓	–
PPSU pressure sleeve coupling	–	–	–	✓
TECElogo-Push fittings	✓	–	✓	✓

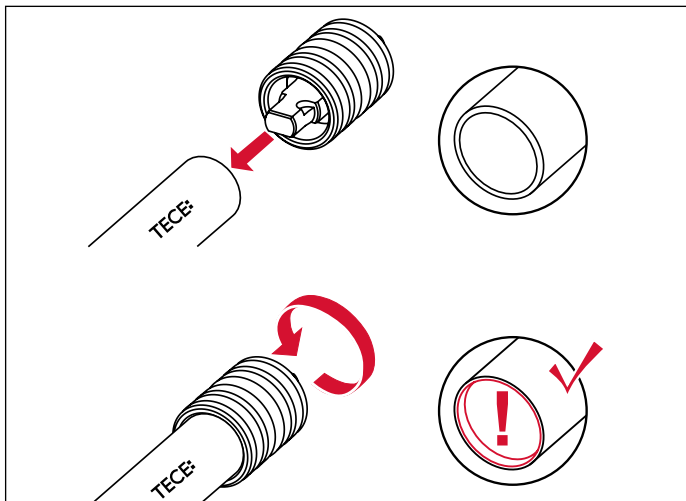
## Assembly instructions

### Specific installation instructions

- Use pipe scissors to separate the pipe at right angles



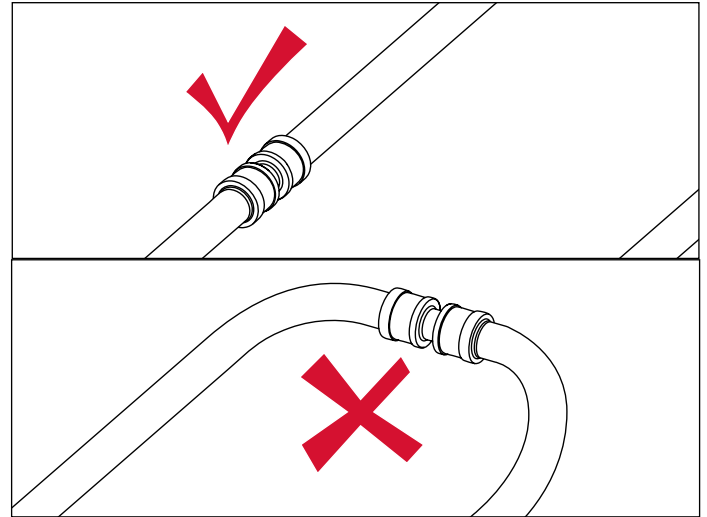
- Remove rough edges from pipe ends of O-ring sealed connectors (Eurocone fitting and TECElogo Push) and calibrate prior to installation.



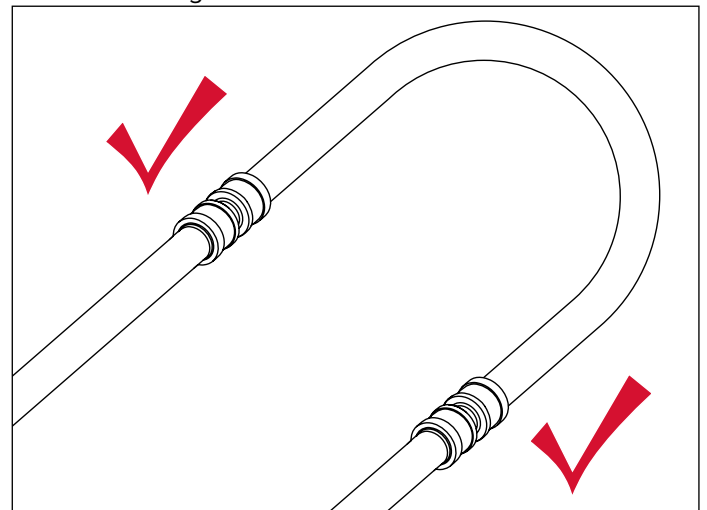
- The connection pipes must be vertical or horizontal to the connector
- If necessary, align and attach the pipe
- Other product-specific installation instructions must be observed

### General installation instructions

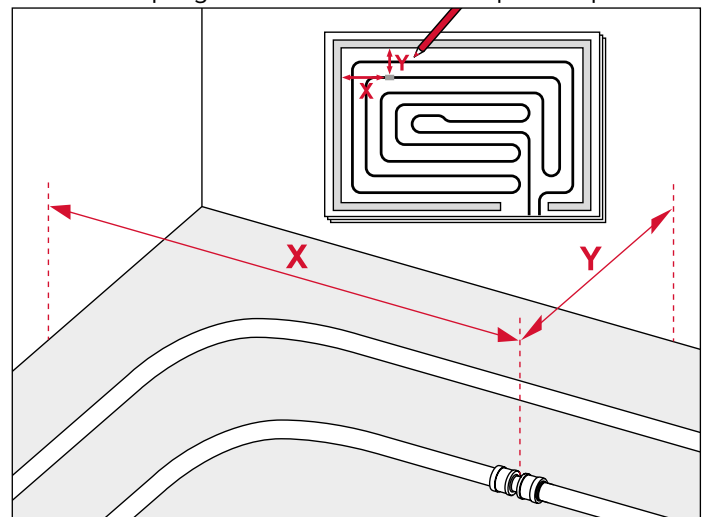
- Couplings must not be installed in elbows or bends



- If necessary, provide two couplings exactly in the bend in case of leakage.



- If couplings are installed inside the screed, the position of the coupling must be noted in the inspection plan.



## Underfloor heating pipes and connectors

### Connections in screed

Permanent leak-proof connections may be installed in the structural shell.

All the above-mentioned connectors in combination with the corresponding TECEfloor panel heating pipes have been tested according to the relevant standard and are considered to be permanently leak-proof and can therefore be installed in the screed without any restrictions.

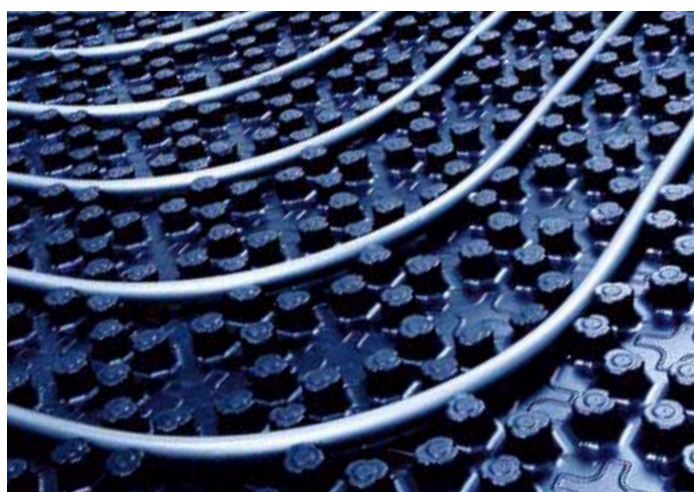
Within the framework of quality assurance, the results are confirmed by regular monitoring by independent institutes (DIN Certco or KOMO).



## Laying systems for wet construction

### Dimpled panel system

The TECEfloor dimpled panel system comes in three different designs. The dimpled panel 30-2 with 30-mm-thick impact sound insulation on the underside, the dimpled panel 11 with 11-mm-thick thermal insulation on the underside, and the dimpled sheet without insulation on the underside. All three design types have a polystyrene multifunctional cover sheet on the top side, which has an extremely good pipe-holding capacity, provides an excellent base for walking on, and ensures a secure seal against liquid screed and moisture. The special dimpled contour allows installation spacings of 6 cm and multiples thereof, and can incorporate heating pipes with dimensions 14, 16 and 17 mm. Installation is carried out in the floor construction under the load distribution layer made of cement or calcium sulphate screed.



#### Dimpled panel 30-2

The dimpled panel 30-2 is a highly effective thermal and impact sound insulation system. It satisfies the minimum insulation requirements of DIN EN 1264-4 for ceilings above heated rooms, and achieves an impact sound improvement of 28 dB. Higher insulation requirements in accordance with EnEV or higher sound insulation requirements must be checked and provided at the installation site. The maximum permissible moving load of the dimpled panel 30-2 is 5 kN/m<sup>2</sup>.

#### Dimpled panel 11

Dimpled panels 11 are used in areas with high moving loads of up to 30 kN/m<sup>2</sup>. They have 11 mm-thick thermal insulation on the underside which has no impact sound properties. The thermal resistance of the panel is R = 0.31 m<sup>2</sup>K/W. Higher insulation requirements and higher sound insulation requirements must be checked and provided at the installation site.

### Dimpled sheet

The dimpled sheet has been designed for installation on top of the on-site insulation. Insulation requirements in accordance with EN 1264-4 and sound insulation requirements must be checked and provided at the installation site.

#### Technical data

	Dimpled panel 30-2	Dimpled panel 11	Dimpled sheet
Insulation material	EPS 040 DES sg	EPS 035 DEO	-
Multi-functional sheet material	PS film	PS film	PS film
Installation dimension (length x width)	1440 x 840	1440 x 840	1440 x 840
Insulation thickness under heating pipe	30 mm	11 mm	-
Installation spacings	6 cm grid	6 cm grid	6 cm grid
Thermal resistance	0.75 m <sup>2</sup> K/W	0.31 m <sup>2</sup> K/W	-
Impact sound improvement**	28 dB	-	-
Building material class acc. to DIN 4102	B2	B2	B2
Max. surface load	5 kN/m <sup>2</sup>	30 kN/m <sup>2</sup>	*

\* depending on the insulation used

\*\* ον α σολιδ χειλινγ ανδ σχρεεδ αππλιεδ ον τοπ οφ τηε ιμπαχτ σουνδ ινσυλατιον ωιτη η μασσ οφ ≥ 70 kg/m<sup>2</sup>

### Accessories

#### Compensating element

With the compensating element, door transitions and screed movement joints are reliably created. Depending on the requirements, a system insulation material is laid on the underside in the area of the compensating element.



#### Fixing hooks

The fixing hooks ensure that the dimpled foil is securely fixed to the insulation provided by the customer.



## Laying systems for wet construction

### Staple panel system

The TECEfloor tacker panel system is available in two different designs: as roll insulation the tacker panel 30-2 and 30-3 with a 30 mm thick impact sound insulation. Both design types consist of a slotted insulation panel on the underside and a laminated composite sheet on the top. The tacker panel layer made of woven fabric forms the basis for quick, easy and secure laying of heating pipes. A line grid is printed on the top side of the sheet, allowing installation spacings of 5 cm and multiples thereof.



#### Roll insulation 30-2

Roll insulation 30-2 is a highly effective thermal and impact sound insulation system. It satisfies the minimum insulation requirements of DIN EN 1264-4 for ceilings above heated rooms, and improves insulation against impact sound by 28 dB. Higher insulation requirements in accordance with EnEV or higher sound insulation requirements must be checked and provided at the installation site. The maximum permissible moving load of staple panel 30-2 is 5 kN/m<sup>2</sup>.

#### Roll insulation 30-3

Roll insulation 30-3 can always be used where greater impact sound insulation is desired or required. The impact sound improvement is 29 dB. With a thermal resistance of 0.67 m<sup>2</sup>K/W, this roll insulation used on its own does not meet the minimum insulation requirements of DIN EN 1264 so that additional thermal insulation must be provided. The maximum permissible moving load of tacker panel 30-3 is 4 kN/m<sup>2</sup>.

### Technical data

	Roll insulation 30-2	Roll insulation 30-3
Insulation material	EPS 040 DES sg	EPS 045 DES sm
Material fabric foil	PE	PE
Installation dimension (length x width)	10 x 1 m	10 x 1 m
Insulation thickness under heating pipe	30 mm	30 mm
Installation spacings	5 cm grid	5 cm grid
Thermal resistance	0.75 m <sup>2</sup> K/W	0.67 m <sup>2</sup> K/W
Impact sound improvement**	28 dB	29 dB
Building material class acc. to DIN 4102	B2	B2
Max. surface load	5.0 kN/m <sup>2</sup>	4.0 kN/m <sup>2</sup>

\* Depending on the insulation used

\*\* On a solid ceiling and screed applied on top of the impact sound insulation with a mass of ≥ 70 kg/m<sup>2</sup>

### Accessories

#### Tacking pins

Special tacking pins facilitate the installation of heating pipes with dimensions 14 x 2 mm, 16 x 2 mm and 17 x 2 mm. Installation is carried out in the floor construction under the load distribution layer made of cement or calcium sulphate screed. The tacking pins must be set at a max. distance of 50 cm.

Tacking pins are available in different designs:

#### T8 tacking pin

Extra wide 8 mm tacking pin for optimal fixing and guiding of pipes, with improved holding force. Length: 40 mm



#### T6 tacking pin

Standard tacking pin in two different lengths, 40 mm and 55 mm. Can be used in many commercially available tacker guns.



The tacking pins are thermally welded into magazines each with 20 or 30 pins. The familiar fixing tape and a possible impairment of the setting process due to sticking with residues of the fixing tape are eliminated.

### TECEfloor tacker guns

Two high-quality, precise tacker guns are available for mounting the pins. The T8 extra tacker gun for processing T8 pins and the standard tacker gun for T6 pins.



### TECEfloor tacker panel 10plus

The 10 mm thick EPS folding tacker panel is designed for universal laying on customer insulations such as suitable mineral wool, EPS and PUR insulation or in renovations on the existing screed. Insulation requirements in accordance with EN 1264-4 and sound insulation requirements must be checked and provided at the installation site.



- Made from expanding polystyrene EPS, nominal value of the thermal conductivity 0.034 W/mK (DIN EN 13163; DIN EN 126667),  $R = 0.285 \text{ m}^2 \text{ K/W}$
- Compression strength at 10% compression 150 kPa CS(10/Y)
- Coated with a highly tear-resistant, finely woven, fibre-reinforced multi-layer composite woven foil made of polyethylene (DIN EN 1264-4), highly adhesive, for the extremely high holding forces of the TECEfloor 10plus pins.
- One-sided, self-adhesive 30-mm-thick foil overlap, grid markings 5 and 10 cm, EPS strength: 10 mm,
- Dimensions: 1.60 x 1.20 m (1.92 m<sup>2</sup>), delivered folded to 0.80 x 1.20 m, optional: underside with self-adhesive coating.

