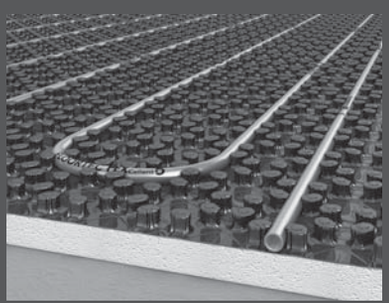
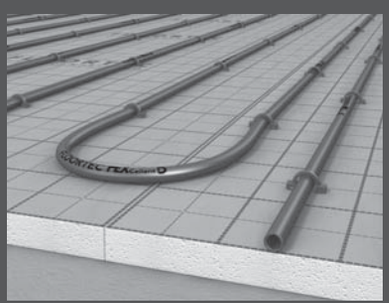
Contents

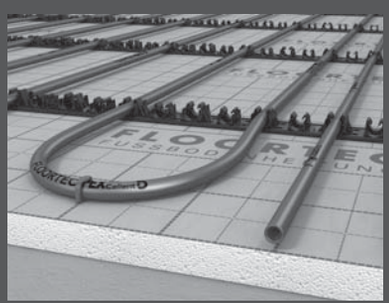
General information



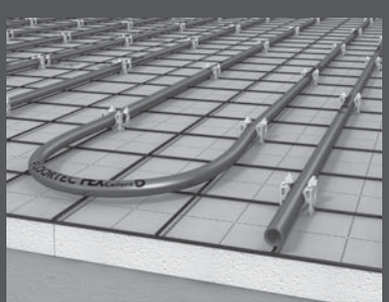
Preformed plate system UNI



Stapler system



Rail-mounting system



Grid mat system

Dry system

Attention:
The dry system is short-term not available for all markets, because of necessary certifications.

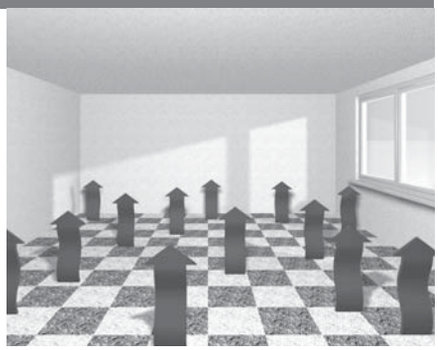
Outputs

Tender offer documents are available to download at **www.vogelundnoot.com/download**

Information to assist decision-making/benefits offered by the system

All benefits offered by FLOORTEC surface heating at a glance:

- Comfort thanks to gentle radiated heat
- A healthy level of heat and no nuisance from dust
- Safety thanks to the highest quality raw materials and workmanship
- Economical thanks to low temperature and short installation times
- Independent of the layout of the building and rooms



Modern heating systems have considerably higher requirements to fulfil today than they did a few years ago: convenience, comfort energy-savings, low environmental impact and futuristic technology have become key concepts, including when it comes to choosing the right heating system.
The FLOORTEC Underfloor heating systems fulfil these expectations, because this is where you demand functional perfection:

A comfortable level of heat is evenly spread across the entire floor, the heat distribution in the room is optimal and energy is conserved.
Thanks to the gentle, comfortable radiated heat provided by the FLOORTEC surface heating system, it is now possible to reduce room temperature by 1 to 2 K, without sacrificing comfort. As a result, you could make additional energy savings of 6 to 12%.
The highly developed technology of components designed to work in harmony ensures safety, a long service life and cost-effectiveness.

The hot water-based surface heating system offers two significant benefits:
1. The extremely low floor surface temperatures prevent burning of dust and dust flurries (see image) due to the high proportion of radiated heat.
2. There are no temperature-dependent air draughts in the case of hot water-based surface heating and the proportion of convection is relatively small.

Studies have shown that Underfloor heating systems not only keep dust flurries to a minimum, but also minimise the growth of mites. This means that neither are the mucous membranes of the nose irritated, nor are any allergic reactions triggered. The gentle heat of the floor removes moisture from the carpet and therefore removes the means of subsistence for bacteria and microbes.

Comfort

Heated surface heating structures provide a comfortable living climate while making economical use of the energy supplied. In order to fulfil the requirements of functionality and living comfort, a number of aspects must be taken into account when planning and manufacturing these components. In accordance with ÖNORM EN 1264, the limit values for surface temperatures of Underfloor heating systems have been set as follows:

- + 29 °C for sleeping areas, living areas and office spaces
- + 33 °C for the bathroom
- + 35 °C for peripheral areas with large glazed surface areas

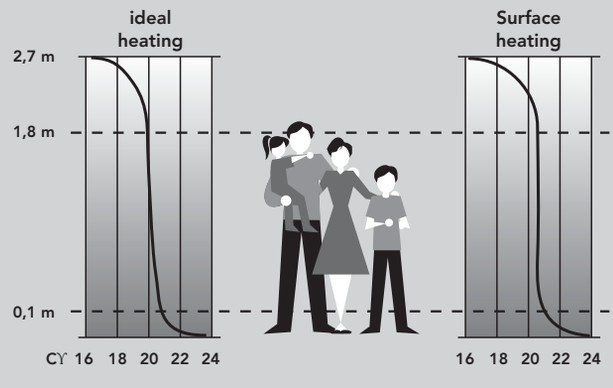
These temperatures are only reached on very few days of the year, however. With Underfloor heating systems, the even distribution of the surface temperature of a floor is essentially determined by the following:

- The spacing of the heating pipes
- The mean temperature of the hot water
- The thermal resistance of the floor covering used

The comfort level experienced by humans is determined by the following climate factors:

- Ambient temperature
- Air humidity
- Air speed
- Temperature of the surfaces enclosing a space
- Temperature distribution in the room

The image below makes it easy to see that the temperature distribution achieved by the surface heating system is practically identical with the ideal temperature gradient from the perspective of physiological perception of heat.



Standards and regulations

In the interests of ensuring a long-lasting and cost-effective system solution, the components of a heating system are subject to a whole series of DIN standards, regulations, guidelines and laws. During the project planning and implementation of a surface heating system, the building planner or the contractor is responsible for correctly selecting and sizing the insulating layers (system panels) in accordance with the statutory regulations and standards, particularly with regard to the construction of heated flooring.

The following DIN/ÖNORM standards and regulations must be observed when planning and installing a surface heating system:

• **DIN 1055**	Actions on structures
• **DIN 4102**	Fire behaviour of building materials and components
• **DIN 4108/ ÖNORM B8110**	Thermal protection and energy economy in buildings
• **DIN 4109**	Sound insulation in buildings
• **DIN 4726**	Warm water Underfloor heating systems and radiator connecting systems - Plastics piping systems and multilayer piping systems
• **ÖNORM EN 1264–1 bis 4**	Surface heating, systems and components
• **DIN 18161**	Cork products as insulating building materials
• **DIN 18164**	Cellular plastics as insulating building materials
• **DIN 18165**	Fibrous insulation materials for building
• **DIN 18195**	Waterproofing of buildings
• **DIN 18202**	Tolerances in building construction
• **DIN 18336**	Waterproofing
• **DIN 18352**	Wall and floor tiling
• **DIN 18353**	VOB [German Construction Contract Procedures] Part C: General technical specifications in constructions contracts, Laying of floor screed
• **DIN 18356**	Floor covering works
• **DIN 18560/ ÖNORM B2232**	Floor screeds in building construction
• **EnEV**	Energy saving ordinance

The planner shall be responsible for carrying out project planning correctly and only implementing those parts that comply with the generally accepted technical regulations.

General requirements

Underfloor heating systems are primarily divided into two different types, depending on their structure. They differ in the arrangement of the heating pipes and the load distribution layer.

We distinguish between
- Wet installation systems and
- Dry installation system

The FLOORTEC floor heating systems described in this technical information brochure are wet installation systems and are used in conjunction with wet screed.
The other designs in this brochure exclusively concern variants of this type.
In both of these systems, the heating pipes are laid within the heated screed and above the insulation layer, which lies across the entire surface of a load-bearing substrate.

Determining the size of the heat insulation

It offers architects, planners and heating installers the opportunity to adjust the insulation thickness as they see fit, down to the lowest level of thermal insulation, and therefore to integrate this into the building design as a whole. The EnEV ordinance sets the accepted technical regulations as the minimum requirement for the insulation layer.
This complies with ÖNORM EN 1264 Part 4. This standard prescribes a minimum thermal resistance of insulation of $R\lambda_{insulation}$ = 1.25 m^2 K/W for floors against unheated rooms and surfaces against ground soil. For surfaces against outside air (external rated temperature from -5 °C to - 15 °C), a minimum thermal resistance of $R\lambda_{insulation}$ = 2.0 m^2 K/W is prescribed. These values are given as minimum insulation standards. The insulation that is to actually be laid is determined in accordance with the specifications of energy considerations for the entire building.
These must be recorded in an 'energy pass' in accordance with the EnEV standard. This energy pass should be given to the building services planner or the contractor as early as possible to enable them to select and determine the required insulation properties and thicknesses in good time.
The thermal resistances for the other instances in which surface heating is used are laid down in the ÖNORM EN 1264 standard.
In practice, only the thermal resistance that must be created by the insulation layer is of interest. Table 1 (see page 86) therefore lists the residual resistance of the insulation layer and the associated insulation layer cover in the case of floor heating in a floor over an unheated cellar. In this case, as per Table 1, a 15 cm-thick concrete covering is required. The thermal resistance R is determined on the basis of the required U-value in accordance with the relationship R = 1/k [m^2 K/W]:

Thermal resistance R:

$R = 1/k\ [m^2\ K/W]$

The total thermal resistance is the sum of all parts providing resistance in the floor structure:

$R_{total} = R\lambda_{insulation} + R_{floor} + R\alpha$

The resistances $R\lambda_{insulation}$ and $R\alpha$ can then only be taken into consideration if the floor heating lies on the floor over an unheated cellar or outside air. $R\alpha$ is determined with $R\alpha$ = 0.17 m^2 K/W against a cellar and $R\alpha$ = 0.04 m^2 K/W for floors against outside air in accordance with the standard. The R-values of the individual layer thicknesses are calculated according to the following formula:

R-values of layer thicknesses:

$R = d/\lambda\ [W/m^2]$

Heat and impact noise insulation

The noise insulation in a building has a significant influence on quality of living. It is therefore necessary to plan and implement special measures to insulate against impact noise.
Floating floor screed with floor heating improves the noise insulation of the floor, because it reduces the transfer of impact sound in the floor construction. The improvement of noise insulation demands a design without a sound bridge, which requires especially careful work.
The impact noise insulation must be fitted across the entire surface.
Noise-insulating materials are simultaneously used as heat insulation. It should be noted, however, that not all commercially available heat insulation materials also have noise impact insulation properties. The PST layer of FLOORTEC system panels comply with the stated technical data.