#### Advantages:

- Universally applicable on many types of insulation material
- Special solutions for renovations
- Easy to handle when cutting and installing
- Clear separation of installing and screed-laying trade
- Up to 200 m<sup>2</sup> on a Euro-pallet — facilitates transport and reduces storage space

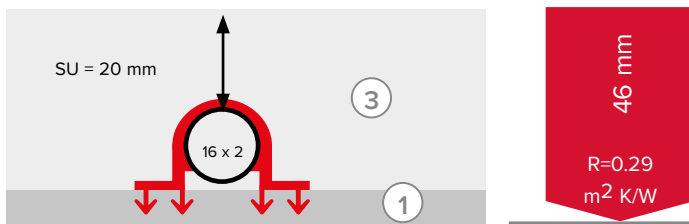
## Laying systems for wet construction

### Application with cement or anhydrite screed

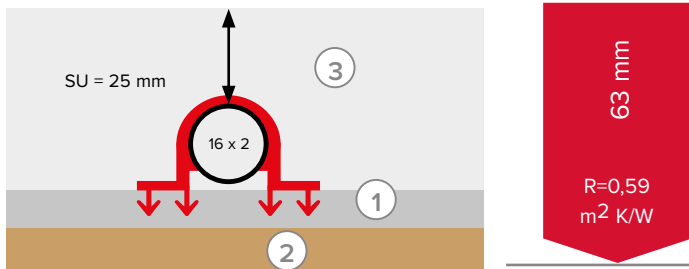
The tacker panel 10plus is suitable for both renovation and new construction in combination with cement or anhydrite screed according to DIN 185602. It can be laid either directly on load-bearing and crack-free subfloors or on insulation already provided on site, which is typically thermal and/or impact sound insulation made of polystyrene, mineral fibre or polyurethane.

### Application with Knauf Levelling Screed 425 for thin-layer constructions

The tacker panel 10plus is preferably suitable for renovation in combination with Knauf levelling screed 425 for thin-layer constructions with the smallest possible construction height of up to 42 or 46 mm. Here, the pipe retaining panel is placed or glued directly onto the load-bearing and crack-free substrate...



Individual load up to 3 kN, surface load up to 3 kN/m<sup>2</sup>  
In acc. with DIN 1991-1-1N/A, rooms of categories A2, A3, B1, B2 and D1.



Individual load to 1 kN, surface load to 2 kN/m<sup>2</sup>  
According to DIN 1991-1-1N/A rooms of category A2, A3 (living and recreation rooms).

- 1) TECEfloor staple panel 10plus
- 2) Knauf mineral wool TP-GP-12-1
- 3) Knauf 425 levelling screed

### Accessories

#### Tacking pin 10plus

Heating pipes in the dimensions 12x1.5 mm and 16 x 2 mm can be laid using the special tacking pins 10plus. With their specially designed holding tips, the pipe pins ensure that the pipes are fixed in a float-proof manner and do not pierce the pipe holding panel. The tacking pins must be set at a max. distance of 50 cm.

#### Tacking pin 10plus

The tacking pin 10plus is available in two different versions: for heating pipes in dim. 10-12 and for heating pipes in dim. 14 - 17 mm.

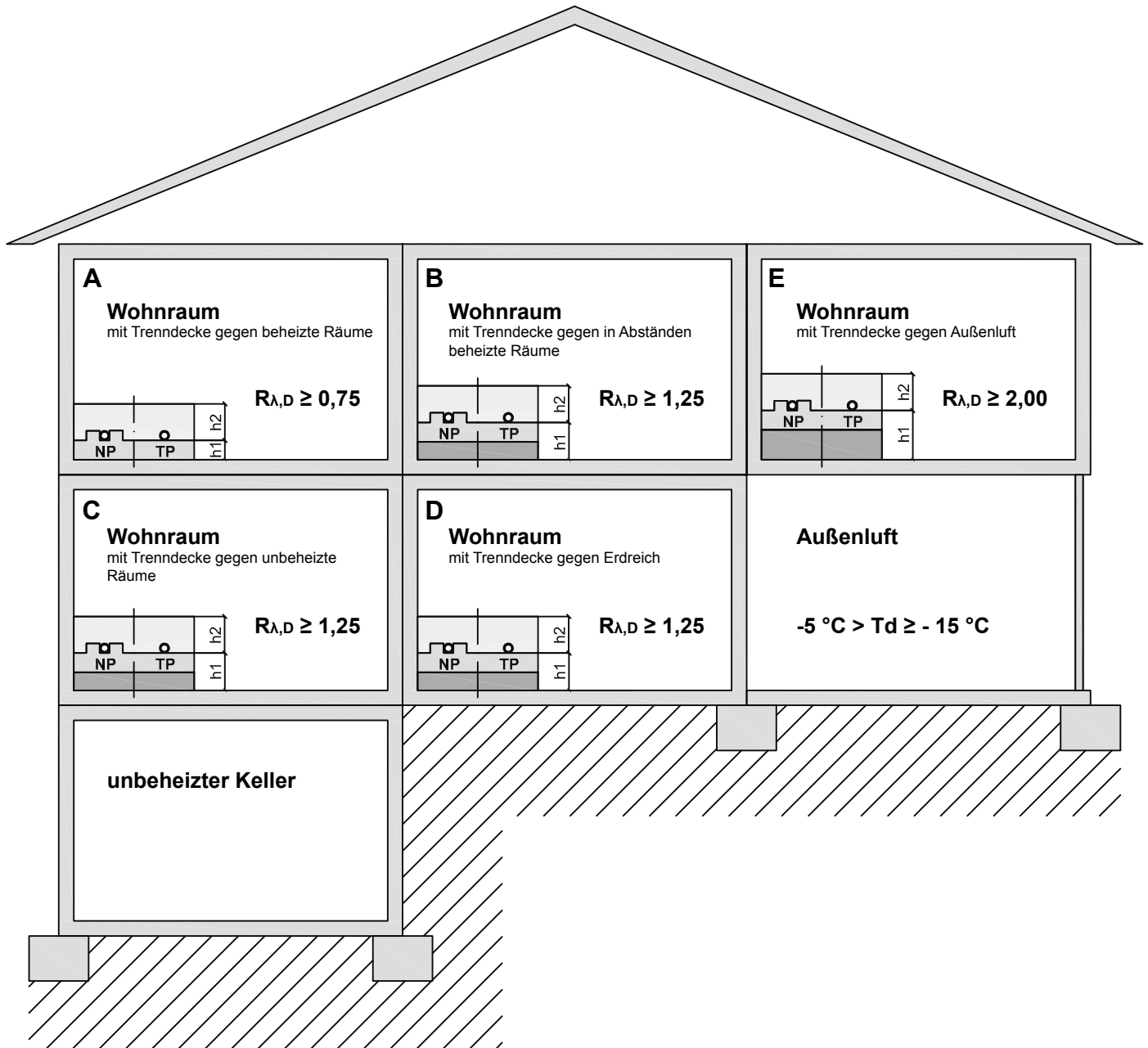


#### Tacker gun

A high-quality, precise tacker gun is available for setting the pins. The tacker gun 10plus.



Minimum insulation requirement in accordance with EN 1264-4



**Note:**

Irrespective of the minimum requirements of DIN 1264-4, the higher insulation requirements of EnEV should be taken into account for applications B, C, D and E.

**Minimum screed layer heights h<sub>2</sub> according to DIN 18560-2**

Surface load	C	CT F4	CT F5	CAF F4	CAF F5
≤ 2 kN/m <sup>2</sup>	≤ 5 mm	45 + d	40 + d	40 + d	35 + d
≤ 3 kN/m <sup>2</sup>	≤ 5 mm	65 + d	55 + d	50 + d	45 + d
≤ 4 kN/m <sup>2</sup>	≤ 3 mm	70 + d	60 + d	60 + d	50 + d
≤ 5 kN/m <sup>2</sup>	≤ 3 mm	75 + d	65 + d	65 + d	55 + d

C = max. permissible insulation compressibility of insulating layers  
 CT F4/CT F5 = cement screed (CT) with flexural tensile strength F4/F5  
 CAF F4/CAF F5 = calcium sulphate flow screed with flexural tensile strength F4/F5  
 d = outer diameter of heating pipes or height of dimple

## Laying systems for wet construction

### Minimum thickness $h_1$ (according to EN 1264-4)

System	Application		
	A	B, C and D	E
<b>TECEfloor dimpled panel 30-2</b>	30 mm	30 mm	30 mm
Minimum additional insulation according to DIN EN 1264-2 (installation site)	-	e. g. 20 mm EPS WLG 040	e. g. 50 mm EPS WLG 040
Thermal resistance $R_{\lambda,D}$	0.75 m <sup>2</sup> K/W	1.25 m <sup>2</sup> K/W	2.00 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	30 mm	50 mm	80 mm
<b>TECEfloor dimpled panel 11*</b>	11 mm	11 mm	11 mm
Minimum additional insulation according to DIN EN 1264-2 (installation site)	e. g. 20 mm EPS WLG 040	e. g. 40 mm EPS WLG 040	e. g. 70 mm EPS WLG 040
Thermal resistance $R_{\lambda,D}$	0.81 m <sup>2</sup> K/W	1.31 m <sup>2</sup> K/W	2.06 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	31 mm	51 mm	81 mm
<b>TECEfloor dimpled sheet*</b>	-	-	-
Minimum additional insulation according to DIN EN 1264-2 (installation site)	e. g. 30 mm EPS WLG 040	e. g. 50 mm EPS WLG 040	e. g. 80 mm EPS WLG 040
Thermal resistance $R_{\lambda,D}$	0.75 m <sup>2</sup> K/W	1.25 m <sup>2</sup> K/W	2.00 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	30 mm	50 mm	80 mm
<b>TECEfloor tacker panel 30-2</b>	30 mm	30 mm	30 mm
Minimum additional insulation according to DIN EN 1264-2 (installation site)	-	e. g. 20 mm EPS WLG 040	e. g. 50 mm EPS WLG 040
Thermal resistance $R_{\lambda,D}$	0.75 m <sup>2</sup> K/W	1.25 m <sup>2</sup> K/W	2.00 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	30 mm	50 mm	80 mm
<b>TECEfloor tacker panel 30-3</b>	30 mm	30 mm	30 mm
Minimum additional insulation according to DIN EN 1264-2 (installation site)	e. g. 5 mm EPS WLG 040	e. g. 25 mm EPS WLG 040	e. g. 55 mm EPS WLG 040
Thermal resistance $R_{\lambda,D}$	0.795 m <sup>2</sup> K/W	1.29 m <sup>2</sup> K/W	2.71 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	35 mm	55 mm	85 mm
<b>TECEfloor tacker panel 10plus</b>	10 mm	10 mm	10 mm
Minimum additional insulation according to DIN EN 1264-2 (installation site)	20 mm EPS DES WLG 040	20 mm EPS DES WLG 040 + 20 mm EPS DEO WLG 040	20 mm EPS DES WLG 035 + 30 mm PUR WLG 025
Thermal resistance	0.789 m <sup>2</sup> K/W	1.286 m <sup>2</sup> K/W	2.057 m <sup>2</sup> K/W
Minimum insulation thickness $h_1$	30 mm	50 mm	60 mm

\* no impact noise (in the event of an impact noise requirement, provide additional insulation)

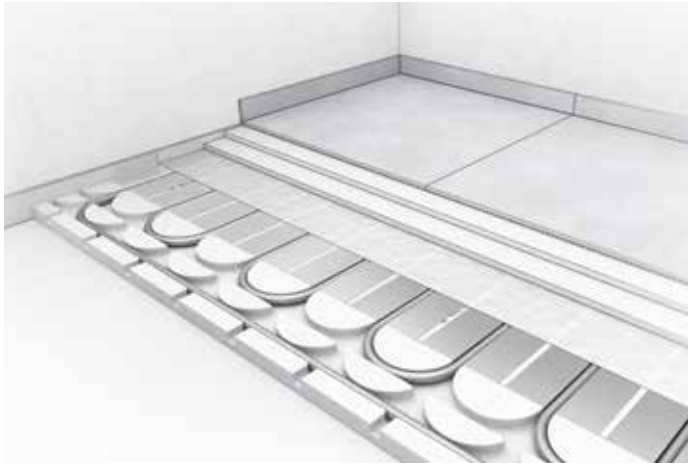
Thermal conductivity group: Insulating materials are classified into thermal conductivity groups according to the rated value of the thermal conductivity which simplifies calculation and use. The thermal conductivity group results directly from the rated value  $\lambda(R)$ :  $\lambda(R)$  with 0.040 W/(m·K) = WLG 040.

### Thermal resistance $R_{\lambda}$ of TECEfloor system panels

TECEfloor system panels	Thermal resistance $R_{\lambda}$
Dimpled panel 30-2	$R_{\lambda,SP} = 0.75 \text{ W/m}^2\text{K}$
Dimpled panel 11	$R_{\lambda,SP} = 0.31 \text{ W/m}^2\text{K}$
Dimpled sheet	$R_{\lambda,SP} = 0.00 \text{ W/m}^2\text{K}$
Tacker panel 30-2	$R_{\lambda,SP} = 0.75 \text{ W/m}^2\text{K}$
Tacker panel 30-3	$R_{\lambda,SP} = 0.67 \text{ W/m}^2\text{K}$
Tacker panel 10plus	$R_{\lambda,SP} = 0.286 \text{ W/m}^2\text{K}$

## Dry construction systems

Besides the classic wet systems such as stud and tacker systems (pipe laying above the insulation in the screed), there are what are known as dry construction systems. These enable the installation of underfloor heating in accordance with construction type B (piping installation within the insulation layer beneath the screed).



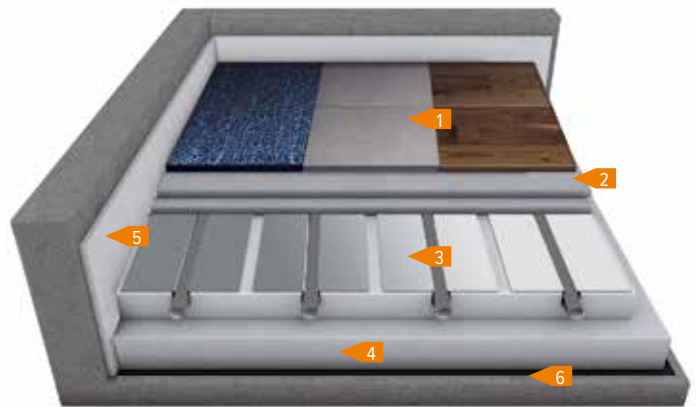
Dry construction systems are useful wherever a low construction weight is required for structural reasons or where dry screed elements are used. Furthermore, dry construction systems are predestined for use in renovation projects due to their low installation height.

TECE offers two dry construction systems with the TP 30/16 and the UP 16/12.

## TECEfloor dry construction system TP 30/16

The TP 30/16 is the standard dry construction system in combination with dry screed elements (e.g. Fermacell, Knauf) or with thin-layer wet screeds. It consists of just two individual components and allows easy handling and processing with a short construction time.

The TP 30/16 dry construction panel consists of a 30 mm thick expanded polystyrene (EPS 035,  $\geq 150$  kPa) and meets the minimum insulation requirements of DIN EN 1264-4 for partition ceilings against heated rooms. The associated heat-conducting profiles to accommodate 16x2.0 mm heating pipes are optionally available in aluminium or steel. They have integrated predetermined breaking points which allow for processing without tools.



- |   |   |       |
|---|---|-------|
| 1 | Carpet / tiles / parquet / laminate / plastic         |       |
| 2 | Dry screed element (Fermacell)                        | 25 mm |
| 3 | Dry panel TP 30/16 + system pipe                      | 30 mm |
| 4 | Additional insulation EPS 035 DEO, 200 kPa (optional) |       |
| 5 | Edge insulation strip                                 |       |
| 6 | Moisture barrier if applicable                        |       |

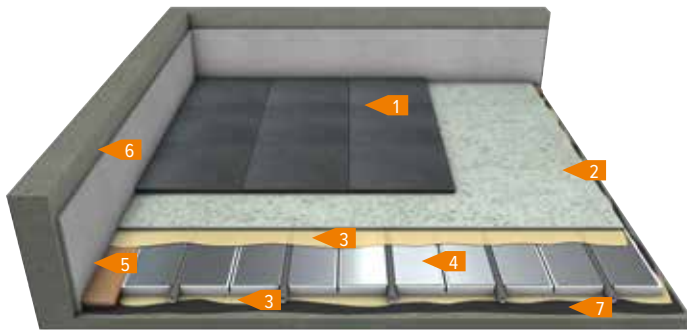
55 mm

## Dry construction systems

### TECEfloor 16/12 universal panel

The universal panel 16/12 is particularly suitable for restricted installation heights for integration in the floor, on the wall and under the ceiling. This is possible thanks to the low element height of just 16 mm and using a 12 x 1.5 mm heating pipe. The extremely low installation provides optimum controllability of the system.

The UP 16/12 universal panel consists of 16 mm thick expanded polystyrene (EPS 035, 240 kPa). Due to its extremely high compression strength, it allows for very flat constructions. The aluminium heat-conducting profiles are glued to the polystyrene panel over the entire surface at the factory. This allows for very fast processing.



<b>1</b> Tiles $\geq$ 10 mm   Natural stone $\geq$ 15 mm	
<b>2</b> Insulation mat UP + joint adhesive strip	5 mm
<b>3</b> Adhesive (MAPEI ECO FIX)	
<b>4</b> Universal panel + system pipe	16 mm
<b>5</b> Edge board (16 mm), mandatory	
<b>6</b> Edge insulation strip	
<b>7</b> Moisture barrier if applicable (connection to subsurface)	
	<b>21 mm</b>

#### Note:

For further detailed information such as product data sheets, standard and special constructions, performance data and installation instructions, please refer to our "Technical Information - Universal Panel UP 16/12 - Dry Panel TP 30/16".

### Accessories

#### Edge insulation strip

For sound insulation and to compensate for thermal expansion of the screed layer in accordance with DIN 18560.

The edge insulation strip made of closed-cell PE foam with adhesive strip and special foil strip guarantees maximum adhesive strength and quick installation.

Suitable for cement and flow screed.

Thickness: 10 mm

Height: 150 mm

Length: 40 m roll

#### Movement joint profile

To create permanently elastic screed joints and to limit screed areas. Suitable for cement and flow screed.

Thickness: 10 mm

Height: 100 mm

To protect the underfloor heating pipes, cut approx. 30 cm-long pipe sleeves made of pipe joint protection, and tape in the area of the movement joints above the connection lines.





### **TECEfloor screed accessories**

#### **Cement screed additive CT standard**

Plasticizing additive especially for the production of cement and calcium sulphate-bonded heating screeds (not suitable for flow screeds). In addition to higher bending tension and compression strength, adding the screed additive to the mixing water significantly improves processing of the mortar and reduces the quantity of the mixing water while achieving the same mortar consistency.

Requirement: 0.03 kg/m<sup>2</sup> per cm screed thickness

Minimum pipe cover: 45 mm

Colour: light green/clear

#### **Cement screed, CT Special additive**

Strengthening, modifying additive to produce thin-bed cement screeds.

Requirement: 0.25-0.30 kg/m<sup>2</sup> per cm screed thickness

Minimum pipe overlap 30 mm

Colour: light pink/milky

## Heating circuit manifold and manifold housing

### Heating circuit manifold and manifold housing

#### TECEfloor stainless steel heating circuit manifold with flow indicator

The TECEfloor stainless steel heating circuit manifolds offer a high material quality for permanent corrosion resistance. They have a large chamber volume, a polished surface, sound-proofing plastic holders with quick assembly function and 1" union nuts, flat-sealing.

The manifold bars can be mounted either on the right or left side. Due to the valve spacing of 50 mm and the laterally offset arrangement of the connections, installation is easy even in difficult connection situations. Every manifold that leaves the factory undergoes a pressure test as well as a closing dimension check of the valves. The batch indication enables tracking and unique identification of the manifold even after many years of operation (supply of accessories and spare parts).

The water quantity is regulated via the lockable flow regulating valves with integrated 0.5-4 l/min flow meter. The flow meters have a locking ring in accordance with DIN EN 1264-4, which allows for captive hydraulic balancing. The sight glasses can be replaced under system pressure or dismantled for cleaning purposes.

The integrated return valves are factory-fitted with a manual locking cap and have a 30 x 1.5 mm connection thread to accommodate the TECEfloor actuators. The closing dimension is 11.5 mm. They also have a conical valve closure. This means that even small amounts of water can be easily adjusted, e.g. via a continuous actuator.

#### TECEfloor stainless steel heating circuit manifold with Eurocone connection fitting

The standard manifold has 3/4" Eurocone connection fittings and enables the installation of the TECEfloor heating pipes in dim. 12, 16, 17, 20 using a corresponding Eurocone compression fitting.

#### TECEfloor stainless steel heating circuit manifold with Eurocone compression fitting and pre-assembled push-in connection type Logo

The TECEfloor heating circuit manifold type Logo has outlets with "Type Logo" pre-assembled push fittings, for quick and twist-free connection of the TECEfloor heating pipes SLQ AI/PE-RT, SLQ MDXc 5S and SLQ PE-RT 5S in dim. 16.

Push-fit connections with Eurocone connection can be subsequently removed with ease using the system tool.

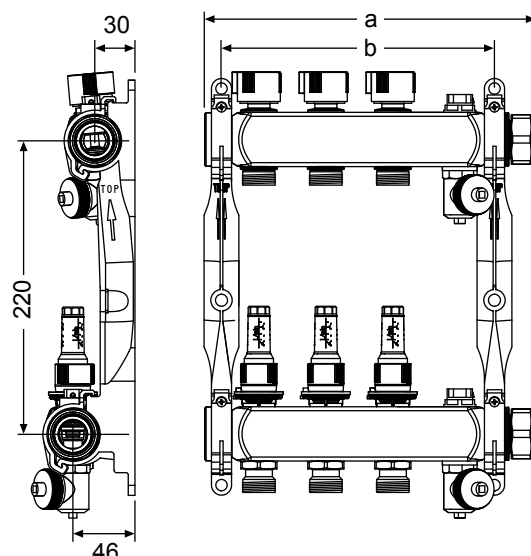


TECEfloor pipes and the Eurocone fitting or push-fit connection are continuously monitored in the TECE materials laboratory and by independent institutes. Pipes and connectors are tested in conformity with DIN standards.

#### Technical data:

kvs value, flow and return valve	1.2 m <sup>3</sup> /h
Max. volumetric flow (12 heating circuits)	2.88 m <sup>3</sup>
Max. operating pressure	6 bar
Max. operating temperature	60°C (6 bar) 70°C (5 bar)
Max. test pressure	10 bar (< 30°C)
Distance to heating circuit	50 mm

#### Dimensions:



## Heating circuit manifold and manifold housing

Heating circuits	a (in mm)	b (in mm)
2	198	154
3	248	204
4	298	254
5	348	304
6	398	354
7	448	404
8	498	454
9	548	504
10	598	554
11	648	604
12	698	654

### TECEfloor plastic heating circuit manifold with flow indicator

The TECEfloor plastic heating circuit manifold made of glass-fibre reinforced polyamide offers variable application options thanks to its modular concept. It consists of a basic module and one or more 2-way, 3-way or 4-way connection modules with integrated valve technology.

Basic module flat-sealing on the primary side with union nut G1, flow and return thermometer, two rotatable filling/draining units and two vent valves for manual venting. Includes manifold wall bracket with sound insulation inserts in accordance with DIN 4109 and mounting set.



The water volume is regulated via the lockable flow regulating valves with integrated 0-3.5 l/min flow meter. The flow meters have a locking ring in accordance with DIN EN 1264-4, which enables captive hydraulic balancing. The sight glasses can be changed under system pressure or dismantled for cleaning purposes.

The integrated return valves are factory-fitted with a manual closing cap and have a 30x1.5 mm connection thread to accommodate the TECEfloor actuators. The clos-

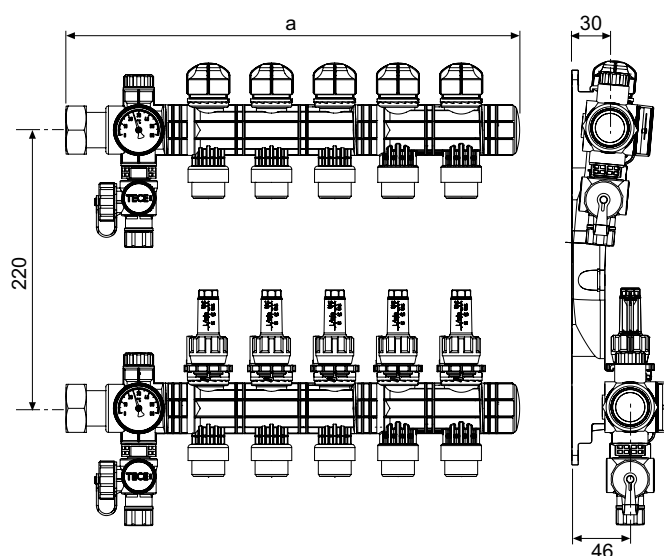
ing dimension is 12.3 mm. They also have a conical valve closure. This means that even small amounts of water can be easily adjusted, e.g. via a continuous actuator.

The plastic heating circuit manifold has 3/4" Eurocone connection fittings and enables the installation of TECEfloor heating pipes in dim. 12, 16, 17, 20 using a corresponding Eurocone compression fitting.

Technical data:

kvs value, flow and return valve	0.75 m <sup>3</sup> /h
Max. volumetric flow (12 heating circuits)	2.52 m <sup>3</sup>
Max. operating pressure	6 bar
Max. operating temperature	60°C (6 bar) 70°C (5 bar)
Max. test pressure	10 bar (< 30°C)
Distance to heating circuit	50 mm

Dimensions:



Heating circuits	a (in mm)
2	202
3	252
4	302
5	352
6	402
7	452
8	502
9	552
10	602
11	652
12	702

## Heating circuit manifold and manifold housing

### TECEfloor heat meter installation set

Heat meter corner installation set with sensor mounting according to DIN 1434-2, universally applicable, construction length 110 mm or 130 mm, primary connection Rp 3/4", manifold connection R 1", flat sealing, flow and return ball valve with sensor connection M 10 x 1, installation dimension 127 mm, 70 mm centre distance.



### TECEfloor control valve

Control valve G 1"/Rp 1" for shutting off the manifold flow and hydraulic comparison with pre-setting display incl. locking, Kvs value: 5.0 m<sup>3</sup>/h, installation dimension 70 mm.



### TECEfloor zone control valve

Zone control valve G 1"/Rp 1" for shutting off the manifold return flow as well as for taking the TECEfloor SLQ actuator 230 V or 24 V, Kvs value: 4.6 m<sup>3</sup>/h, installation dimension 70 mm.



### TECEfloor angled ball valve set

Angled ball valve set consisting of return or flow ball valve with angled connection. Manifold connection R 1", flat-sealing. Primary connection Rp 3/4" or Rp 1", including flat seal. Installation dimension 125 mm (3/4") or 145 mm (1").



### TECEfloor ball valve

Ball valve with 1" connection, nickel plated, including flat seal, installation dimension 70 mm.



Ball valve 1" with thermometer, nickel plated, with thermometer in turning handle, includes red and blue clips to mark flow and return.



### TECEfloor Eurocone Y-piece

Eurocone 3/4" Y-piece to connect two equal heating circuits with a maximum flow rate of 2 l/min. to a heating circuit manifold outlet.



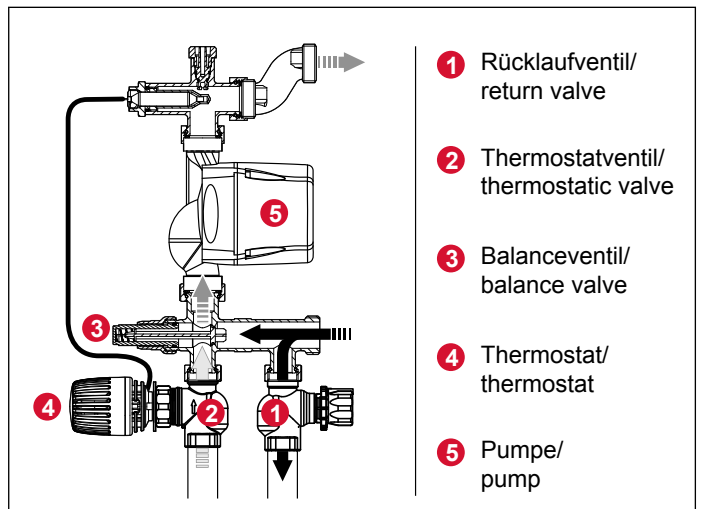
### Fixed value control 20-55°C

As a manifold station, the TECEfloor fixed value control regulates the temperature of the water in the secondary floor heating area via a thermostat head with a flow sensor. This remains below the water temperature on the primary side as long as this — generally weather-compensated water temperature — remains above the value set on the fixed value control.