Design and installation notes

If a building is equipped with surface heating, the following points should be taken into consideration as early as the building planning stage:

- Heat insulation of the building
- Use of the various rooms
- Required construction heights
- Type of building construction
- Influence from other heat sources
- Type of heat generation

Sealing the structure

Parts of the building that rest on soil, i.e. cellar floors and ground level floors in buildings without cellars, must be sealed off from ground moisture and unpressurised water. The architect is responsible for determining such cases and the type of sealing, which is then carried out by specialist contractors.

Load-bearing substrate (sub-floor)

The sub-floor must fulfil the requirements of DIN 18560 and be sufficiently dry and rigid. The surface must not feature any significant unevenness, as stipulated in Table 3 of DIN 18202 "Tolerances in building construction". Any large pieces of dirt such as plaster and mortar residues must be cleared from the substrate, which must also be thoroughly swept, prior to installing the floor heating. If possible, the laying of pipelines or ductwork onto the sub-floor should be avoided, as cutting into system elements will result in the heat and noise impact insulation properties being diminished.

Structural requirements

In so far as wall plaster is provided, this must be applied all the way down to the sub-floor and finished in accordance with DIN 18560 Part 2, "Structural Requirements". All external doors and windows should be fully installed and openings to the buildings must be closed, at least temporarily, in order to protect the screed to be applied from damage caused by damp and extreme temperature fluctuations. Until the screed is applied, it should be ensured that no unauthorised persons are able to enter the construction site, in order to rule out any damage to the laid system. The setting out points should be clearly and visibly marked by the site management team in all rooms. All installation works should be completed and checked. The structural requirements in accordance with DIN 18560 Part 2, Section 4 must be observed.

Surface joints

Apart from at enclosing walls (expansion joints), additional surface joints are to also be provided on large or geometrically offset surfaces. The width-length ratio of individual surfaces should not exceed 1:2 (Fig. 1). It must also be ensured that structural joints are in the same positions in the screed to be laid over the top.

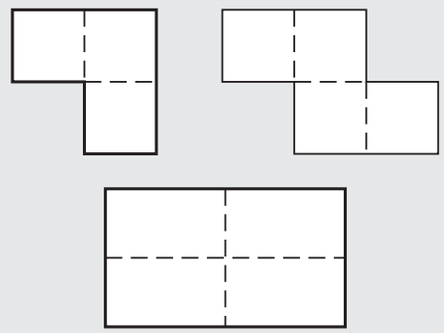


Fig. 1 surface joints

Permitted bay sizes, criteria
The size of individual bays should not exceed 40 m². If bays are square, e.g. 6.50 m x 6.50 m, thermal load will be minimal.

Expansion joints crossing heating pipes
Whenever underfloor heating screeds are used, expansion joints should only be crossed by connecting pipelines at a single level. It is absolutely essential that the arrangement of the heating pipes is coordinated with each of the screed bays. The connecting pipes that cross an expansion joint must be provided with flexible protective bushings (stapler system) or tubes (pre-formed plate system) measuring approximately 0.4 m in length (Fig. 2).

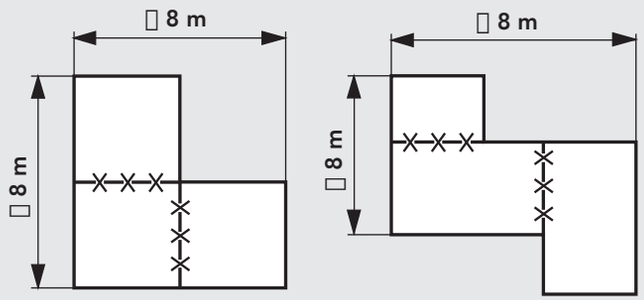


Fig. 2 bay sizes

Underfloor heating screed (Initial application)

After installing the FLOORTEC floor heating, no further works may be carried out prior to applying the underfloor heating screed onto the laid floor.

Screed strength
In the case of floor heating systems, the underfloor heating screed is applied directly onto the system elements with the pipework fixed onto it. **An additional protective film is not necessary!** The screed strengths are determined in accordance with DIN 18560 Part 2 (Table 1). The FLOORTEC system is constructed in accordance with "Bauart A1" [construction type A1].

Where screed layers are applied (ZE20/AE20), it is generally the case that pipework covering must measure at least 45 mm. In accordance with DIN 18560, the pipe covering may be reduced to at least 30 mm where screed of a higher strength class is used (subject to a performance test) (please take note of the manufacturing guidelines). Where footfall impact is greater than is usual in living areas (1.5 kN/m²), larger pipework coverings or higher screed strength classes are necessary (DIN 1055). In addition to its function of distributing impact, the underfloor heating screed also serves to transfer heat from the heating pipework to the room through the floor covering.
In order to ensure the most effective transfer of heat from the heating pipes to the screed, the heating pipe must be fully enclosed by screed.

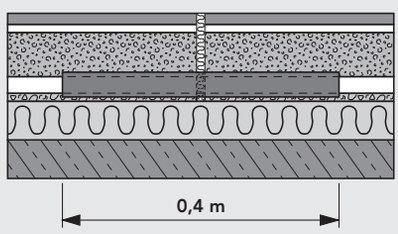


Fig. 3 Expansion joints

Screed type	Construction type	Bending tensile strength class or hardness class according to DIN EN 13813	Screed thickness in mm min.	Pipework covering in mm min.
Calcium sulphate self-levelling CAF screed	A B, C	F4 F4	40 + d 35	40
Calcium sulphate screed	A B, C	F4 F4	45 + d 45	45
Cement-based screed	A B, C	F4 F4	45 + d 45	45
Mastic asphalt screed	A B, C	IC 10 IC 10	25 + d 25	15

1) d is the external diameter of the heating element.

2) The compressibility of the insulation layer must be no more than 5 mm.

3) The total distances of the heating elements from the top and bottom surfaces of the screed layer must be at least 45 mm.

Underfloor heating screed (initial application)

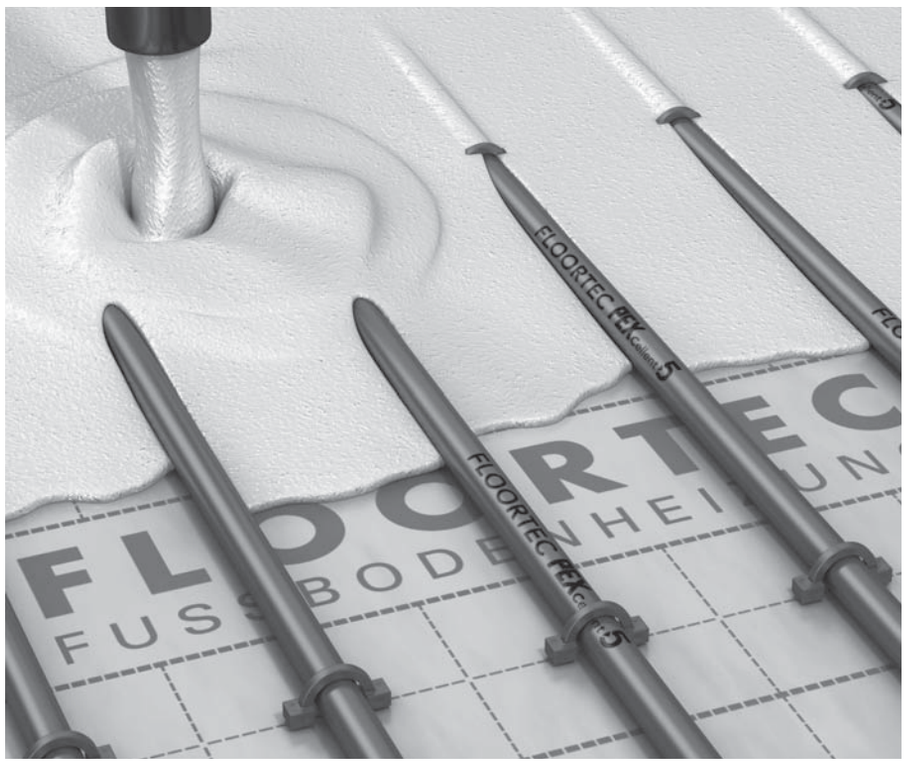
Underfloor heating screed emulsion
The addition of screed additive to cement-based screed serves to ensure the plastification of the underfloor heating screed. The additive W 200 is used for conventional cement-based screed and 45 mm-pipework covering. The recommended dose is 0.2 litres/m² depending on the screed thickness.

Reinforcement
According to DIN 18560 Part 2, the reinforcement of screed layers on insulation layers is in principle not necessary. A reinforcement is advisable however in the case of cement-based screeds applied for the purpose of laying a stone or ceramic covering. The reinforcement does not perform any static function and it cannot prevent the formation of cracks in the screed; it can only minimise the width of any cracks that may form. If reinforcement is provided in the form of steel reinforcing mesh, this must be placed in the middle third of the screed layer in accordance with DIN 18560.

Thermal load of underfloor heating screed
Due to the thermal load and heat-induced expansion of the screed layer, expansion joints must be fitted directly in connection with floor heating constructions. Expansion joints allow the adjoining areas of screed to move freely towards one another and away from one another at the point of separation, without one impeding the movement of the other.
These joints may reach widths of approximately 10 mm under certain conditions, depending on the type of expansion joint material that has been laid between the screed areas. Screed has expansion coefficients of 0.012 mm/mK. According to this, if the temperature rises due to a heated floor construction from 10 °C to 40 °C, an area of screed measuring 8 m along the edge will expand by 8 m x 0.012 mm/mK x 30K. This expansion area increased by a safety factor should be ensured around the screed in all directions. In the event of improper functioning of temperature control, particularly if the maximum limit facility of the floor heating system fails, the screed may be subject to increased thermal load and therefore greater expansion. In the case of anhydrite self-levelling screeds, the manufacturer's treatment guidelines must be followed. In general, this type of floor is not subject to a maximum bay size. If dummy joints are created in underfloor heating screed, they must be cut no deeper than a third of the thickness of the screed floor. A plan of the joints is to be created that shows the arrangement and type of joints. The plan of the joints is to be created by the site planner and must be presented to the installer as part of the technical specifications.

Heating up
Before beginning to lay the floor coverings, the screed must be heated up. In the case of cement-based screed, this must not begin any earlier than 21 days, or 7 days in the case of anhydrite self-levelling screed, after the screed works were completed. The process of heating up begins at a supply temperature of 25 °C, which is to be maintained for three days.
Then the rated supply temperature of the floor heating system is set and maintained constant for 4 days. A record is to be kept during the process of heating up; the blank form for recording details of the heating-up process is available as a download at www.vogelundnoot.com/download.

NEW!
Screed CM measurement device
Item no.: BRADDISCMSET0A0



Underfloor heating screed (initial application)

Important notes when using self-levelling screed:

- In principle, anhydrite self-levelling screed is suitable for use with FLOORTEC system elements. However, it should be noted that the installer must take care to seal off the joints along the periphery.
- In principle, no screed additive can be mixed into anhydrite self-levelling screed.
- In accordance with DIN 18560 Part 2, if the nominal thickness is being reduced in the case of anhydrite self-levelling screed, a performance test must be carried out to test load-bearing capacity.