If the water temperature on the primary side drops due to the heating curve setting being below the set fixed value temperature, the flow temperature on the secondary side in the underfloor heating circuit will also drop. The station is designed according to pressure loss, flow rate and spread to provide an output of approx. 10 kW.

To hydraulically harmonise the connected underfloor heating with the rest of the heating installation, the TECEfloor fixed value control is equipped with a control valve (1) in the primary return, and a balance valve (3) in the underfloor heating circuit return.

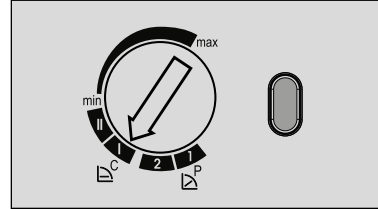


## Heating circuit manifold and manifold housing

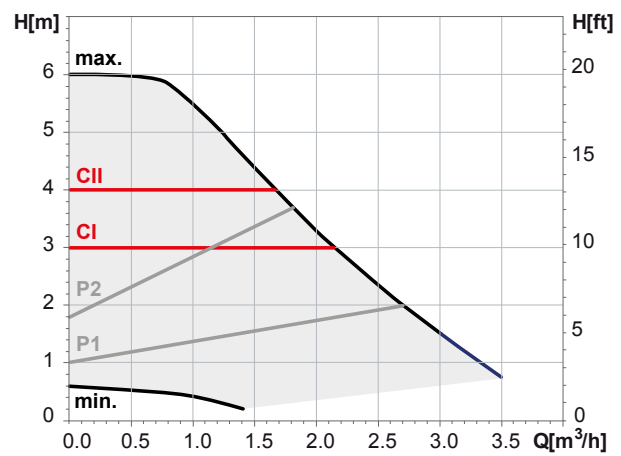
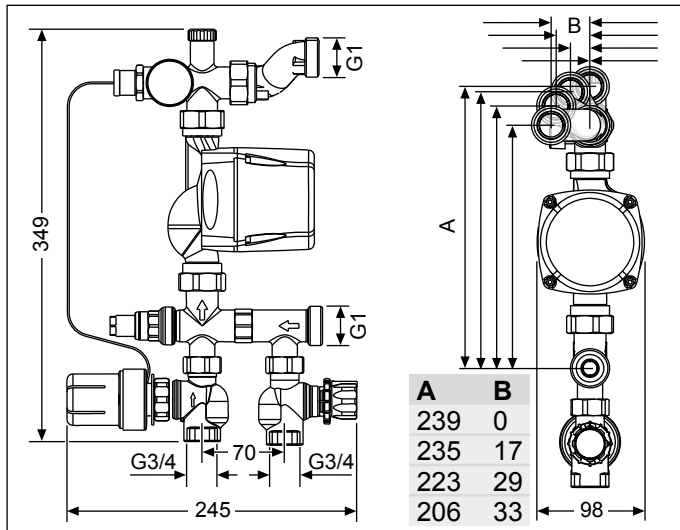
Technical data:

Temperature	
Primary	20–90°C
Secondary	20–55°C
p max	6 bar
Pump	
U	230 V, 50 Hz
Q	2.7 m <sup>3</sup> /h
H	6 mWs
P	8.4 ... 53 W
Glycol	Max. 40 vol%
Valves	
Return valve	kvs 2.7 m <sup>3</sup> /h
Thermostatic valve	kvs 4.0 m <sup>3</sup> /h

The pre-mounted and electronically-controlled circulating pump **ES 15-60** is fitted with a permanent magnet synchronous motor which can be set via a simple rotary knob to the various operating modes.



Programm	LED Light
P1/P2 = $\Delta p$ variabel	green
C1/C2 = $\Delta p$ constant	orange
Min-Max	blue
Error	red
Air control	white (flashing)



## Heating circuit manifold and manifold housing

### TECEfloor manifold housings

TECEfloor manifold housings are available in different versions and dimensions and therefore offer sufficient space not only for the manifolds, but also for additional components. This means that, for example, the TECEfloor fixed value control station, heat meter and TECEfloor connection units can be neatly accommodated in a very small space.

#### Manifold housing UP 110/UP 80



Flush-mounted manifold housing in two housing depths (UP 110 and UP 80) made of galvanised sheet steel. With adjustable mounting rails to accommodate the TECEfloor stainless steel manifolds or TECEfloor plastic manifolds. Plug-in door with rotary bolt.

Removable and adjustable screed baffle plate. Adjustable frame. Door, frame and screed baffle plate powder-coated in RAL 9016 (traffic white). With lateral pre-punched pipe guides for universal manifold connection. Removable pipe return rail for easy installation of the underfloor heating pipes.

Height-adjustable from 712-842 mm.

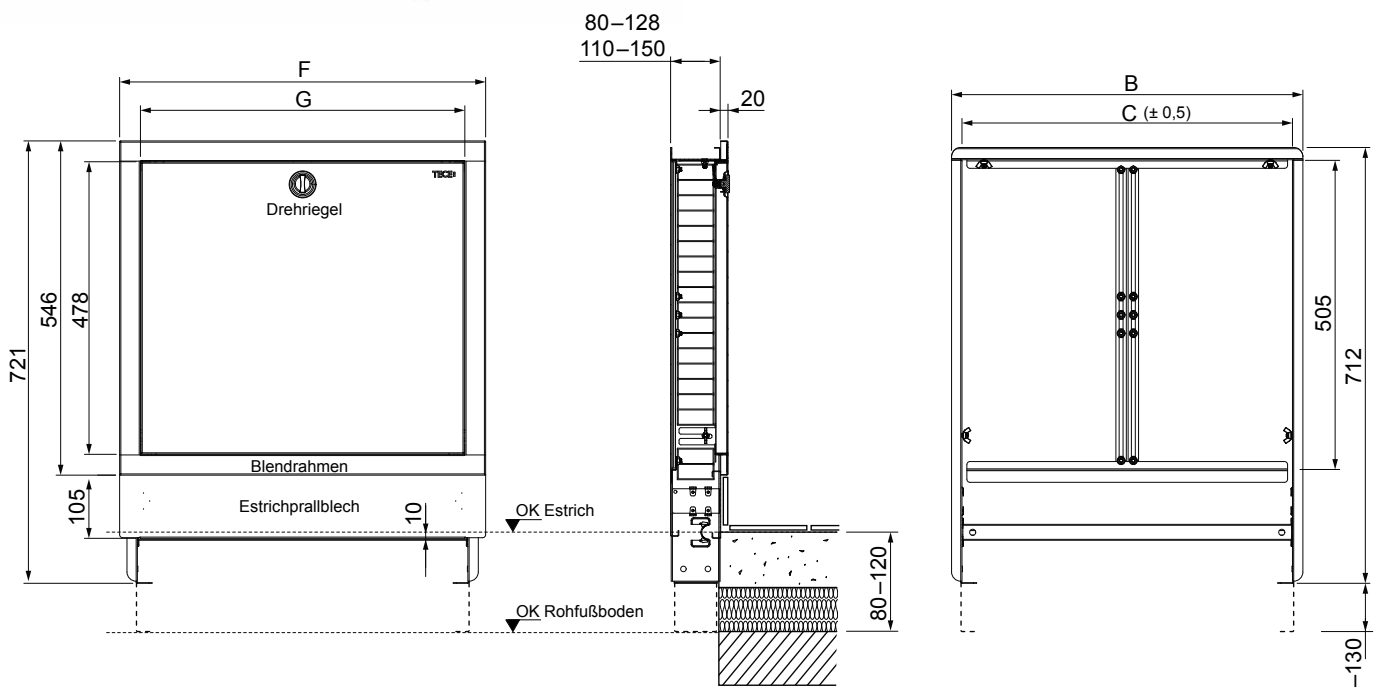
Depth-adjustable from 110-150 mm (UP 110)

or 80-120 mm (UP 80)

Width: see dimension table

Dimensions table

Type	400	600	750	900	1050	1200
B	435	574	724	874	1024	1174
C	401	540	690	840	990	1040
F	459	598	748	898	1048	1198
G	391	530	680	830	980	1130



Allocation of manifold housing - heating circuit distributor

Interior width	400	540	690	840	990	1140
Required niche width	445	585	735	885	1035	1185
No. heating circuits incl. ball valve*	2	3-5	6-8	9-11	12	-
No. heating circuits incl. corner ball valve*	-	2-4	5-7	8-10	11-12	-
No. heating circuits incl. corner heat meter set*	-	2-3	4-6	7-9	10-12	-
No. heating circuits incl. fixed value control*	-	2	3-5	6-8	9-11	12

\* Ρεχοµενόδεθ ηουσινη ωιδτη = φητινηγσ + µουντηνη διστανχη σν βοτη σιδεσ (2 Ξ ≥ approx. 50 mm) **Manifold housing AP 125**

## Heating circuit manifold and manifold housing

Wall-mounted manifold housing made of galvanised sheet steel. With adjustable mounting rails to accommodate the TECEfloor stainless steel manifolds or TECEfloor plastic manifolds. Plug-in door with rotary bolt.

Removable screed baffle plate. Door and body powder-coated in RAL 9016 (traffic white).

Removable pipe return rail for easy installation of the underfloor heating pipes.

Installation height: 620 mm

Height-adjustable from 622-752 mm.

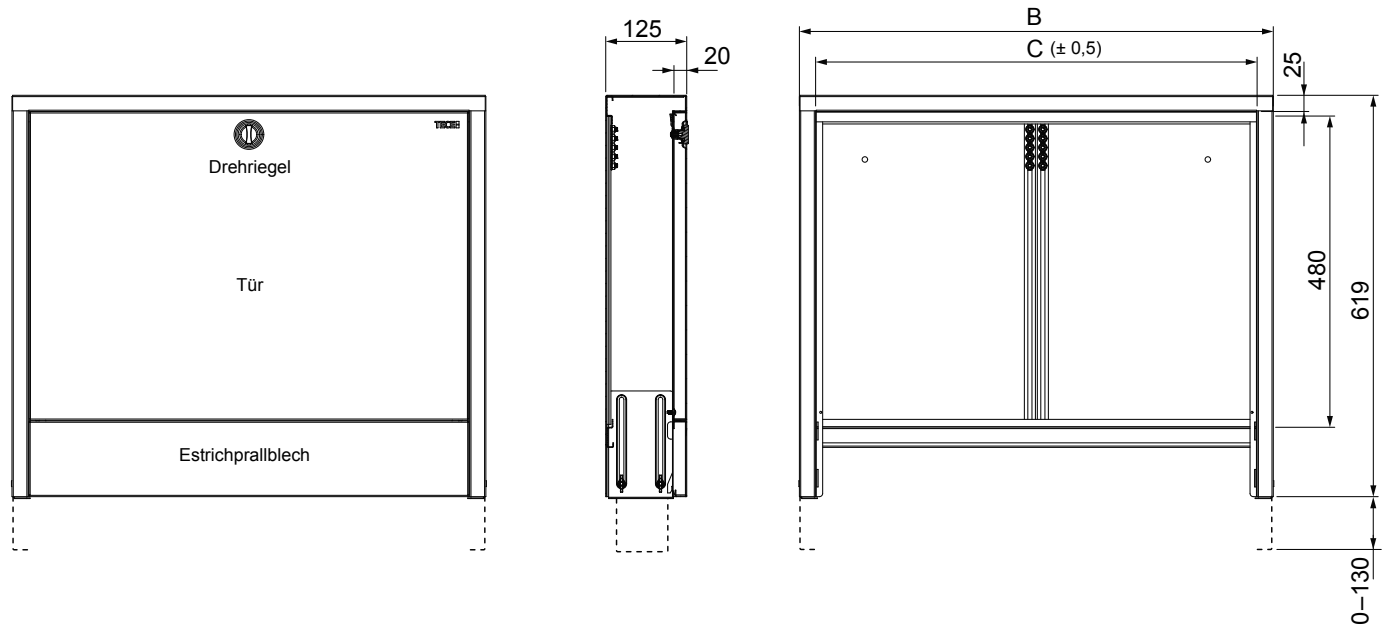
Depth: 125 mm

Width: see dimension table



Dimensions table

Type	500	730	900	1000
<b>B</b>	496	731	881	1031
<b>C</b>	446	531	831	981



Allocation of manifold housing - heating circuit distributor

Interior width	446	681	831	981
No. heating circuits incl. ball valve*	2-4	5-9	10-11	12
No. heating circuits incl. corner ball valve*	2-3	4-8	9-11	12
No. heating circuits incl. corner heat meter set*	2	3-7	8-10	11-12
No. heating circuits incl. fixed value control*	-	2-6	7-9	10-12

## Individual room controller

### Individual room controller



**Caution:** Please observe the information in the assembly instructions attached. Disconnect the wiring from the mains prior to carrying out any work.

#### System components

- TECEfloor room thermostat, analogue (24 V or 230 V, heating or heating/cooling)



- TECEfloor room thermostat LC display (24 V or 230 V, Standard or Control)



- TECEfloor connection unit (24 V or 230 V, Standard or Standard Plus)



- TECEfloor actuator (24 V or 230 V)



### TECEfloor room thermostat

TECEfloor room thermostats are high quality room temperature controls for measuring and regulating the required room temperature to achieve maximum user comfort. The room thermostat is available for operating voltages 24 V and 230 V. Easy individual room control is possible with actuators which can be directly connected. In conjunction with the TECEfloor connection unit, it is possible to create a perfectly harmonised overall system for regulating surface temperatures.

#### TECEfloor room thermostat, analogue

- Available in two versions: Heating (RT-A) and heating/cooling (RT-A HK)
- Available in a choice of 24 V or 230 V
- Flat design and small dimensions (86 x 86 x 29 mm)
- Stand alone controls or controls integrated into the system
- Set-back input for reducing the room temperature
- Target value calibration
- Limitation of the target value setting range
- Valve safeguard and frost protection function
- Changeover input (only RT-A HK)
- High-quality, modern design
- High functional safety

#### Technical data

Operating voltage:	24 V $\pm$ 20%, 50 Hz 230 V $\pm$ 10%, 50 Hz
Safety feature:	24 V: T1A 230 V: T2AH
Switching element:	24 V: Triac 230 V: Relay
Switching capacity:	24 V: 1 A ohmic load 230 V: 2 A ohmic load
Temperature setting range:	10°C - 28°C
Target value calibration:	$\pm$ 2 K
Set-back temperature:	2 K
Temperature measurement:	0 - 40°C
Measurement accuracy:	$\pm$ 0.5 K
Ambient temperature:	0 - 50°C
CE conformity in accordance with:	EN 60730
Protection class:	24 V: III 230 V: II
Degree of protection:	IP 20
Weight:	90 g
Dimensions (W x H x D):	86 x 86 x 29 mm

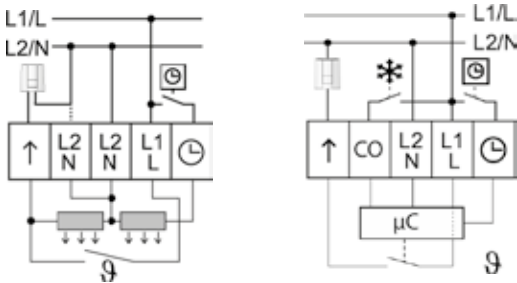
Frost protection function: From + 6°C in heating mode, not active in cooling mode.

Controller with heating/cooling function only



Valve safeguard function: Every two weeks for 6 minutes after the last actuation

## Electrical connection



RT-A wiring diagram

RT-A HK wiring diagram

- Mains connection (power supply via TECEfloor connection unit or an external voltage source)
- Set-back input (receives an external set-back signal for time-controlled lowering of the room temperature of a TECEfloor room thermostat RT-D Control, or an external system clock)
- Changeover-input (switches between heating and cooling via an external potential-free contact)
- Connection for actuators (integrated valve safeguard function)

**Note:** For the 24 V version, a 50 VA transformer is also required.

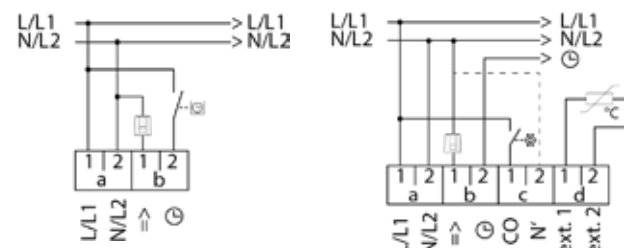
## TECEfloor room thermostat, LC display

- Available in two versions: RT-D Standard and RT-D Control
- Available in a choice of 24 V or 230 V
- Large, clearly arranged LC display (with background lighting, RT-D Control version only)
- Flat design and small dimension (86 x 86 x 31 mm)
- Stand alone controls or controls integrated into the system
- Equipment for heating and cooling systems
- Smart Start/Smart Stop function
- Configurable operating modes
- Heating and cooling mode comfort program
- Configurable set-back temperature
- Correction of actual temperature measurement
- Limitation of the target value setting range
- Valve safeguard and frost protection function
- Connection for an external temperature sensor
- Changeover input
- High-quality, modern design
- Suitable for NC and NO operation
- High functional safety

## Technical data

Operating voltage:	24 V ± 20%, 50 Hz 230 V ± 10%, 50 Hz
Safety feature:	24 V: T1A 230 V: T1AH
Switching element:	24 V: Triac 230 V: Relay
Switching capacity:	1 A ohmic load
Temperature setting range:	5 - 30°C
Terminals:	0.22 mm <sup>2</sup> to 1.5mm <sup>2</sup>
Set-back difference:	RT-D standard: 2 K RT-D control: configurable
Temperature measurement:	0 - 40°C
Ambient temperature:	0 - 50°C
CE conformity in accordance with:	EN 60730
Protection class:	24 V: III 230 V: II
Degree of protection:	IP 20
Weight:	105 g
Dimensions (W x H x D):	86 x 86 x 31 mm
Valve safeguard function:	Every two weeks for 10 minutes after the last actuation.
Frost protection function:	From +5°C in heating mode. Not active in cooling mode

## Electrical connection



RT-D standard wiring plan

RT-D control wiring plan

- Mains connection (power supply via TECEfloor connection unit or an external voltage source)
- Set-back input (RT-D standard version, receives external time signal for time-controlled lowering of the room temperature)
- Set-back output (RT-D control version, transmits the internal time signal to other components of the TECEfloor room thermostat range)
- Changeover-input (RT-D control design, switches between heating and cooling via an external signal (potential-free contact))
- Connection for actuators (integrated valve safeguard function or integrated frost protection function)
- Connection of an external sensor (monitoring of room or floor temperature and minimum floor temperature regulation)

## Individual room controller

### TECEfloor connection unit

The TECEfloor connection unit is the central base of the TECEfloor individual room controller for regulating surface temperatures of heating and cooling systems. The base can be wired to all system components such as the controller and actuators with very little effort. The system components are supplied directly via the unit's power supply. All the controller's switching commands are transmitted directly to the connected components via the TECEfloor connection unit. This high quality connection unit is available with 6 or 10 zones in 24 V or 230 V. Two designs are available to satisfy all installation requirements. Standard version for heating mode with set-back channel, or enhanced Standard Plus version with comprehensive functions for energy-efficient heating/cooling mode which protects the system.

- Available in two versions: Standard or Standard Plus,
- Version with 6 or 10 zones
- Available in a choice of 24 V or 230 V
- Up to 18 actuators can be connected
- Equipment for heating and/or cooling systems
- Easy, intuitive installation and operation
- Tried and trusted cabling, and standard-compliant tension relief
- Screwless clamping connection technology
- Clearly arranged clamping connections
- Set-back channel for time-controlled lowering of the room temperature
- Pump or boiler controller
- Fixed follow-up time for pump or boiler controller
- Connection for a temperature limiter or dew point sensor
- Control direction of actuators to be connected: NC or NO (NC: Without current / NO: With current)
- High functional safety
- Maintenance-free

#### Technical data

Operating voltage:

- Standard: 24 V  $\pm$  20%, 50 Hz  
230 V  $\pm$  10%, 50 Hz
- Standard Plus: 24 V  $\pm$  20%, 50 Hz  
230 V  $\pm$  10%, 50 Hz

Power input:  
24 V: max. 30 VA  
230 V: max. 50 VA

Safety feature:  
24 V: T2A  
230 V: T4AH

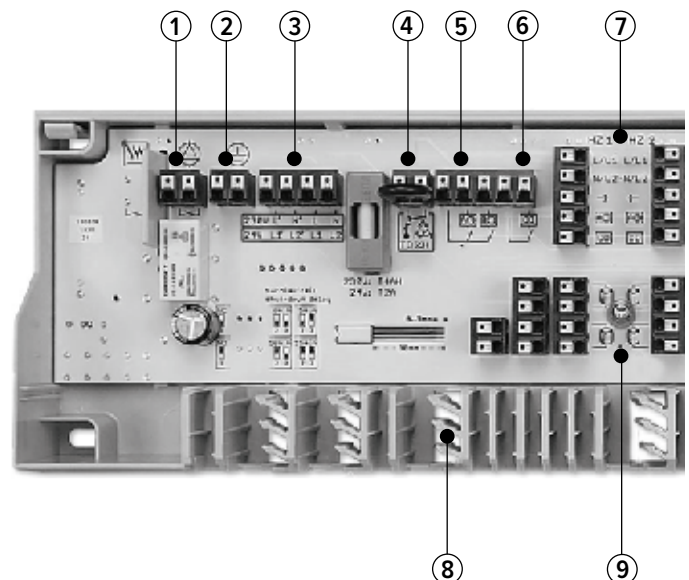
Number of heating zones: 6 or 10

Actuators to be connected:

- Type NC or NO

	24 V or 230 V
- 6 heating areas:	max. 15 to 2 W (230 V) max. 12 to 2 W (24 V)
- 10 heating areas:	max. 18 to 2 W (230 V) max. 12 to 2 W (24 V)
- Nominal load of all actuators:	max. 24 W (at 24 V) max. 36 W (at 230 V)
Control direction:	NC or NO (Standard) NC (Standard Plus)
Ambient temperature:	0 to +50°C
Protection class:	24 V: III 230 V: II
Protection class:	IP 20

### Electrical connection



TECEfloor connection unit (Standard Plus)

1. Pump controller\* (pump control via a potential-free contact)
2. Protective conductor adapter\* (clamp for the intermediate connection of the protective conductor of an electrical consumer such as a boiler or pump (230V version only))
3. Power supply/mains feed-through clamp (mains connection of TECEfloor connection unit, mains feed-through clamp for connecting an electrical consumer such as a pump or boiler (230 V version only), mains feed-through clamp for connecting a dew point sensor (24 V version only))
4. Temperature limiter/dew point sensor\*
5. Set-back channel — connection for an external system clock (transmission of up to two timer signals for time-controlled lowering of the room temperature to a connected controller via a potential-free contact. Alternatively, up to two TECEfloor RT-D Control room thermostats (point 7) can be used as a timer.
6. Changeover heating/cooling\* switching of entire individual room controller between heating and cooling, transmission of an external signal via a potential-free contact, transmission of change-over signal to a connected controller
7. Connection for controller (power supply for connected controller)
8. Cabling and tension relief (integrated cabling and tension relief in accordance with DIN EN 60730)
9. Connection for actuators (power supply for connected actuators)  
Standard Plus only

## TECEfloor radio-controlled unit for individual room control



Caution: Please observe the information in the assembly instructions attached. Disconnect the wiring from the mains prior to carrying out any work.

### System components

- TECEfloor radio-controlled room thermostat, analogue (RTF-A)



- TECEfloor radio-controlled room thermostat LC display (RTF-D)



- TECEfloor radio base unit including transformer, 24 V



- TECEfloor actuator (24 V or 230 V)



## TECEfloor room radio thermostats

TECEfloor room radio thermostats, analogue (RTF-A) with LC display (RTF-D) are high quality room temperature controls for measuring and regulating the required room temperature to achieve maximum user comfort.

On the RTF-A, the required room temperature in the allocated heating zone can be set easily by means of an easy-to-read rotary dial with soft-lock. Sliders beneath the dial are used to limit the possible setting range and perform a target value comparison.

The RTF-D also guarantees the bidirectional exchange of data with the radio base station for calling up numerous status messages and displaying them on the large, clearly arranged display. The thermostat is operated by means of a rotary dial with turn and press mechanism, soft-lock and the clearly arranged, language-neutral indicator on the high quality display.

## TECEfloor radio-controlled room thermostat, analogue

- Optimal price/performance ratio
- Patented target value comparison
- Setting range 10 to 28°C
- Reliable 868 MHz radio technology for optimum positioning without any cabling at all
- Flat design and small dimension (86 mm x 86 mm x 26 mm)
- Rotary dial with ¼ degree soft-lock
- Wall- and flush-mounted container (Germany and Switzerland)
- With limitation of the room temperature setting range to a maximum and/or minimum value

### Technical data

Power supply:	2 x LR03/AAA (Micro) Alkaline battery
Battery life:	> 2 years
Radio technology:	Radio, 868 MHz, SRD band
Temperature setting range:	10°C - 28°C
Temperature measurement:	0 - 40°C
Measurement accuracy:	±0.3 K
Ambient temperature:	0 - 50°C
Ambient humidity:	5% to 80% (non-condensing)
Protection class:	III
Degree of protection:	IP 20
Weight:	90 g
Dimensions (W x H x D):	86 x 86 x 20 (26) mm
Colour:	RAL9010 (pure white)

## Individual room controller

### TECEfloor radio-controlled room thermostat with LC display

- Flat design and small dimension (86 mm x 86 mm x 26.5 mm)
- Self-explanatory, language-neutral operation and user guidance
- Large, clearly arranged LC display (60 mm x 40 mm)
- Continuous display of room temperature, system time and operating status
- Reliable 868 MHz radio technology for optimum positioning without any cabling at all
- 3 menu levels (Lifestyle functions, Settings and Service) for greater reliability
- Limitation of the room temperature setting range
- Convenient operation with rotary dial (turn and press mechanism with dynamic soft-lock)
- Wall- and flush-mounted container (Germany and Switzerland)
- Setting range 5 to 30°C
- Optional remote sensor or integrated infra-red sensor for monitoring the floor temperature
- High-quality design version with real glass cover

#### Technical data

Power supply:	2 x LR03/AAA (Micro) Alkaline battery
Battery life:	> 2 years
Radio technology:	Radio, 868 MHz, SRD band
Temperature setting range:	5°C - 30°C
Temperature measurement:	0 - 40°C
Measurement accuracy:	±0.3 K
Ambient temperature:	0 - 50°C
Ambient humidity:	5% to 80% (non-condensing)
Protection class:	III
Degree of protection:	IP 20
Weight:	115 g
Dimensions (W x H x D):	86 x 86 x 21.5 (26.5) mm
Colour:	RAL9010 (pure white)

### TECEfloor radio base unit

The TECEfloor system radio is the intelligent individual room controller of the future, for maximum comfort and energy efficiency when regulating surface temperatures.

The TECEfloor radio base units 24 V with 4 or 8 zones are the system's intelligent regulation and connection units for processing central information and communicating with all system components. They capture and utilise a large amount of measurement data for individual, energy-ef-

icient temperature regulation in each room, achieving maximum user comfort. The 868 MHz radio technology guarantees reliable, bidirectional communication between the assigned room controllers, base stations and connected drives with minimal radio load. Even in the standard version, the highly developed system software meets all the demands of current and future systems — adaptations and updates for a technologically-changing environment can be conveniently carried out via a MicroSD card slot.