The maximum moisture content of screed to determine when the screed is ready for a floor covering to be applied

The time when screed is ready to be covered applies in general to all heating systems when using underfloor heating screed and must be tested by the floor layer prior to laying the floor coverings.

	Top floor layer	Cement-based screed target [%]	Calcium sulphate screed target [%]
Floor covering 1	Textiles and elastic coverings	1,8	0,3
Floor covering 2	Parquet	1,8	0,3
Floor covering 3	Laminate floor	1,8	0,3
Floor covering 4	Ceramic tiling or natural/concrete stone	2,0	0,3

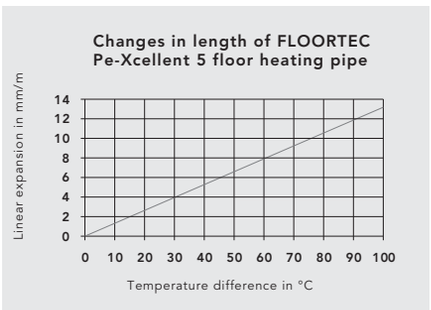
System components

Dimensions and weight

- Wall thickness: 2 mm
- Density: 938 kg/m^3
- Smallest bending radius 5 x d_a

Thermal and mechanical specifications

- Linear expansion coefficient: 1.5 x 10^{-4} [K-1]
- Thermal conductivity: 0.41 W/m^2 K
- Operating temperature: up to 90 °C
- Max. operating pressure: 8 bar]
- Surface roughness (according to Prandtl-Colebrook): ε = 0.007 mm



Pe-Xcellent 5 floor heating pipe – technical data

Technical data	Pre-formed plate UNI, rail-mounts	Pre-formed plate UNI, staplers, grid mat, rail-mounts	Staplers, rail mounts
Dimension	14 x 2	17 x 2	20 x 2
Linear expansion coefficient in mm/m x K (at room temperature)	0,15		
Thermal conductivity in W/m x K	0,41		
Max. operating temperature in °C	90		
Max. operating pressure in bar	8		
Water capacity in l/m	0,079	0,133	0,201
Bending radius in mm	5 x d_a		
Crosslinking level in %	≥60		
Oxygen permeability in g/m^3 x d	< 0,1		

Aluminium composite heating pipe – technical data

Technical data	Pre-formed plate, stapler, rail-mount, grid mat and dry system
Dimension	16 x 2
Linear expansion coefficient in mm/m x K	0,026
Thermal conductivity in m^2 K/W	0,43
Max. operating temperature in °C	90
Max. operating pressure in bar	8
Water capacity l/m	0,113
Bending radius in mm	5 x d_a

Pe-Xcellent 5 floor heating pipe

The quality of a floor heating system is determined by the quality of the heating pipe that is used:

All FLOORTEC heating pipes are characterised by:

- Excellent creep-rupture strength
- Highly resilient
- Easy to lay

The FLOORTEC safety heating pipe is available in the nominal widths 14 x 2 mm and 17 x 2 mm. Both nominal widths 14 x 2 mm and 17 x 2 mm are supplied in rolls of 200 – 600 m. The FLOORTEC roll-out device makes it easy to lay the pipe. FLOORTEC Pe-Xcellent 5 floor heating pipes (DIN 4729) are manufactured in accordance with DIN 16892 and are oxygen diffusion-tight to DIN 4726. In order to guarantee the consistently high quality of the pipe, the pipe is subject to continuous quality control during the manufacturing process.
Take account of thermal linear expansion when laying the Pe-Xcellent 5 floor heating pipes. In order to prevent greater forces being exerted on fixture points such as manifolds, the pipe should be allowed the capacity to expand. This can be achieved by means of a change of direction or expansion bends.

Installation notes for heating pipes

Attention: when choosing the pipes, please ensure that they comply with the standard and that the dimensions correspond with the nominal measurements of the threaded joint.

1. Cutting the pipe to size
Cut the pipe to be used to size using the pipe cutter, cutting at a right angle to the central axis.

2. Deburring and calibrating
Select the deburring and calibration tool suitable for the pipe dimension, insert it completely into the pipe and turn it clockwise. This calibrates and chamfers the end of the pipe in a single step. Remove any shavings from the end of the pipe after completing this step. Check the end of the pipe to ensure it is clean and fully deburred (using a rotating bezel).

3. Fit a screw nut and clamping ring
The screw nut and clamping ring are to be slid onto the end of the pipe in the correct order. In the case of metal-plastic composite pipes, ensure there is a galvanic isolation element (by means of a plastic insulating disc) between the pipe bushing and the central aluminium layer of the metal-plastic composite pipe. The bushing is then inserted (with the plastic insulating disc if applicable) into the end of the pipe until it engages.

4. Fitting the taper
The free end of the pipe is to be inserted voltage-free with the taper of the bushing into the taper of the threaded joint and screwed tight with the screw nut located on the end of the pipe.

5. Fitting the screw nut
Tighten the screw nut using an open-ended spanner, taking note of the data in the table below.
Caution: in the case of pipes that are led around a bend for connection, the end of the straight pipe after the threaded joint must measure at least 1.5 times the length of the external diameter of the pipe.
Attention: When tightening, at least until the clamping ring has engaged with the pipe, the pipe including the bushing must be pressed until it engages. If this is not done, the pipe could slip out of the connection. If necessary, provide a counterforce at the screw-on nipples or the valve.

6. Directions for watertightness testing
The watertightness test for a heating installation takes place in accordance with VOB (DIN 18380); for a bathroom installation, in accordance with DIN 1988 Part 2, paragraph 11.1.2.

thread type		M 22 x 1,5	G 3/4	G 1
angle of rotation with open-ended spanner	number of turns	1 1/4	1	1
	degrees	450°	360°	360°

Image	Model/description	m no.
	FLOORTEC calibration tool for heating pipe 16 x 2 mm	FAYTTCA1620000A0
	FLOORTEC press-fit coupling for aluminium composite heating pipe 16 x 2 mm	FAY5S16M16M200A0
	FLOORTEC crimping pliers for aluminium composite pipe 16 x 2 mm	FAYTTJPML00016A0
	FLOORTEC pipe cutter for pipe dimensions up to < 63 mm	FAYTA00CUTTER1A0

Stainless steel heating loop manifold

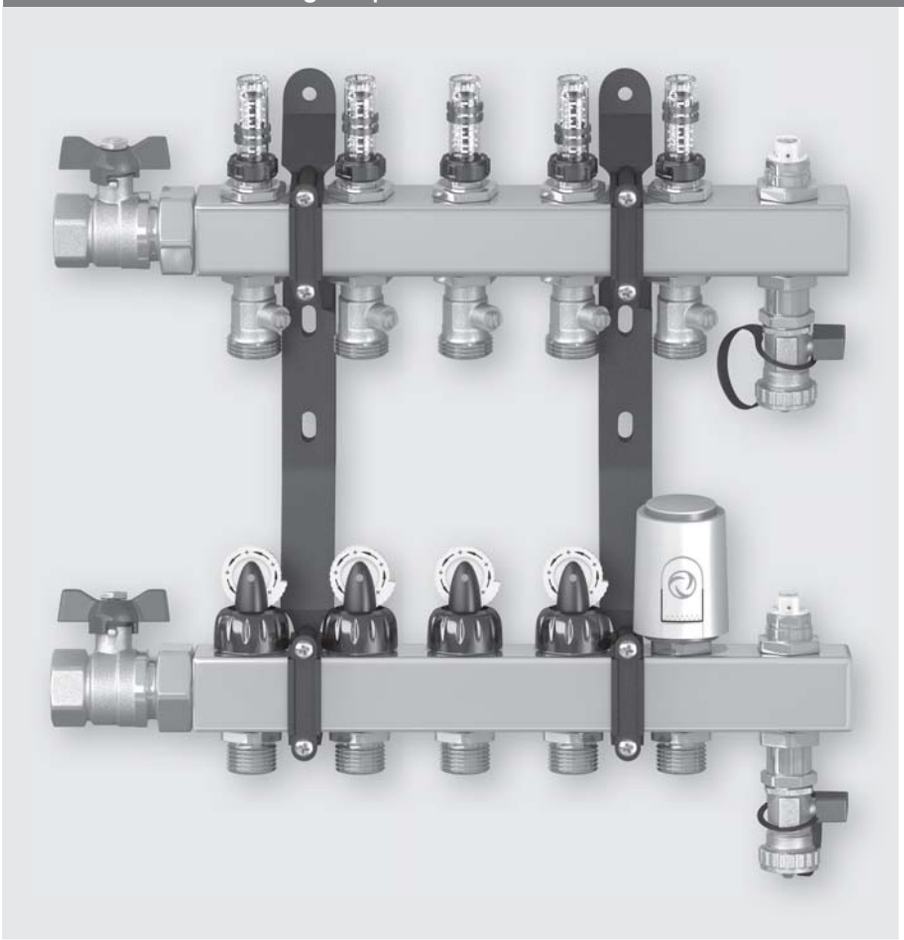


Fig. 1 Supply – built-in balancing top section

Fig. 2: Return – built-in manually adjustable valves

Floor heating loop manifold
Stainless steel EN1264-4
The modern FLOORTEC heating loop manifold systems ensure the optimum distribution of heat throughout your home.

Description
Thanks to their innovative technology, they are reliable and work according to your needs while being especially cost-effective. The new integrated shut-off facility for each heating loop enables, in a simple manner, the independent balancing and shut-off functions in accordance with the EN 1264-4 standard.
The manifold valves are ready for use with FLOORTEC adjusting drives. The manual adjustment handles make it possible to set the flow manually and reselect this easily. Different valve settings generate different flow rates. They therefore ensure the regulation of room temperature in individual rooms that is tailored precisely to the needs of your customers.
The hand-operated vents make it possible to bleed the supply and return pipe and therefore increase the operating safety level and user comfort. The floor heating loop manifolds are pre-mounted onto plastic brackets and delivered in robust, non-slip cardboard packaging. Designed for two to twelve heating loops, it fulfils every requirement when it comes to performance and a long service life. The modern FLOORTEC heating loop manifold systems ensure the optimum distribution of heat throughout the home.