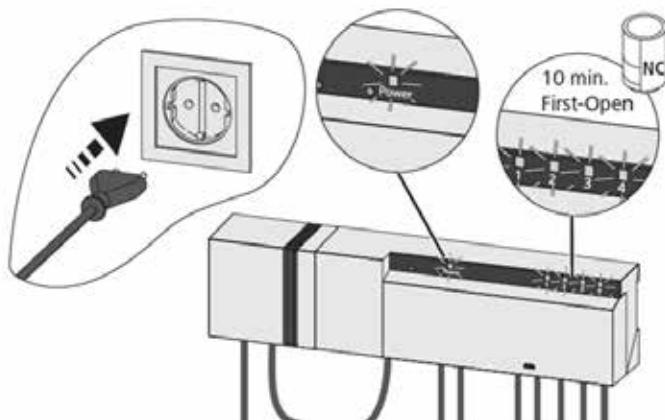
The Ethernet version is not just easily integrated into the home network and conveniently controlled via computer and/or Smartphone or over the Internet. The XML interface also enables integration into higher-level building control and home automation systems.

- High-quality, modern design
- Versions with 4 and 8 zones
- All-in-one – fully equipped for heating and/or cooling systems even in the standard version
- Coupling of up to 7 base stations via radio and or syBUS
- Automatic Plug&Play configuration even for future extensions to the system
- Easy, intuitive installation, operation and maintenance
- Connection for up to 12 x 2 W actuators (1 to 2 per zone)
- Initial state can be selected as NC or NO
- Tried and trusted cabling and tension relief
- Screwless plug/terminal connection technology
- MicroSD card slot for individual adjustments by means of MicroSD cards via an online service
- Easy to operate, program and initialise
- Perfect interaction of several base stations over Bus
- Integrated system clock
- Ethernet version only: Smart Home ready, therefore easy to integrate via XML into higher-level home automation systems
- Ethernet version only: easy to integrate into the home network
- Ethernet version only: web-based application software for convenient control via computer, Smartphone or the Internet
- Smart Start function for even more energy-efficient operation

## Technical data

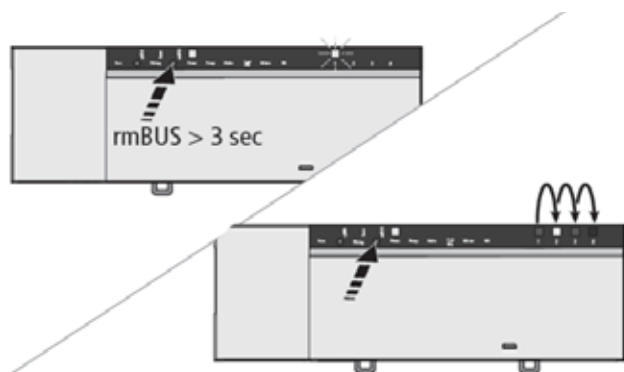
Max. number of heating zones:	4 to 8
Operating voltage:	24 V / $\pm 20\%$ / 50 Hz
Power input	0.6 W or 1.4 W
No load/with transformer:	limited
Max. power consumption (without pump):	50 W (limited by system transformer)
Safety feature:	5 x 20 mm, T2A
Protection class:	II
Degree of protection:	IP20
Radio technology:	Radio, 868 MHz, SRD band
Max. number of drives:	6 to 12
Max. nominal load of all drives:	24 W (12 x 2 W)
Control mode:	PI/2-point adjustable
Control accuracy:	$\pm 1$ K
Temperature regulation:	$\pm 0.2$ K
Perm. ambient temperature:	0 to 60°C
Perm. ambient humidity:	5 to 80% (non-condensing)
Mains connection version:	System transformer with Euro plug

## Start-up (pairing of components)

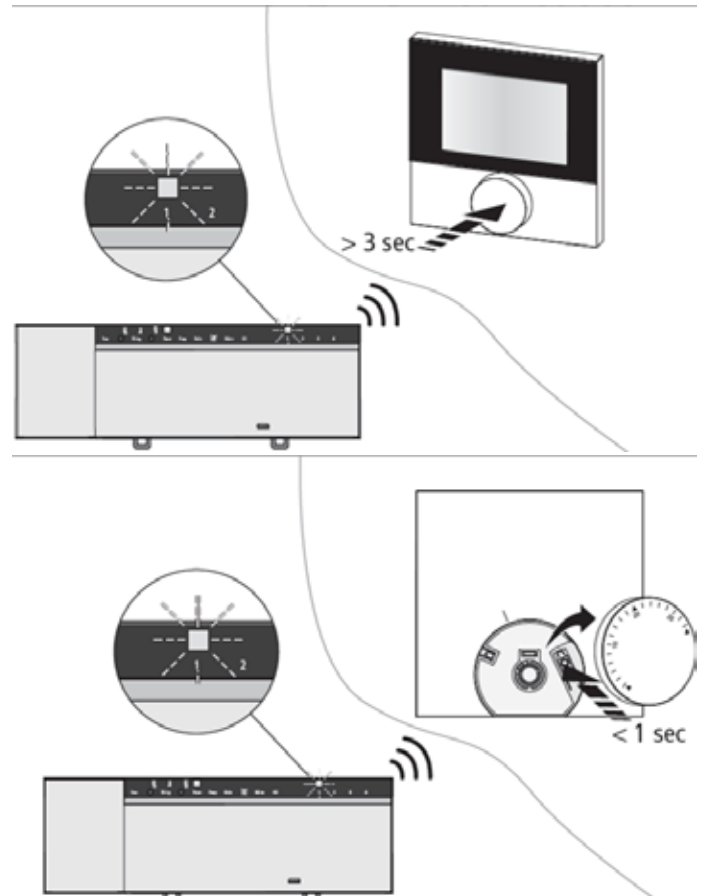


Switch on mains voltage (the base station initialises the installation mode for 30 minutes.)

If the base station is parameterised for NC drives, all heating zones are driven for 10 minutes, to unlock the First Open function of NC drives.



Activate the pairing function on the base station for the required heating zones.



Press the dial (RTF-D) or pairing button under the setpoint adjuster (RTF-A) on the room radio thermostat for a few seconds to activate the pairing function.

The base unit and room controller are connected to each other.

One room controller can be assigned to several heating zones. It is not possible to assign several room controllers to one zone.

## TECEfloor design RTL box

### TECEfloor design RTL box

TECEfloor RTL box is a high-quality room temperature control with a real glass cover and an attractive aluminium thermostat head. It is ideal for performing decentralised individual room control of floor and wall heating systems in combination with radiator heating systems. The high radiator water temperatures can be limited (via an integrated return temperature limiter) to a suitable temperature level for the underfloor heating.

With its compact design, it is not only up to 60% smaller than standard RTL boxes, but is also pleasing with its sophisticated depth adjustment which ensures that its appearance never changes. This makes it the first RTL box to offer the option of installation at standard switch height. Operation at floor level is a thing of the past.



TECEfloor design RTL box

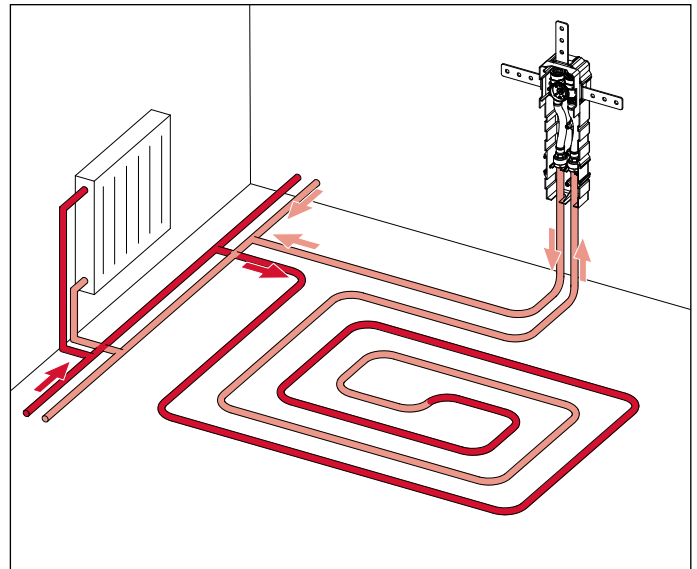
- Real glass cover in white or black
- Anodised aluminium thermostat head
- Flat design and small dimension (124 x 104 x 7 mm)
- Individual room control without additional energy
- Integrated return temperature limiter
- Integrated stop and control valve
- Integrated air release
- 25 mm depth adjustment
- Minimum installation depth of just 50 mm
- Suitable for dry and brick-wall installation

### Function

From a control technology point of view, the integrated thermostat valve in the TECEfloor RTL box is a continuous proportional controller (P controller) which does not require additional energy. It does not need any electrical connection or other outside source. The change in room air temperature (controlled variable) is proportional to the change in valve stroke (correcting variable). If the room air temperature increases, e.g. due to the sun's rays, the liquid in the temperature sensor expands, affecting the corrugated sheath pipe. Via the valve spindle, this restricts the water supply in the underfloor heating circuit. If the room air temperature drops, the process is reversed. The TECEfloor RTL box is also equipped with a return temperature limiter (RTL), which prevents the set return temperature from being exceeded. The valve opens if the value falls below the set limiting value.

### Instructions for use

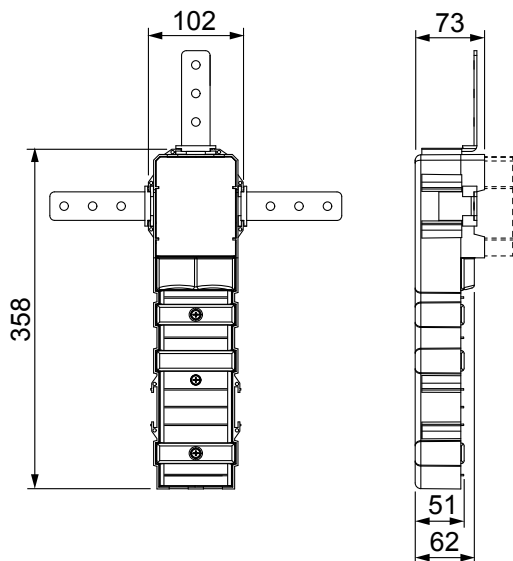
- The TECEfloor RTL box should always be installed behind the panel heating circuit, i.e. in the return direction. Observe the flow direction



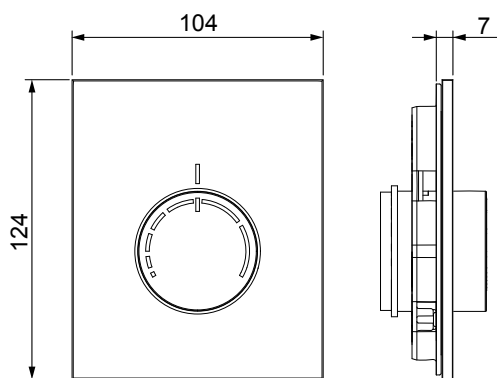
- The TECEfloor Design RTL box offers individual room control by means of an automatic thermostat and, at the same time, limits the temperature of the heating area by means of the return temperature limiter.
- Hydraulic compensation is performed at the preconfigurable valve insert. The TECEfloor Design RTL box can be operated without additional radiators if the thermal output of the radiant heating is sufficient.
- The TECEfloor Design RTL box is, depending on pipe loss, suitable for heating circuits of up to approx. 20 m<sup>2</sup> or approx. 120 m with an inner diameter of 12 mm.
- If used in combination with radiator heating, the flow temperature must not exceed 70°C so that the max.

- screed temperature of 55°C is not exceeded in the pipe area.
- The RTL box thermostat must be protected from heating by external sources. Do not install near other heat sources, e.g. additional heaters. Protect from direct sunlight. Do not install in areas where there are draughts.
- The underfloor heating pipes are connected via suitable Eurocone compression fittings.
- To ensure quiet operation of the system, the pressure difference over the valve must not exceed 0.2 bar.
- Cement and anhydrite screed must be heated in accordance with EN 1264-4.

## Dimensions



Shell set dimensions



Fine installation set dimensions

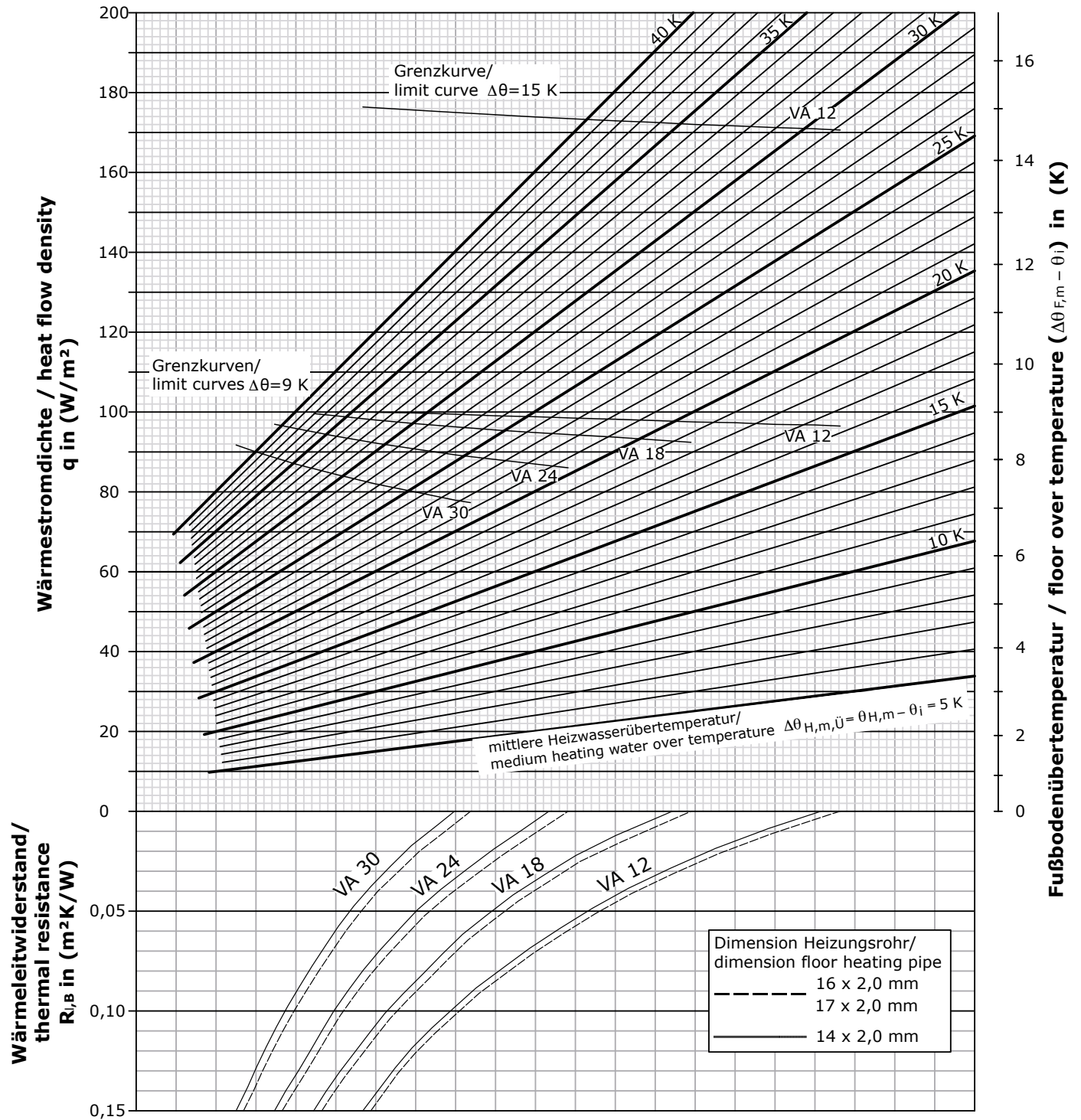
## Setting range

Return temperature limit:	1 – 4 or 20 – 48°C
(factory settings:	2.5 = 40°C)
Room temperature control:	10 – 30°C
Control valve:	1 – 4
(factory settings:	4 = fully open)