Installation site
For fitting on an ascending pipe on the left or the right, or overhead

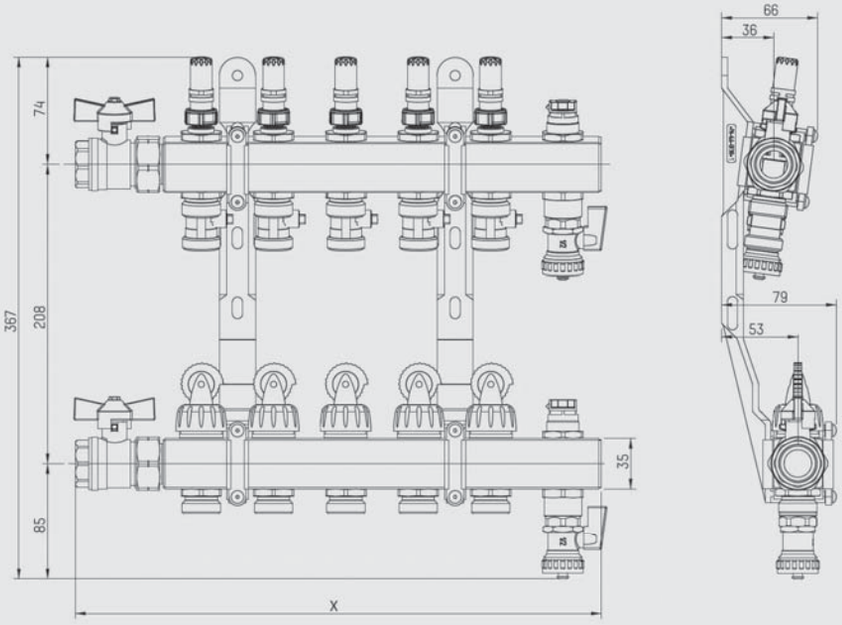
Functioning
Supply and return bars of the manifold are connected to the heating system. The threaded joints that are also available allow for easy connection of hot/cold loops to the two to twelve Euro cone outlets. The configured flow rate is set on the top meter for each circuit. It is easy to shut off the balancing valve independently using the key provided. The manual adjustment handle or room thermostat with adjusting drives provide comfort tailored to each individual room.

Building categories
- Residential buildings, family home developments, multi-family homes
- Residential homes and nursing homes
- Administrative and service buildings
- Hotels and restaurants
- Schools and gymnasiums, sports facilities
- Business and industrial buildings

Benefits
- Complies with the EN 1264-4 standard
- Lightweight, modern and robust manifold made from stainless steel
- Balancing using the tried-and-tested supply pipe top meters with red position indicator
- Ball valve for highly accurate flow setting
- Manual adjustment handle with a graduated scale printed on it, to enable the setting to be reselected
- Pre-mounted onto a plastic bracket to allow firm mounting without rattling
- 100% watertightness test

Stainless steel heating loop manifold

Stainless steel heating loop manifold



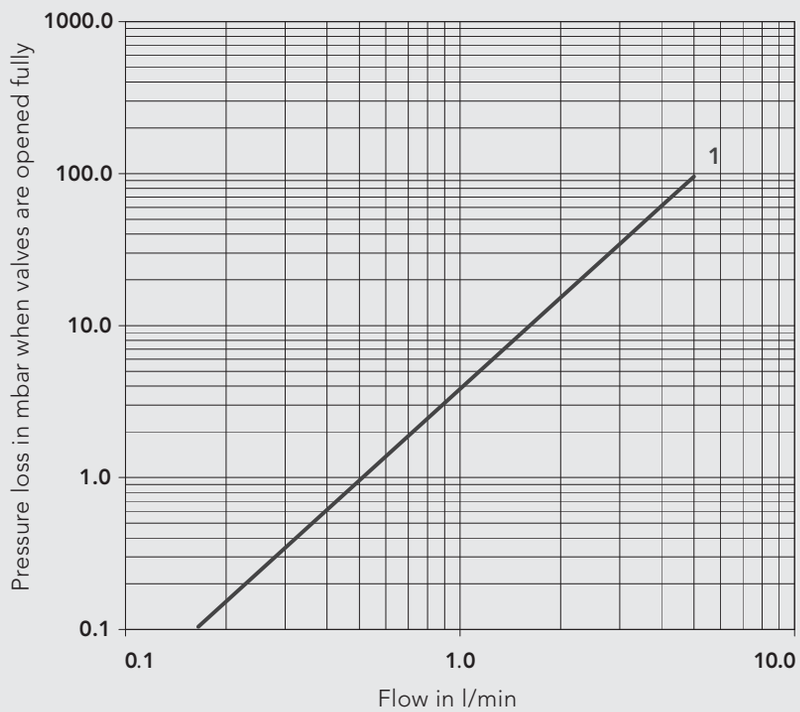
Technical data

General:
- Temperature of medium: -10 °C to +70 °C
- Max. operating pressure P_{Bmax}:
  - High end: 6 bar
  - Value: 6 bar
  Connect: 8 bar
- Display accuracy: ± 10% of display value
- K_{vs} value and measurement range according to the "pressure loss diagram"
- Heating loop connections: ¾" Euro cone

Material:
- Bar: stainless steel
- Interior: nickel-plated brass, heat-proof and impact-resistant plastics
- Seals: EPDM O-rings
- Mounting bracket: plastic, reinforced with fibre-glass

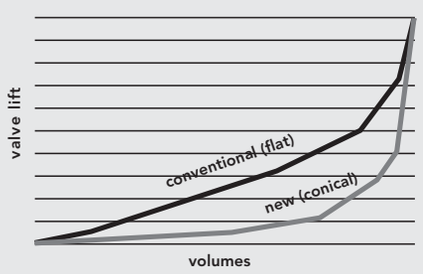
Flow media:
- Heating water (VDI 2035; SIA Guideline 384/1; ÖNORM H 5195-1)
- Cold water in accordance with DIN 1988-7

Pressure loss diagram



1 TopMeter Supply 0 – 5 l/min: k_{VS} = 0,97

valve meter forms and their effect



Stainless steel heating loop manifold

Heating loop	Length in mm	Depth in mm	Boiler connection in inches	Distance between each connecting piece to heating loop connection in mm	Item no.
2	213	79	3/4	50	FBVMSST0231324A0
3	263	79	3/4	50	FBVMSST0331324A0
4	313	79	3/4	50	FBVMSST0431324A0
5	363	79	3/4	50	FBVMSST0531324A0
6	413	79	3/4	50	FBVMSST0631324A0
7	463	79	3/4	50	FBVMSST0731324A0
8	513	79	3/4	50	FBVMSST0831324A0
9	563	79	3/4	50	FBVMSST0931324A0
10	613	79	3/4	50	FBVMSST1031324A0
11	663	79	3/4	50	FBVMSST1131324A0
12	713	79	3/4	50	FBVMSST1231324A0

Model	Function	Item no.
FLOORTEC Adjusting drive 24 V	NC	FBVAMEOA024NC2A0
FLOORTEC Adjusting drive 230 V	NC	FBVAMEOA230NC2A0

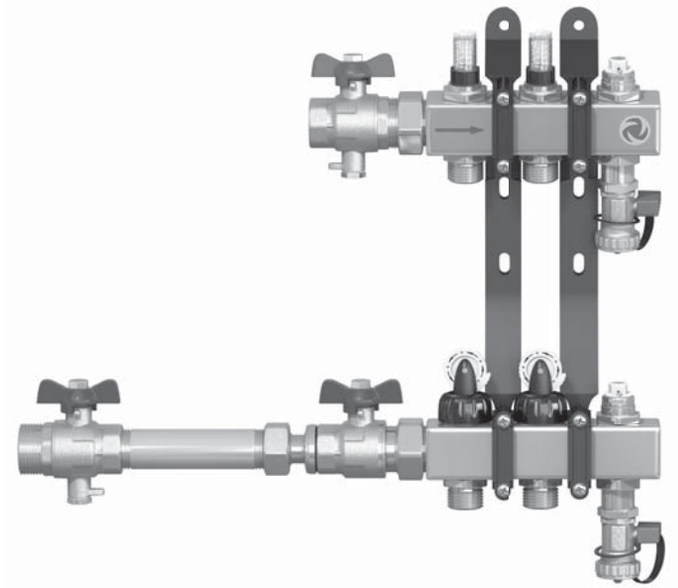
Adjusting drive for stainless steel manifolds

Any deviation from the room temperature target value triggers the adjusting drive to relay an appropriate lift movement to the valve. The controller and the adjusting drive work in accordance with the "OPEN/CLOSED" principle. Variable rhythmic opening and closing also results in virtually constant control, independently of the heating output requirements.halten.

Technical data

- Design: currentless closed (NC)
- Nominal voltage (AC): 24 V or 230 V version
- Permissible voltage deviation ± 10%
- Current peak (<150 ms): ≤ 1.5 A (24 V) / ≤ 0.3 A (230 V)
- Recommended fuse: 0.35 A inactive, in accordance with DIN 41662
- Continuous power rating (approx. 3 min): 1 W
- Opening time: approx. 3 min
- Closing time: approx. 5 min
- Nominal lift: 4 mm
- Nominal closure force: 100 N ± 7%
- Ambient temperature: 0....50 °C
- Connection cable length: 1 m
- Connection pipe: 2 x 0.75 mm^2, white PVC
- Drive protection mode IP 54
- Electrical components protection mode IP 65
- Protection class II
- Technical data comply with the applicable EN standards. The product has been given a CE conformity mark.

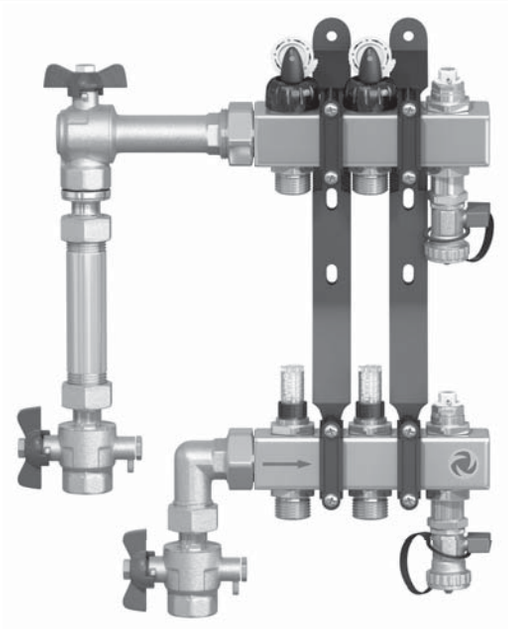
FLOORTEC horizontal heat meter UNI for use with the FLOORTEC stainless steel manifold



Item no.: BVAMONOHORUNIA0

FLOORTEC UNI vertical heat meter for use with the FLOORTEC stainless steel manifold

Attention:
When connecting to the FLOORTEC manifold, the versions with supply top meter (item no. BVMSST0231324A0-BVMSST1231324A0), the positions of the supply and return bars should be swapped around in so far as they are mounted in a manifold cabinet. This means, the supply bar should be underneath, while the return bar is above.