## Annex

### Heat output diagram for TECEfloor dimple system

(45 mm screed cover)



Limit curves  $\Delta\theta = 9$  K applies to living areas

- Indoor temperature  $\theta_i = 20^\circ\text{C}$  with max. surface temperature  $\theta_{F,max} = 29^\circ\text{C}$
- Indoor temperature  $\theta_i = 24^\circ\text{C}$  with max. surface temperature  $\theta_{F,max} = 33^\circ\text{C}$

Limit curves  $\Delta\theta = 15$  K applies to edge areas

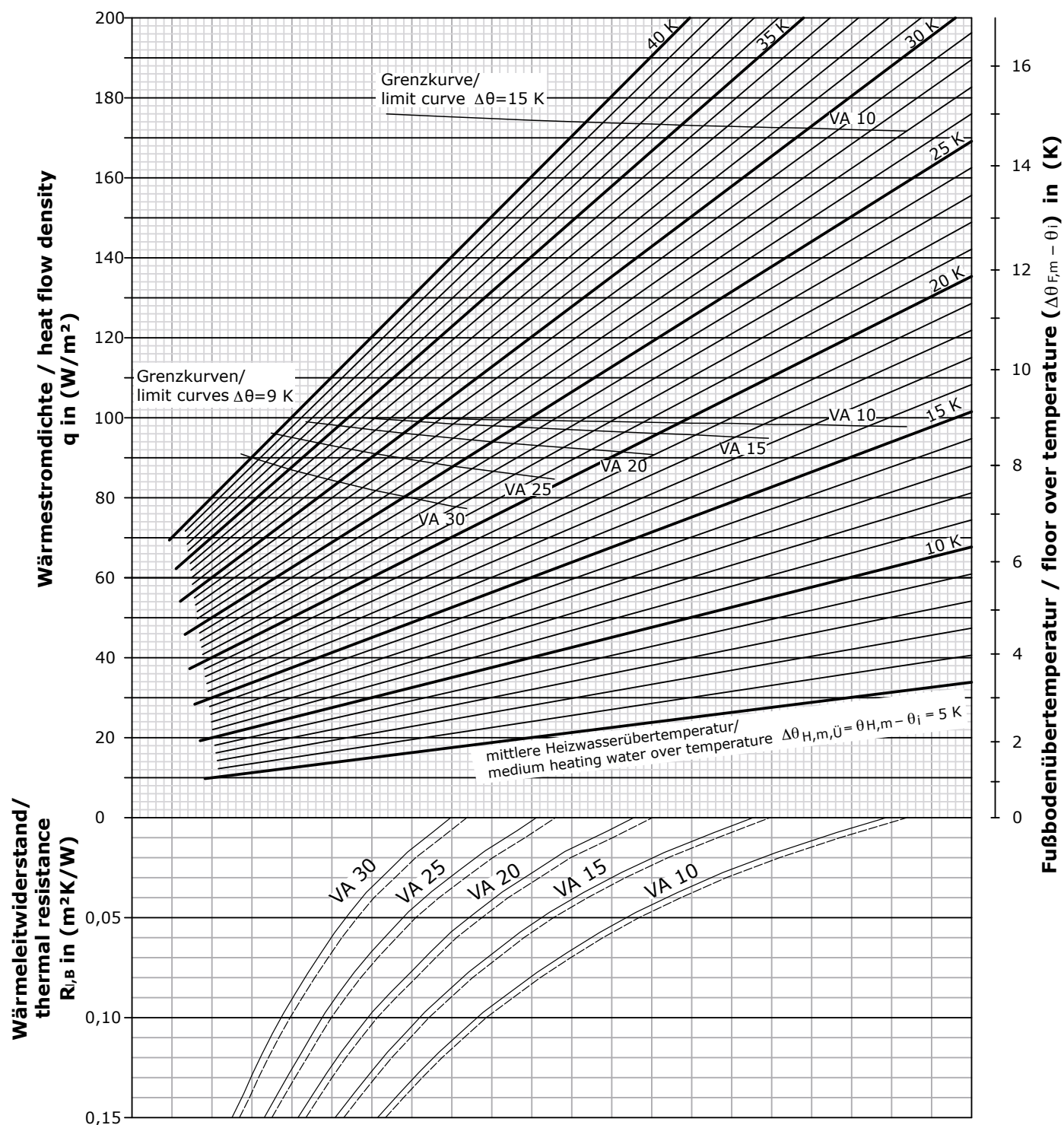
- Indoor temperature  $\theta_i = 20^\circ\text{C}$  with max. surface temperature  $\theta_{F,max} = 35^\circ\text{C}$

The limit curves must not be exceeded, i.e. the flow temperature of the design may be max. 2.5 K above the heating limit temperature.



## Heat output diagram for TECEfloor tacker system

(45 mm screed cover)



Limit curves  $\Delta\theta = 9\text{ K}$  applies to living areas

- Indoor temperature  $\theta_i = 20^\circ\text{C}$  with max. surface temperature  $\theta_{F,\text{max}} = 29^\circ\text{C}$
- Indoor temperature  $\theta_i = 24^\circ\text{C}$  with max. surface temperature  $\theta_{F,\text{max}} = 33^\circ\text{C}$

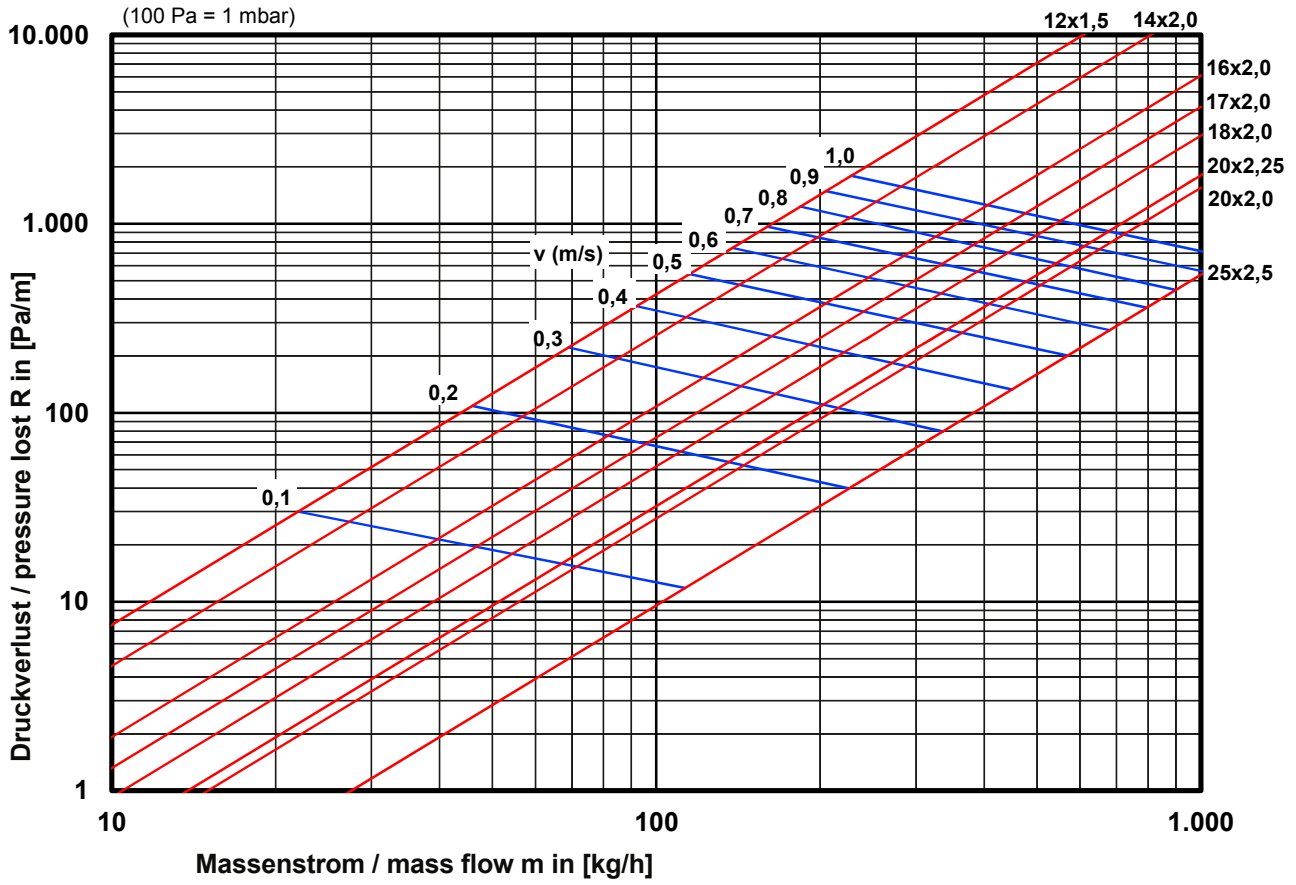
Limit curves  $\Delta\theta = 15\text{ K}$  applies to edge areas

- Indoor temperature  $\theta_i = 20^\circ\text{C}$  with max. surface temperature  $\theta_{F,\text{max}} = 35^\circ\text{C}$

The limit curves must not be exceeded, i.e. the flow temperature of the design may be max. 2.5 K above the heating limit temperature.

# Annex

## Pressure loss diagram for SLQ panel heating pipes



## Quick design table for TECEfloor dimple system (45 mm screed cover)

Flow and return temperature				35/27°C				40/30°C			
Thermal resistance	Room temperature	Spacing	Heating pipe requirement	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area
R <sub>l,B</sub>	t <sub>i</sub>	VA	L	q	t <sub>o</sub>	Dim. 14	Dim. 16	q	t <sub>o</sub>	Dim. 14	Dim. 16
m <sup>2</sup> K/W	°C	(cm)	(m)	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )
0.01	20°C	12	8.3	60	25.7	10.4	14.9	82	27.5	9.7	13.8
		18	5.6	50	24.8	13.5	19.3	69	26.4	12.4	17.6
		24	4.2	43	24.2	16.3	23.3	59	25.6	15.1	21.6
		30	3.3	37	23.7	19.5	27.9	50	24.9	18.3	26.1
	24°C	12	8.3	38	27.7	14.6	20.5	60	29.7	12.2	17.3
		18	5.6	32	27.2	18.9	26.5	50	28.8	15.8	22.3
		24	4.2	28	26.8	22.6	31.9	43	28.2	19.2	27.4
		30	3.3	23	26.4	27.9	39.6	37	27.7	23.1	32.7
0.05	20°C	12	8.3	48	24.7	12.4	17.4	65	26.1	11.5	16.3
		18	5.6	41	24.0	15.7	22.1	56	25.3	14.6	20.7
		24	4.2	36	23.6	18.7	26.6	49	24.7	17.5	24.7
		30	3.3	31	23.1	22.2	31.8	43	24.2	20.4	29.1
0.10	20°C	12	8.3	38	23.7	14.6	20.5	52	25.0	13.7	19.2
		18	5.6	34	23.4	18.0	25.4	46	24.4	16.9	23.8
		24	4.2	30	23.0	21.6	30.5	41	24.0	19.9	28.3
		30	3.3	27	22.7	24.9	35.1	37	23.7	23.1	32.7
0.15	20°C	12	8.3	32	23.2	16.6	23.3	44	24.2	15.4	21.6
		18	5.6	29	22.9	20.2	28.4	40	23.9	18.7	26.3
		24	4.2	26	22.6	24.0	33.6	36	23.6	22.1	31.0
		30	3.3	23	22.4	27.9	39.6	32	23.2	25.5	36.3

Flow and return temperature				45/35°C				50/40°C			
Thermal resistance	Room temperature	Spacing	Heating pipe requirement	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area
R <sub>l,B</sub>	t <sub>i</sub>	VA	L	q	t <sub>o</sub>	Dim. 14	Dim. 16	q	t <sub>o</sub>	Dim. 14	Dim. 16
m <sup>2</sup> K/W	°C	(cm)	(m)	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )
0.01	20°C	12	8.3	109	29.7	7.8	11.2	136	31.9	6.6	9.5
		18	5.6	92	28.3	9.9	14.2	115	30.2	8.3	12.1
		24	4.2	78	27.1	12.0	17.5	98	28.9	10.1	14.6
		30	3.3	67	26.2	14.4	21.0	84	27.7	12.0	17.4
	24°C	12	8.3	87	31.9	9.4	13.2	114	34.1	7.6	10.8
		18	5.6	73	30.8	11.9	16.9	96	32.7	9.5	13.9
		24	4.2	63	29.9	14.4	20.6	83	31.5	11.5	16.8
		30	3.3	54	29.2	17.4	24.9	70	30.5	13.8	20.1
0.05	20°C	12	8.3	87	27.9	9.4	13.2	108	29.7	7.9	11.3
		18	5.6	75	26.9	11.7	16.6	94	28.4	9.7	14.0
		24	4.2	65	26.1	13.9	20.2	82	27.5	11.5	16.8
		30	3.3	57	25.4	16.5	23.7	71	26.6	13.8	20.1
0.10	20°C	12	8.3	70	26.6	10.9	15.5	87	27.9	9.4	13.2
		18	5.6	62	25.8	13.5	19.1	77	27.0	11.3	16.4
		24	4.2	55	25.2	15.8	22.8	68	26.3	13.4	19.4
		30	3.3	49	24.7	18.6	26.4	61	25.8	15.6	22.5
0.15	20°C	12	8.3	59	25.6	12.5	17.5	74	26.8	10.6	14.9
		18	5.6	53	25.1	15.1	21.4	66	26.1	12.8	18.4
		24	4.2	48	24.7	17.8	25.2	60	25.7	14.9	21.4
		30	3.3	43	24.2	20.4	29.1	53	25.0	17.4	24.9

The TECEfloor performance table enables you to quickly calculate the required spacing and max. heating circuit size.