Item no.: BVAMONOVERUNIA0

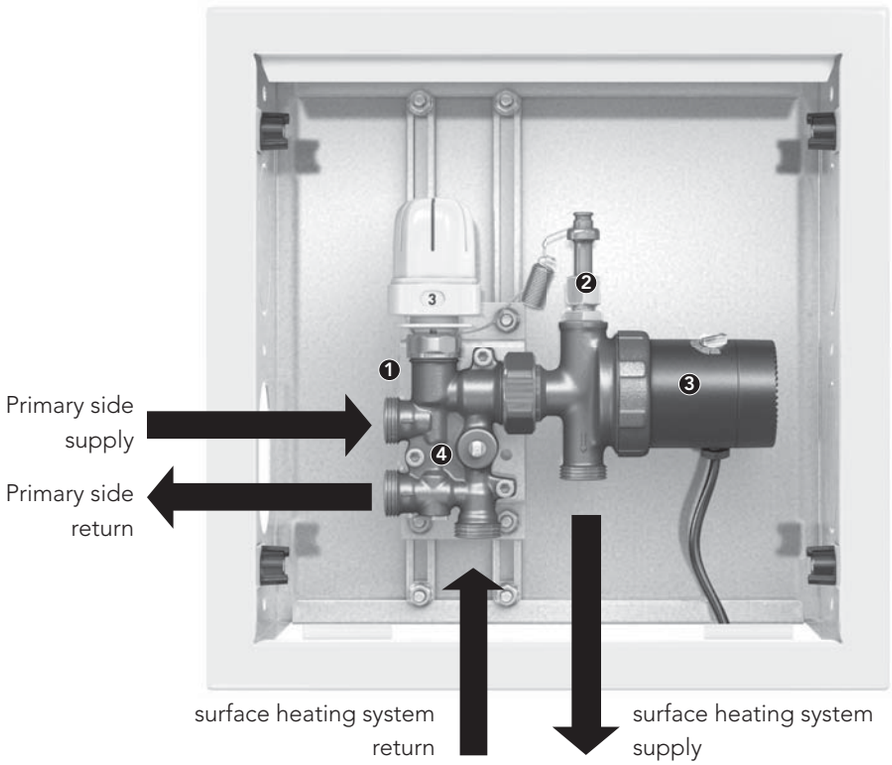
Compact control station

Mixing station for systematic connection of small Underfloor heating systems up to approximately 25 m2 (max. 80 m aluminium composite pipe 16 x 2 mm or max. 2 x 80 m with duplex threaded joint) to the one-pipe and two-pipe systems.

Product benefits
- Easy connection to the existing radiator system
- Excellent heat distribution by constantly quiet spherical motor pump
- Room temperature control including excess temperature safety device

Technical features
- Mixing module (Euro cone ¾" connection) including shaftless spherical motor-circulator pump
- Integrated constant temperature - control unit (20-70 °C) for additional connection of a room thermostat for room temperature control
- Holder can be mounted at the front or at the back
- Frost prevention
- Excess temperature limit on supply of 55 °C
- Adjustable bypass for connection to a single pipe system
- Temperature sensor

❶ Supply excess temperature limit of 55 °C
❷ Temperature sensor
❸ Excellent heat distribution by constantly quiet spherical motor pump
❹ Adjustable bypass for connection to a single pipe system



General information

General information

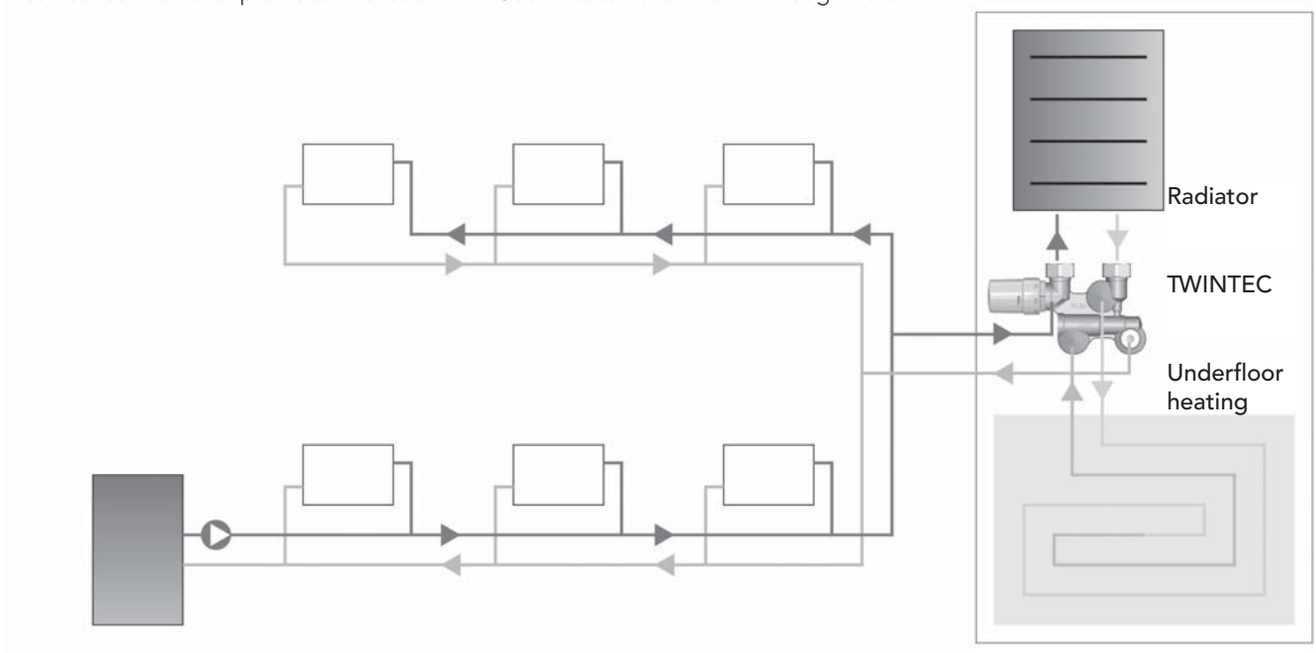
Max. system pressure	1 MPa (10 bar)
Max. system temperature	80° C (radiator/boiler circuit), 55° C (floor circuit)
Max. differential pressure	100 kPa (1 bar) in radiator/boiler circuit
Electrical connection	1x 230 V / 50 Hz
Power consumption	8 Watts

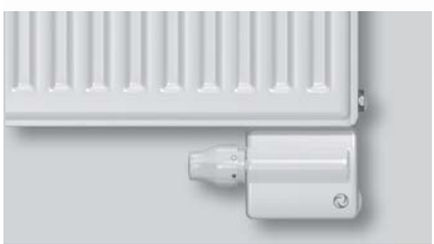
Image	Model/description	Item no.
	FLOORTEC Compact control station Mini mixer station for underfloor heating– 3/4' Mixer set with integrated constant temperature control unit (20-70 °C) for additional connection of a room thermostat for room temperature control	FBRMANIKRST010A0
Optional:		
	FLOORTEC duplex threaded joint (set of 2)	FBVAMFNE34M340A0
	FLOORTEC Compact cabinet sheet steel (in white) in RAL 9010. Alcove dimensions: H 330 x W 320 x D 115–170 mm	FBVCWS00F40040A0

Twintec

TWINTEC is the intelligent element that connects the radiators and the surface heating.

- TWINTEC connects the radiator to the surface heating and provides efficient control combined with a high level of comfort.
- A single thermostatic head allows conflict-free control and provides the user with a comfortable, convenient means of operation.
- Thanks to the serial connection, the surface heating is supplied with water at the appropriate temperature in line with the radiator.
- An integrated return temperature limit function provides additional protection
- Guarantees the flow through the (design) radiator even if the return temperature limit function is activated
- TWINTEC is suitable for both new-builds and for renovation projects and it can be combined with a multitude of radiators.

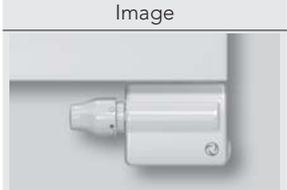
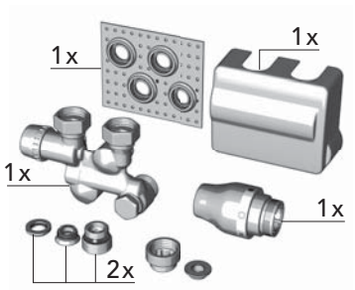




TWINTEC in combination with panel radiators

TWINTEC in combination with convectors and heating panels

TWINTEC in combination with towel warmers and design radiators

Image	Model/description	Item no.:	Scope of delivery
	**TWINTEC** with covering and thermostatic head in RAL 9016 Traffic White	FBROTHETWITE2GAR9016	
	**TWINTEC** with covering and thermostatic head, chrome-plated	FBROTHETWITE2GASCHRO	

Optional TWINTEC accessories – for use with panel radiators and Kontec/Vonaris

	2 adapters incl. 2 flat gaskets	FBROTHETWITECAA0	

In-wall manifold cabinet – standard

Item no.	Width	Model	Internal width	Height	Depth
FBVCFS03A63040A0	400	FLOORTEC manifold cabinet for 2 - 3 heating loops	393	630 - 730	110 - 165
FBVCFS05A63050A0	500	FLOORTEC manifold cabinet for 4 - 5 heating loops	493		
FBVCFS07A63070A0	700	FLOORTEC manifold cabinet for 6 - 7 heating loops	693		
FBVCFS10A63085A0	850	FLOORTEC manifold cabinet for 8 - 10 heating loops	843		
FBVCFS12A63100A0	1000	FLOORTEC manifold cabinet for 11 - 12 heating loops	993		
FBVCFS00A63120A0	1200	FLOORTEC manifold cabinet for 12 + heat meter	1193		

Verteilerschränke Unterputz - Bautiefe 80 mm

Item no.	Width	Model	Internal width	Height	Depth
FBVCFS03H63040A0	400	FLOORTEC manifold cabinet for 2 - 3 heating loops	393	630 - 730	80 - 125
FBVCFS05H63050A0	500	FLOORTEC manifold cabinet for 4 - 5 heating loops	493		
FBVCFS07H63070A0	700	FLOORTEC manifold cabinet for 6 - 7 heating loops	693		
FBVCFS10H63085A0	850	FLOORTEC manifold cabinet for 8 - 10 heating loops	843		
FBVCFS12H63100A0	1000	FLOORTEC manifold cabinet for 11 - 12 heating loops	993		
FBVCFS00H63120A0	1200	FLOORTEC manifold cabinet for 12 + heat meter	1193		

The housing is manufactured from galvanised sheet steel. The depth of the attachable frame of the standard in-wall manifold cabinet with door can be extended from 110 to 165 mm, while that of the 80 mm in-wall manifold cabinet can be extended from 80 to 125 mm and is supplied as a coated version (RAL 9010/Pure White). The vertical universal fixtures will fit most manifold types.
Cut-out feedthroughs enable the supply and return lines to be securely guided in. The door is also fitted with a lock and the body of the cabinet is fitted with pull-out feet.

Verteilerschrank Aufputz - Standard

Item no.	Width	Model	Internal width	Height	Depth
FBVCWS03F63040A0	473	FLOORTEC manifold cabinet for für 2 - 3 heating loops	393	645	130
FBVCWS05F63050A0	573	FLOORTEC manifold cabinet for für 4 - 5 heating loops	493		
FBVCWS07F63070A0	773	FLOORTEC manifold cabinet for für 6 - 7 heating loops	693		
FBVCWS10F63085A0	923	FLOORTEC manifold cabinet for für 8 - 10 heating loops	843		
FBVCWS12F63100A0	1073	FLOORTEC manifold cabinet for für 11 - 12 heating loops	993		
FBVCWS00F63120A0	1273	FLOORTEC manifold cabinet for für 12 + heat heating loops	1193		

The housing is manufactured from galvanised sheet steel. The cabinet including the door has a depth of 130 mm (non-adjustable) and a fixed height of 645 mm (rear wall is non-removable). It is supplied as a coated version (RAL 9010/Pure White). The vertical universal fixtures will fit most manifold types. The door is also fitted with a counter-sunk lock.

Control technology

The actual heat output to be provided by the heat generation and heat distribution system is only a fraction of the output of the installed system during most of the year. Every heating system must therefore be run using the power that provides for the current heat requirements of the building. For reasons of comfort and economy, a control facility is required to carry out automatic adjustment in the residential rooms.

Apart from that, the legislator requires a control facility for the boiler and the heating surface that depends on the external temperature.

In addition, equipment that functions independently must be installed in relation to the heat distribution system in order to control the room temperature on a room-by-room basis.

The FLOORTEC room temperature control systems not only comply with the statutory provisions, but also implement them in an economical and efficient way.

General information

The architect and planner must take account of the statutory regulations and standards when planning the control facilities. The systems engineer must undertake the approaches necessary to ensure optimum operation. The following standards and laws must be complied with in this regard:

Standards and guidelines

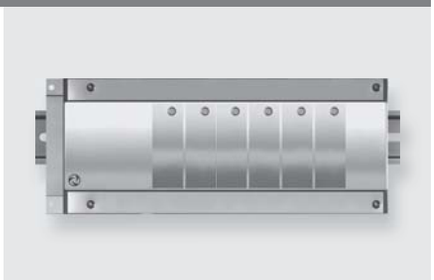
• **EnEV**	Energy saving ordinance
• **DIN 18380**	Installation of central heating systems and hot water supply systems
• **DIN 18382**	Electrical supply systems rated in buildings
• **DIN 18386**	Building automation and control systems
• **VDI 0100**	Erection of power installations with nominal voltages up to 1000 V
• **VDI 2073**	Hydraulic circuits in heating, ventilation and air conditioning
• **VDE 44574**	Electric room heating: charging controls of storage heaters

Room temperature control

The control facility in an individual room is based on the functional principle of two-point control. When heat is required, the valve opens and then closes when room temperature has been reached. The two-point control is the most commonly used system in the field of heating technology. In this system, a room thermostat monitors the air temperature. When the temperature falls below that set for the room, the thermostat responds and sends the appropriate message to the relevant adjusting drive on the heating loop manifold.
The thermal feedback in the thermostat simulates the temperature rise after switching off, therefore preventing temperature overshoot.

Connection module

The connection module serves the central wiring of the FLOORTEC room thermostats and adjusting drives in the 24 V and 230 V versions, which must be in accordance with requirements of the VDE standard.



NEW Control

Click-mounting function of the 24V and 230V room controllers

To facilitate installation, the wired room controllers consist of a flush-mounted base to be fixed permanently and an operating component that is plugged into it. This enables the controllers to be removed at any time. This is a valuable advantage when it comes to painting and decorating works, because it makes the work easier and the controllers are protected from damage and soiling when removed. The protective cap that is also supplied also protects the flush-mounted base.

FLOORTEC 24 V/230 V analogue room thermostat

- Electronic P-controller
- Room sensor
- Click-mounting on a flush-mounted connection unit
- Just 25 mm deep
- Mechanical min./max. limit function
- LED to indicate on/off status

Analogue room thermostat

FLOORTEC 24 V NA/230 V NA analogue room thermostat

Same functions as the analogue thermostat, but with the following additional features:
- Electronic PI-controller (2-point or PWM)
- With night setbacks
- Suitable for heating and cooling
- LED indicator (red LED = heating; blue LED = cooling)

Push button

FLOORTEC 24 V/230 V digital room thermostat

- Electronic PI-controller (2-point or PWM)
- LCD display, orange backlight
- Suitable for heating and cooling
- Room sensor, optional connection to a floor sensor
- 3 different basic control modes are possible:
  Room temperature control
  Room temperature control and floor temperature limit function (min./max.)
  Floor temperature control

Digital room thermostat

FLOORTEC 24 V/230 V touchscreen room thermostat

Same functions as the digital thermostat,
but with the following additional features:
- Graphic LCD display
- Automatic summer/winter switching
- Programming possible in 3 different time slots
- Self-optimisation function
- Week and holiday programme
- Integrated hygrostat for use when cooling mode is activated

Touchscreen
room thermostat

FLOORTEC 24 V/230 V programming unit room thermostat

Same functions as the digital thermostat,
but with the following additional features:
- Graphic LCD display
- Automatic summer/winter switching
- Programming possible in 3 different time slots
- Self-optimisation function
- Week and holiday programme
- Integrated hygrostat for use when cooling mode is activated

Programming unit
room thermostat

Floor sensor

FLOORTEC connection module

- Basic module for use with up to 6 room temperature controllers
- With integrated boiler and pump module
- Extension module for 4 or 6 additional room temperature controllers
- Extension module for heating and cooling operation
- 'Top hat' rail mounting

Connection module

Project planning

The principles for testing and project planning in relation to hot water and Underfloor heating systems are laid down in the applicable standard ÖNORM EN 1264 Warmwasser-Flächenheizungen [Water-based surface embedded heating and cooling systems] Parts 1 to 4. In contrast to panel radiators with multi-layer structure and/or convection panels, it is not possible to make any changes to the construction of thermal convection surfaces of surface heating. Consequently, every surface heating system, with identical floor, air, covering and wall temperatures, provides the same heat output.

- Compliance with the statutory heat insulation regulations
- Limitation of the flow of heat downwards
- Heat requirement calculation in accordance with ÖNORM H7500
- Max. permissible floor surface temperature in accordance with ÖNORM EN 1264 at the lowest standard external temperature in accordance with ÖNORM H7500. This lays down the output criteria of hot water Underfloor heating systems.

The corresponding equation is as follows:

θ = $8{,}92 \cdot (\theta_{Fm} - \theta_i)^{1{,}1}$, with
θ_i = internal temperature in °C according to the standard
θ_{Fm} = Average floor surface temperature in °C
q = Heat flow density in W/m²

The characteristic base line, as it is known, illustrates the relationship between the floor temperature, the room temperature and the specific heat output, independently of the system.

Part 3 of the ÖNORM EN 1264 standard describes in detail the process of how surface heating should be laid for a building plan. The following preconditions are important with regard to the layout of surface heating:

The corresponding values are as follows:

living areas:	$\theta_{F\,max} \leq$	29 °C
peripheral areas (1 m Breit):	$\theta_{F\,max} \leq$	35 °C
baths, showers:	$\theta_{F\,max} \leq$	33 °C

On average during the heating period, the surface temperatures in a room with a room temperature of 20 °C lie at approximately 23 °C.

Note: As a rule, with regard to the floor surface to be heated, the entire surface area of the room is available, on which to lay out the surface. In order to prevent any unnecessary disparities in the underfloor heating screed between the cold and warm surfaces (for example: in the kitchen, living room 20% of the surface is covered with items of furniture), part of the heating pipes should also be laid underneath the areas covered by cupboards.

As there is often no clarity regarding the properties of the floor coverings in the planning stage, the DIN standard now sets the binding stipulation that all living areas are to be assessed using the following uniform thermal resistance:

The corresponding equation is as follows:

$R_{\lambda,B}$ = 0,10 m² K/W

In the case of baths
$R_{\lambda\,Dämm}$ = 0 m² K/W

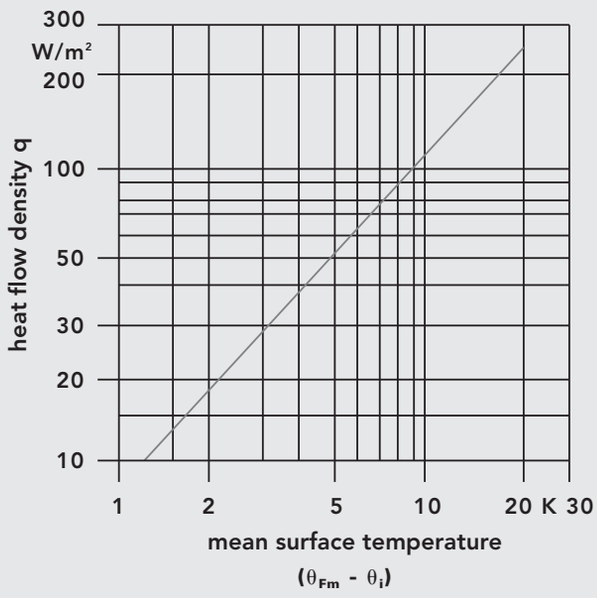
The assessment of each room begins with the least favourable room, i.e. the room with the greatest specific heating requirements q [W/m²]. The spread for this room is set at 5 K.

It is possible to derive the distance between the pipe VA and the rated excess temperature of the heating components $\Delta\theta_{H,des}$ from the characteristic base line for $R_{\lambda,B}$ = 0,10 m².

The distance to be maintained between the pipes when laying should be chosen in such a way to ensure that the maximum surface temperature $\theta_{F\,max}$ = 29 °C for residential areas is never exceeded.

In peripheral areas, this is: $\theta_{F\,max}$ = 35 °C.

The corresponding limiting curves are marked on the characteristic line fields.



Project planning

The following are sufficiently accurate for standard structures: for wet screed with su = 45 mm and U = 1.2 W/m2Km²K

R_o of the floor construction upwards						
$R_{\lambda,B}$			0,00	0,05	0,10	0,15
R_o			0,1305	0,1805	0,2305	0,2805
R_u of the floor downwards	ÖNORM EN **1264**	R_u =	**0,75**	with similar use		
		R_u =	**1,25**	against earth, with different use, against unheated rooms		
		R_u =	**2,00**	against external air		

Formula symbols

Symbol	Description	Measurement unit
$\Delta\theta_{H,des}$	Rated heating medium excess temperature	K
$\Delta\theta_H$	Mean heating medium excess temperature	K
$\Delta\theta_{H,j}$	Rated heating medium excess temperature of the other rooms	K
$\Delta\theta_{V,des}$	Rated excess temperature of the heating medium in supply	K
θ_R	Return temperature	°C
θ_V	Supply temperature	°C
$\theta_{F\,max}$	Maximum floor surface temperature	°C
$\theta_{F\,m}$	Mean floor surface temperature	°C
θ_i	Standard internal temperature	°C
θ_u	Temperature in the room underneath the room equipped with underfloor heating	°C
σ	Spread between heating loop supply and return	K
σ_u	Spread between the heating loop supply and return of other rooms	K
A_F	heating floor surface	m^2
q	Heat flow density on the floor surface	W/m^2
c_w	Specific heat capacity of water	W s/kg K