Procedure:

1. Determine the required flow and return temperature
2. Determine the thermal resistance of the top floor covering and the indoor temperature
3. Compare the required heating output (e.g. from the heat load analysis) with the max. heat flux density
4. Required installation distance VA and max. heating circuit area (dim. 14 or dim. 16)

When laying out the system, the max. surface temperatures must be taken into account:

Living zones: 29°C / edge zones (max. 1 m): 35°C / bathrooms: 33°C

The following data has been taken into account in the performance tables:

- Screed cover over pipes: 45 mm
- Underlying room heated in the same way (insulation: R = 0.75 m<sup>2</sup>K/W)
- Max. heating circuit area at 200 mbar pressure loss (incl. 2 x 5 m connection line)

# Annex

## Quick design table for TECEfloor tacker system (45 mm screed cover)

Flow and return temperature				35/27°C				40/30°C			
Thermal resistance	Room temperature	Spacing	Heating pipe requirement	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area
R <sub>L</sub> B	t <sub>i</sub>	VA	L	q	t <sub>o</sub>	Dim. 14	Dim. 16	q	t <sub>o</sub>	Dim. 14	Dim. 16
m <sup>2</sup> K/W	°C	(cm)	(m)	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )
0.01	20°C	10	10.0	64	26.0	9.5	13.4	87	27.9	8.8	12.5
		15	6.6	56	25.4	11.7	16.7	76	27.0	11.0	15.6
		20	5.0	48	24.7	14.4	20.4	66	26.2	13.2	18.8
		25	4.0	42	24.2	16.8	24.0	58	25.5	15.5	22.3
	24°C	30	3.3	37	23.7	19.5	27.9	50	24.9	18.3	26.1
		10	10.0	41	28.0	13.1	18.4	64	30.0	11.1	15.5
		15	6.6	35	27.5	16.7	23.4	56	29.3	13.8	19.5
		20	5.0	31	27.1	19.8	28.0	48	28.7	16.8	23.8
0.05	20°C	25	4.0	27	26.7	23.5	33.3	42	28.1	19.8	28.0
		30	3.3	23	26.4	27.9	39.6	37	27.7	23.1	32.7
		10	10.0	51	24.9	11.2	15.7	69	26.4	10.5	14.8
		15	6.6	45	24.4	13.8	19.5	61	25.8	12.9	18.3
		20	5.0	40	23.9	16.4	23.4	54	25.2	15.4	21.8
0.10	20°C	25	4.0	35	23.5	19.3	27.5	48	24.7	18.0	25.5
		30	3.3	31	23.1	22.2	31.8	43	24.2	20.4	29.1
		10	10.0	40	23.9	13.4	18.7	55	25.3	12.4	17.4
		15	6.6	36	23.6	16.4	23.0	50	24.8	15.0	21.2
		20	5.0	33	23.3	19.0	26.8	45	24.3	17.6	25.0
0.15	20°C	25	4.0	30	23.0	21.8	30.8	41	23.9	20.3	28.8
		30	3.3	27	22.7	24.9	35.1	37	23.7	23.1	32.7
		10	10.0	33	23.3	15.3	21.4	46	24.4	14.0	19.6
		15	6.6	30	23.0	18.8	26.1	42	24.2	17.1	24.0
		20	5.0	28	22.8	21.4	30.0	38	23.7	20.0	28.2
0.15	20°C	25	4.0	25	22.6	25.0	35.0	35	23.5	22.8	32.0
		30	3.3	23	22.4	27.9	39.6	32	23.2	25.5	36.3

Flow and return temperature				45/35°C				50/40°C			
Thermal resistance	Room temperature	Spacing	Heating pipe requirement	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area	Max. heat flux density	Average surface temperature	Max. heating circuit area	Max. heating circuit area
R <sub>L</sub> B	t <sub>i</sub>	VA	L	q	t <sub>o</sub>	Dim. 14	Dim. 16	q	t <sub>o</sub>	Dim. 14	Dim. 16
m <sup>2</sup> K/W	°C	(cm)	(m)	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(°C)	(m <sup>2</sup> )	(m <sup>2</sup> )
0.01	20°C	10	10.0	117	30.3	7.1	10.1	145	32.7	6.0	8.6
		15	6.6	101	29.2	8.9	12.6	127	31.2	7.4	10.7
		20	5.0	88	28.0	10.6	15.2	110	29.8	8.8	12.8
		25	4.0	77	27.1	12.3	18.0	96	28.7	10.3	15.0
	24°C	30	3.3	67	26.3	14.4	21.0	84	27.7	12.0	17.4
		10	10.0	93	32.4	8.4	11.9	122	34.8	6.8	9.7
		15	6.6	81	31.5	10.5	14.9	107	33.6	8.4	12.0
		20	5.0	70	30.6	12.6	18.0	93	32.4	10.0	14.6
0.05	20°C	25	4.0	62	29.8	14.8	21.0	81	31.4	11.8	17.3
		30	3.3	53	29.1	17.4	24.9	70	30.5	13.8	20.1
		10	10.0	92	28.3	8.5	12.0	115	30.2	7.2	10.2
		15	6.6	81	27.5	10.5	14.9	102	29.1	8.7	12.6
		20	5.0	72	26.7	12.4	17.6	90	28.1	10.4	15.0
0.10	20°C	25	4.0	64	26.0	14.3	20.5	80	27.3	12.0	17.3
		30	3.3	57	25.4	16.5	23.7	71	26.6	13.8	20.1
		10	10.0	73	26.8	10.1	14.2	92	28.3	8.5	12.0
		15	6.6	66	26.2	12.2	17.3	83	27.6	10.2	14.7
		20	5.0	60	25.7	14.2	20.2	75	26.9	12.0	17.2
0.15	20°C	25	4.0	54	25.2	16.3	23.5	67	26.3	13.8	20.0
		30	3.3	49	24.7	18.6	26.4	61	25.8	15.6	22.5
		10	10.0	61	25.8	11.5	16.1	76	27.0	9.8	13.7
		15	6.6	56	25.3	13.8	19.5	69	26.5	11.9	16.8
		20	5.0	51	24.9	16.0	22.8	63	26.0	13.6	19.6
0.15	20°C	25	4.0	47	24.5	18.3	26.0	58	25.5	15.5	22.3
		30	3.3	43	24.2	20.4	29.1	53	25.1	17.4	24.9

**Example: TECEfloor quick laying**

Construction project: Example house

TECEfloor laying system: Tacker panel 30-2

Flow and return temperature: 40/30°C

TECEfloor pipe: PE-Xc 14 x 2.0 mm

1	Name of room		Office	Bedroom	Kitchen	Living room	Bath-room	Toilet	Hall	Σ
2	Room number		1	3	4	5	6	7	8	
4	Standard indoor temperature	°C	20	20	20	20	24	20	20	
5	Room area	m <sup>2</sup>	14.5	20.0	12.5	34.0	8.0	3.0	10.5	102.5
6	Floor area to be heated	m <sup>2</sup>	14.5	20.0	12.5	34.0	6.2	3.0	10.5	100.7
7	Heating load (according to DIN 12831)	W	754	960	700	1496	608	195	546	5259
8	Required heat flux density	W/m <sup>2</sup>	50.0	48.0	56.0	44.0	98.0	65.0	52.0	
9	Floor covering resistance	m <sup>2</sup> K/W	0.1	0.1	0.01	0.1	0.01	0.01	0.05	
10	Spacing	cm	15	15	20	20	10	20	20	
11	Max. heat flux density	W/m <sup>2</sup>	50	50	66	45	64	66	54	
12	Average surface temperature	°C	24.8	24.8	26.2	24.3	30.0	26.2	25.2	
13	Max. heating circuit area	m <sup>2</sup>	15.0	15.0	13.2	17.6	11.1	13.2	15.4	
14	Number of floor heating circuits	m	1	2	1	2	1	1	1	9+1
15	Length of pipe per heating circuit	m	97	67	63	85	62	15	53	592
16	Connection line per heating circuit	m	10	16	6	12	12	8	2	94
17	Heat flow per heating circuit (↑ and ↓)	W	880	655	844	939	521	329	623	6385
18	Mass flow per heating circuit	l/min	1.3	0.9	1.2	1.3	0.7	0.5	0.9	9.1

Note:

1. Areas underneath baths and shower trays are left out.
2. In bathrooms, there is a residual heating load of approx. 211 W (64 W/m<sup>2</sup> × 6.2 m<sup>2</sup> = 397 W - 608 W = 211 W).
3. The residual heating load in the bathroom is covered by the additional bathroom radiator. Provide an additional manifold outlet.
4. Connection lines may need to be insulated to protect them from too high levels of heat dissipation.

**List of materials:**

	Amount		Order amount		Delivery units	
TECEfloor tacker panel 30-2	102.5	m <sup>2</sup>	110	m <sup>2</sup>	10	m <sup>2</sup>
TECEfloor tacking pins	2058	pc.	2200	pc.	200	pc.
TECEfloor adhesive tape	3	pc.	3	pc.	1	pc.
TECEfloor pipe 14 x 2	686	m	900	m	300/600	m
TECEfloor stainless steel manifold HCM 10	1	pc.	1	pc.	1	pc.
TECEfloor manifold housing UP 110-5	1	pc.	1	pc.	1	pc.
TECEfloor compression fitting 14 x 2	20	pc.	20	pc.	10	pc.
TECEfloor corner ball valve 1"	1	Set	1	Set	1	Set
TECEfloor edge insulation strip	120	m	200	m	100	m
TECEfloor movement joint profile	15	m	18	m	18	m
TECEfloor pipe joint protection	10	m	12	m	12	m
TECEfloor pipe bend guides	20	pc.	25	pc.	25	pc.
TECEfloor terminal strip	2	pc.	2	pc.	1	pc.
TECEfloor actuator	9	pc.	9	pc.	1	pc.
TECEfloor room thermostat	7	pc.	7	pc.	1	pc.
TECEfloor screed additive	18.5	kg	20	kg	10	kg
Additional notes						

## Annex

### Functional heating protocol for TECE panel heating

According to DIN EN 1264 part 4, anhydrite and cement screed should be heated before installing floor coverings. For cement screed, this should be done 21 days at the earliest, and for anhydrite screed, 7 days at the earliest (according to the manufacturer's instructions) after the screed work has been completed.

Note: Reductions to the above-mentioned drying times and/or any changes to the heating sequence described below (temperature, number and duration of heating steps) require written approval by the screed manufacturer and/or the screed layer before commencing the heating phase.

Construction project: \_\_\_\_\_

Heating installation company: \_\_\_\_\_

Screed laying company: \_\_\_\_\_

TECE laying system: \_\_\_\_\_

TECE pipe (type/nominal dimension/spacing): \_\_\_\_\_

Screed type:  Cement screed \_\_\_\_\_ cm thick  Anhydrite screed \_\_\_\_\_ cm thick

Date of screed application: \_\_\_\_\_

Outdoor temperature before start of functional heating: \_\_\_\_\_

Room temperature before start of functional heating: \_\_\_\_\_

#### 1. Start flow temperature of 20–25°C set and maintained constantly for 3 days:

Started on: \_\_\_\_\_ Ended on: \_\_\_\_\_

#### 2. Max. available layout temperature set and maintained for at least 4 days (not reduced at night time):

Started on: \_\_\_\_\_ Ended on: \_\_\_\_\_

Functional heating performed flawlessly:  Yes  No

Heating interrupted on: \_\_\_\_\_

Identified defects: \_\_\_\_\_

\_\_\_\_\_  
Place, date

\_\_\_\_\_  
Place, date

\_\_\_\_\_  
Client/representative  
(Signature)

\_\_\_\_\_  
Contractor/Installer  
(Stamp/signature)

Note: After completion of the functional heating process, it cannot be guaranteed that the screed has reached the degree of humidity required to create suitable conditions for laying the floor covering. Therefore, the suitability of the screed for laying the floor covering must be checked by the floor layer.

## Pressure test protocol for TECE underfloor heating

Construction project: \_\_\_\_\_

Heating installation company: \_\_\_\_\_

### 1. System data

Heat source type and output: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Installation site: \_\_\_\_\_

max. operating pressure: \_\_\_\_\_ max. operating temperature: \_\_\_\_\_

### 2. Pressure test

- |  | completed                |
|--|--------------------------|
| a. Close ball valve on manifold  | <input type="checkbox"/> |
| b. Fill and purge each heating circuit, one after the other  | <input type="checkbox"/> |
| c. Vent air from the system  | <input type="checkbox"/> |
| d. Apply the test pressure: The test pressure must be twice as high as the operating pressure but at least 6 bar (according to DIN EN 1264 part 4)   | <input type="checkbox"/> |
| e. Apply pressure again after 2 hours as a drop in pressure may occur due to pipe expansion  | <input type="checkbox"/> |
| f. Test time: 12 hours   | <input type="checkbox"/> |
| g. The pressure test is passed if water does not leak at any point in the pipeline and the test pressure has not dropped more than 0.1 bar per hour. | <input type="checkbox"/> |

Note: During laying of screed, the max. operating pressure must be maintained so that any leaks can be detected immediately.

### 3. Certification

The pressure test was performed correctly. No leaks were detected during the test, and none of the components permanently changed shape.

\_\_\_\_\_  
Place, date

\_\_\_\_\_  
Place, date

\_\_\_\_\_  
Client/representative  
(Signature)

\_\_\_\_\_  
Contractor/Installer  
(Stamp/signature)