Symbol	Description	Measurement unit
$\dot{m}_h$	Rated heating medium flow	kg/h
su	Thickness of the covering over the heating pipe	m
Ro	upper partial thermal contact resistance of the floor	m^2 K/W
Ru	Lower partial thermal contact resistance of the floor	m^2 K/W
$R_{\alpha o}$	Heat transmission resistance upwards	m^2 K/W
$R_{\alpha u}$	Heat transmission resistance downwards	m^2 K/W
$R_{\lambda,B}$	Thermal resistance of the floor covering	m^2 K/W
$R_{\lambda,Dämm}$	Thermal resistance of the insulation	m^2 K/W
$R_{\lambda,Decke}$	Thermal resistance of the ceiling	m^2 K/W
$R_{\lambda,Putz}$	Thermal resistance of the ceiling plaster	m^2 K/W
L_A	Length of the connecting heating loop pipeline	m
L_R	Length of the heating loop pipeline	m
VA	Distance between the heating loop pipes when laid	m
$\Delta p_{HKR,R}$	Pressure loss from pipeline	mbar
R	Specific pipe resistance	Pa/m

Overview of load distribution layers/screeds	
Calcium sulphate screed AE 20, e.g. Maxitplan 490... (anhydrite self-levelling screed)	
Advantage	Quick and easy to lay, price
Disadvantage	Heating-up stage is necessary, not suitable for commercial wet rooms, high level of moisture introduced into the building, high installation thickness
Ready for covering with a floor	No earlier than 21 days, depending on residual moisture
Covering	35-40 mm above the upper edge of the pipe, depending on manufacturer and quality
Cement-based screed ZE 20	
Advantage	Suitable for use in wet rooms, possible to lay as mortar bed for natural stone
Disadvantage	Heating-up stage is necessary, cupping is possible, high level of moisture introduced into the building
Ready for covering with a floor	No earlier than 28 days, depending on residual moisture
Covering	45 mm above the upper edge of the pipe
Cement-based self-levelling screed ZE 20 (Maxitplan 440)	
Advantage	Quick and easy to lay like calcium sulphate screed, suitable for use in wet rooms, no cupping
Disadvantage	Heating-up stage is necessary, high level of moisture introduced into the building
Ready for covering with a floor	No earlier than 22 days, depending on residual moisture
Covering	> 45 mm
Blanke PERMAT	
Advantage	Lowest possible thickness for tiles or adhesive parquet, easy handling, only minimal introduction of moisture, the floor is already capable of bearing weight and withstanding heat after 24 hours, also suitable for greater loads
Disadvantage	Stringent requirement for the sub-floor to be even
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours, depending on the version
Covering	3.5 mm + adhesive + top covering
Lazemoflex mortar bed	
Advantage	Minimal thickness of 8-15 mm, ready for covering after a short time also directly in the mortar bed, the floor is already capable of bearing weight after 24 hours, important in renovation measures, little mass to be heated up by the floor heating system enabling rapid response times, also suitable for use in moist rooms and rooms bearing greater loads.
Disadvantage	Price, can only be heated after 28 days
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours
Covering	8-15 mm + top covering
Mortar bed	
Advantage	Natural stone or ceramic tiles can be laid immediately in the single-layer cement mortar bed, saves time and minimal thickness instead of protective screed layers with separate mortar bed in the middle
Disadvantage	Time-consuming, high level of skill required of the tile layer
Ready for covering with a floor	Laying and floor covering in one go
Covering	> 45 mm + natural stone
Dry screed boards (manufactured by Knauf)	
Advantage	Minimal thickness, can be walked on and the floor covering laid immediately, possibility of compensating for unevenness by filling in, no additional moisture in the building
Disadvantage	Price
Ready for covering with a floor	Can be covered immediately
Covering	22 mm

Overview of load distribution layers/screeds	
Screed tile	
Advantage	Minimal thickness, rapid response time, can be laid as the visible floor
Disadvantage	Very limited selection of colours if laid as the visible floor
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours
Covering	20 mm or 20 mm + floor covering
Real wood plank flooring (laid as a floating floor; manufactured by JUNCKERS)	
Advantage	Minimal thickness of 17-25 mm, the floor is capable of bearing loads immediately after laying, important in renovation measures
Disadvantage	Price, insulating effect of wood
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	17-25 mm (incl. felt layer if laid as floating floor)
Real wood plank flooring (laid and screwed down; manufactured by JUNCKERS)	
Advantage	Minimal thickness of 14-22 mm, the floor is capable of bearing loads immediately after laying, important in renovation measures, also for greater load-bearing requirements
Disadvantage	Price, insulating effect of wood, heat output is poorer than if the felt layer is screwed down
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	14-22 mm
Laminate (laid as a floating floor; manufactured by ALLOC)	
Advantage	Minimal thickness of 11-13 mm, floor is capable of bearing loads immediately after laying, little mass to be heated by the underfloor heating enabling rapid response times
Disadvantage	Little mass, therefore problems with impact noise under certain conditions
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	approx. 12 mm
Metal anti-slip flooring	
Advantage	Extremely low thickness of 4-6 mm, can be covered further immediately
Disadvantage	Price
Ready for covering with a floor	can be covered further immediately
Covering	4-6 mm + floor covering

Overview of types of floor covering

The principle applies that an $R_{\lambda B}$ of > 0.15 m² K/W is unsuitable for underfloor heating, as the insulation value of the combined floor layer cannot guarantee that the underfloor heating will operate correctly.

Ceramic floor coverings/Stone	
Thermal conductivity	Very good ($R_{\lambda B}$ = 0.01 – 0.1 m2 K/W)
Laying	Using tile adhesive and grout on top of screed or Blanke PERMAT Using Lazemoflex directly as mortar bed covering or in the thick bedding mortar
Important	Permanently flexible adhesives should be used (suitable for underfloor heating)
Strip parquet	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,15 m² K/W
Laying	Glued down using parquet adhesive on top of a load distribution layer
Important	Permanently flexible adhesives should be used (suitable for underfloor heating)
Parquet boards (made by JUNCKERS), thickness 14 mm, (floating floor)	
Thermal conductivity	$R_{\lambda B}$ = 0,15 m² K/W floating floor
Laying	Floating with intermediate layer
Important	Maximum permitted surface temperature of 27 °C
Parquet boards (made by JUNCKERS), thickness 14 mm and 20 mm (glued down)	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,15 m² K/W when fully glued down on top of wet and dry screed
Laying	Fully glued down on top of load distribution layer
Important	Maximum permitted surface temperature of 27°C
Parquet boards (made by JUNCKERS), thickness 14 mm and 20 mm (on battens)	
Thermal conductivity	$R_{\lambda B}$ = 0,80 – 0,13 m² K/W
Laying	The boards are screwed down onto battens, between which the FLOORTEC dry system elements are located. The underside of the boards must be laid directly in contact with the elements.
Important	Maximum permitted surface temperature of 27°C
Laminate (made by ALLOC)	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,12 m² K/W
Laying	Laid as a floating floor on wet/dry screeds or directly onto system elements (only in living areas)
Important	A PE film must additionally be laid underneath the laminate as a moisture barrier.
Plastic floor covering	
Thermal conductivity	$R_{\lambda B}$ = ca. 0,10 m² K/W
Laying	Glued onto a load distribution layer
Important	Determine compatibility with underfloor heating (manufacturer's approval)
Carpets	
Thermal conductivity	max. $R_{\lambda B}$ = 0,15 m² K/W
Laying	Glued onto a load distribution layer
Important	Determine compatibility with underfloor heating (manufacturer's approval)

Fast calculation for Stapler system (DIN tested N. reg. 7F147) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	150	129	112	97	84	73
	18	128	110	95	82	72	62
	20	113	97	84	73	63	55
	22	98	84	73	63	55	48
	24	83	71	62	53	46	40
	26	68	58	50	44	38	33
40 bei FLOW 45 °C RETURN 35 °C	15	188	162	140	121	105	92
	18	165	142	123	107	93	81
	20	150	129	112	97	84	73
	22	135	117	101	87	76	66
	24	120	104	90	78	67	59
	26	105	91	78	68	59	51
45 bei FLOW 50 °C RETURN 40 °C	15	226	194	168	146	126	110
	18	203	175	151	131	114	99
	20	188	162	140	121	105	92
	22	173	149	129	112	97	84
	24	158	136	117	102	88	77
	26	143	123	106	92	80	70
50 bei FLOW 55 °C RETURN 45 °C	15	263	227	196	170	147	128
	18	241	207	179	155	135	117
	20	226	194	168	146	126	110
	22	211	181	157	136	118	103
	24	195	168	145	126	109	95
	26	143	123	106	92	80	70
55 bei FLOW 60 °C RETURN 50 °C	15	301	259	224	194	168	147
	18	278	240	207	180	156	136
	20	263	227	196	170	147	128
	22	248	214	185	160	139	121
	24	233	201	173	150	131	114
	26	143	123	106	92	80	70

Floor covering: e.g. ceramic tiles – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	107	95	84	75	66	59
	18	91	81	71	63	56	50
	20	81	71	63	56	50	44
	22	70	62	55	48	43	38
	24	59	52	46	41	36	32
	26	48	43	38	34	30	27
40 bei FLOW 45 °C RETURN 35 °C	15	134	119	105	93	83	74
	18	118	104	92	82	73	65
	20	107	95	84	75	66	59
	22	97	85	76	67	60	53
	24	86	76	67	60	53	47
	26	75	66	59	52	46	41
45 bei FLOW 50 °C RETURN 40 °C	15	161	142	126	112	99	88
	18	145	128	113	101	89	80
	20	134	119	105	93	83	74
	22	123	109	97	86	76	68
	24	113	100	88	78	70	62
	26	102	90	80	71	63	56
50 bei FLOW 55 °C RETURN 45 °C	15	188	166	147	131	116	103
	18	172	152	134	119	106	94
	20	161	142	126	112	99	88
	22	150	133	118	104	93	82
	24	140	123	109	97	86	77
	26	102	90	80	71	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	215	190	168	149	132	118
	18	199	176	155	138	123	109
	20	188	166	147	131	116	103
	22	177	157	139	123	109	97
	24	166	147	130	116	103	91
	26	102	90	80	71	63	56

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft N. reg. 7F147

Fast calculation for Stapler system (DIN tested N. reg. 7F147) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	83	75	68	61	55	50
	18	71	64	58	52	47	43
	20	63	56	51	46	42	38
	22	54	49	44	40	36	33
	24	46	41	37	34	31	28
	26	38	34	31	28	25	23
40 bei FLOW 45 °C RETURN 35 °C	15	104	94	85	77	69	63
	18	92	83	75	67	61	55
	20	83	75	68	61	55	50
	22	75	68	61	55	50	45
	24	67	60	54	49	44	40
	26	58	53	47	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	125	113	102	92	83	75
	18	113	101	92	83	75	68
	20	104	94	85	77	69	63
	22	96	86	78	71	64	58
	24	88	79	71	64	58	53
	26	79	71	64	58	53	48
50 bei FLOW 55 °C RETURN 45 °C	15	146	131	119	107	97	88
	18	133	120	109	98	89	80
	20	125	113	102	92	83	75
	22	117	105	95	86	78	70
	24	108	98	88	80	72	65
	26	79	71	64	58	53	48
55 bei FLOW 60 °C RETURN 50 °C	15	167	150	136	123	111	100
	18	154	139	126	113	103	93
	20	146	131	119	107	97	88
	22	138	124	112	101	92	83
	24	129	116	105	95	86	78
	26	79	71	64	58	53	48

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	68	62	57	52	48	44
	18	58	53	48	44	41	37
	20	51	47	43	39	36	33
	22	44	40	37	34	31	29
	24	37	34	31	29	26	24
	26	31	28	26	23	22	20
40 bei FLOW 45 °C RETURN 35 °C	15	85	78	71	65	60	55
	18	75	69	63	57	53	48
	20	68	62	57	52	48	44
	22	61	56	51	47	43	39
	24	54	50	46	42	38	35
	26	48	44	40	37	33	31
45 bei FLOW 50 °C RETURN 40 °C	15	102	93	86	78	72	66
	18	92	84	77	70	65	59
	20	85	78	71	65	60	55
	22	78	72	66	60	55	50
	24	71	65	60	55	50	46
	26	65	59	54	50	45	42
50 bei FLOW 55 °C RETURN 45 °C	15	119	109	100	91	84	77
	18	109	100	91	84	77	70
	20	102	93	86	78	72	66
	22	95	87	80	73	67	61
	24	89	81	74	68	62	57
	26	65	59	54	50	45	42
55 bei FLOW 60 °C RETURN 50 °C	15	136	125	114	104	96	88
	18	126	115	105	97	88	81
	20	119	109	100	91	84	77
	22	112	103	94	86	79	72
	24	106	97	88	81	74	68
	26	65	59	54	50	45	42

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Preformed plate system UNI 14 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	141	117	97	82	69
	18	120	99	83	70	59
	20	106	87	73	61	52
	22	92	76	63	53	45
	24	78	64	54	45	38
40 bei FLOW 45 °C RETURN 35 °C	15	177	146	122	102	86
	18	155	128	107	90	76
	20	141	117	97	82	69
	22	127	105	88	74	62
	24	113	93	78	65	55
45 bei FLOW 50 °C RETURN 40 °C	15	212	175	146	123	104
	18	191	157	132	110	93
	20	177	146	122	102	86
	22	162	134	112	94	79
	24	148	122	102	86	73
50 bei FLOW 55 °C RETURN 45 °C	15	247	204	171	143	121
	18	226	187	156	131	111
	20	212	175	146	123	104
	22	198	163	136	115	97
	24	184	152	127	106	90
55 bei FLOW 60 °C RETURN 50 °C	15	282	233	195	164	138
	18	261	216	180	151	128
	20	247	204	171	143	121
	22	233	192	161	135	114
	24	219	181	151	127	107

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	102	87	75	65	56
	18	87	74	64	55	48
	20	77	65	56	49	42
	22	66	57	49	42	36
	24	56	48	41	36	31
40 bei FLOW 45 °C RETURN 35 °C	15	128	109	94	81	70
	18	112	96	82	71	62
	20	102	87	75	65	56
	22	92	78	67	58	50
	24	82	70	60	52	45
45 bei FLOW 50 °C RETURN 40 °C	15	153	131	112	97	84
	18	138	118	101	87	76
	20	128	109	94	81	70
	22	117	100	86	74	64
	24	107	91	79	68	59
50 bei FLOW 55 °C RETURN 45 °C	15	179	152	131	113	98
	18	163	139	120	103	90
	20	153	131	112	97	84
	22	143	122	105	91	78
	24	133	113	97	84	73
55 bei FLOW 60 °C RETURN 50 °C	15	204	174	150	129	112
	18	189	161	139	120	104
	20	179	152	131	113	98
	22	168	144	124	107	92
	24	158	135	116	100	87

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft N. reg. 7F271-F

Fast calculation for Preformed plate system UNI 14 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	80	70	62	54	48
	18	68	59	52	46	41
	20	60	52	46	41	36
	22	52	45	40	35	31
	24	44	38	34	30	26
40 bei FLOW 45 °C RETURN 35 °C	15	100	87	77	68	60
	18	88	77	68	60	53
	20	80	70	62	54	48
	22	72	63	55	49	43
	24	64	56	49	43	38
45 bei FLOW 50 °C RETURN 40 °C	15	120	105	92	81	72
	18	108	94	83	73	65
	20	100	87	77	68	60
	22	92	80	71	62	55
	24	84	73	65	57	50
50 bei FLOW 55 °C RETURN 45 °C	15	140	122	108	95	84
	18	128	112	99	87	77
	20	120	105	92	81	72
	22	112	98	86	76	67
	24	104	91	80	71	63
55 bei FLOW 60 °C RETURN 50 °C	15	160	140	123	109	96
	18	148	129	114	100	89
	20	140	122	108	95	84
	22	132	115	102	90	79
	24	124	108	96	84	75

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	59	53	47	42
	18	56	50	45	40	36
	20	49	44	39	35	32
	22	43	38	34	31	27
	24	36	32	29	26	23
40 bei FLOW 45 °C RETURN 35 °C	15	82	73	66	59	53
	18	72	65	58	52	46
	20	66	59	53	47	42
	22	59	53	47	42	38
	24	53	47	42	38	34
45 bei FLOW 50 °C RETURN 40 °C	15	98	88	79	71	63
	18	89	79	71	63	57
	20	82	73	66	59	53
	22	75	67	60	54	49
	24	69	62	55	49	44
50 bei FLOW 55 °C RETURN 45 °C	15	115	103	92	82	74
	18	105	94	84	75	68
	20	98	88	79	71	63
	22	92	82	74	66	59
	24	85	76	68	61	55
55 bei FLOW 60 °C RETURN 50 °C	15	131	117	105	94	84
	18	121	108	97	87	78
	20	115	103	92	82	74
	22	108	97	87	78	70
	24	102	91	81	73	65

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	130	112	97	84	73
	18	110	95	83	72	62
	20	97	84	73	63	55
	22	84	73	63	55	48
	24	71	62	53	46	40
40 bei FLOW 45 °C RETURN 35 °C	15	162	140	122	106	92
	18	143	123	107	93	81
	20	130	112	97	84	73
	22	117	101	88	76	66
	24	104	90	78	68	59
45 bei FLOW 50 °C RETURN 40 °C	15	195	168	146	127	110
	18	175	151	131	114	99
	20	162	140	122	106	92
	22	149	129	112	97	84
	24	136	118	102	89	77
50 bei FLOW 55 °C RETURN 45 °C	15	227	196	170	148	128
	18	208	179	156	135	117
	20	195	168	146	127	110
	22	182	157	136	118	103
	24	169	146	126	110	95
55 bei FLOW 60 °C RETURN 50 °C	15	259	224	194	169	147
	18	240	207	180	156	136
	20	227	196	170	148	128
	22	214	185	160	139	121
	24	201	174	151	131	114

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	95	84	75	66	59
	18	81	71	63	56	50
	20	71	63	56	50	44
	22	62	55	49	43	38
	24	52	46	41	36	32
40 bei FLOW 45 °C RETURN 35 °C	15	119	105	93	83	74
	18	104	92	82	73	65
	20	95	84	75	66	59
	22	85	76	67	60	53
	24	76	67	60	53	47
45 bei FLOW 50 °C RETURN 40 °C	15	142	126	112	99	88
	18	128	113	101	89	80
	20	119	105	93	83	74
	22	109	97	86	76	68
	24	100	88	78	70	62
50 bei FLOW 55 °C RETURN 45 °C	15	166	147	131	116	103
	18	152	134	119	106	94
	20	142	126	112	99	88
	22	133	118	104	93	82
	24	123	109	97	86	77
55 bei FLOW 60 °C RETURN 50 °C	15	190	168	149	133	118
	18	176	156	138	123	109
	20	166	147	131	116	103
	22	157	139	123	109	97
	24	147	130	116	103	91

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft **N. reg. 7F147**
N. reg. 7F261

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	75	68	61	55	50
	18	64	58	52	47	43
	20	56	51	46	42	38
	22	49	44	40	36	33
	24	41	37	34	30	28
40 bei FLOW 45 °C RETURN 35 °C	15	94	85	77	69	63
	18	83	75	67	61	55
	20	75	68	61	55	50
	22	68	61	55	50	45
	24	60	54	49	44	40
45 bei FLOW 50 °C RETURN 40 °C	15	113	102	92	83	75
	18	101	92	83	75	68
	20	94	85	77	69	63
	22	86	78	71	64	58
	24	79	71	64	58	53
50 bei FLOW 55 °C RETURN 45 °C	15	131	119	107	97	88
	18	120	109	98	89	80
	20	113	102	92	83	75
	22	105	95	86	78	70
	24	98	88	80	72	65
55 bei FLOW 60 °C RETURN 50 °C	15	150	136	123	111	100
	18	139	126	113	103	93
	20	131	119	107	97	88
	22	124	112	101	91	83
	24	116	105	95	86	78

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	62	57	52	48	44
	18	53	48	44	41	37
	20	47	43	39	36	33
	22	40	37	34	31	28
	24	34	31	29	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	78	71	65	60	55
	18	69	63	57	53	48
	20	62	57	52	48	44
	22	56	51	47	43	39
	24	50	46	42	38	35
45 bei FLOW 50 °C RETURN 40 °C	15	93	86	78	72	66
	18	84	77	70	65	59
	20	78	71	65	60	55
	22	72	66	60	55	50
	24	65	60	55	50	46
50 bei FLOW 55 °C RETURN 45 °C	15	109	100	91	84	77
	18	100	91	84	76	70
	20	93	86	78	72	66
	22	87	80	73	67	61
	24	81	74	68	62	57
55 bei FLOW 60 °C RETURN 50 °C	15	125	114	104	96	88
	18	115	105	97	88	81
	20	109	100	91	84	77
	22	103	94	86	79	72
	24	97	88	81	74	68

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Preformed plate system UNI 16 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

General information

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	142	118	100	85	72
	18	122	102	86	72	61
	20	107	90	76	64	54
	22	93	78	66	55	47
	24	79	66	55	47	40
40 bei FLOW 45 °C RETURN 35 °C	15	179	150	126	106	90
	18	157	132	111	94	79
	20	143	120	101	85	72
	22	129	108	91	77	65
	24	115	96	81	68	58
45 bei FLOW 50 °C RETURN 40 °C	15	215	180	149	128	108
	18	193	162	136	115	97
	20	179	150	126	106	90
	22	165	138	116	98	83
	24	150	126	106	89	76
50 bei FLOW 55 °C RETURN 45 °C	15	250	210	176	149	126
	18	229	192	161	136	115
	20	215	180	151	128	108
	22	200	168	141	119	101
	24	186	156	131	111	93
55 bei FLOW 60 °C RETURN 50 °C	15	285	239	200	170	144
	18	265	221	186	157	133
	20	250	210	176	149	126
	22	236	198	166	140	119
	24	222	186	156	132	111

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	103	89	77	67	58
	18	88	76	66	57	49
	20	77	67	58	50	44
	22	67	58	50	43	38
	24	57	49	42	37	32
40 bei FLOW 45 °C RETURN 35 °C	15	129	111	96	84	73
	18	114	98	85	74	64
	20	103	89	77	67	58
	22	93	80	69	60	52
	24	83	71	62	53	46
45 bei FLOW 50 °C RETURN 40 °C	15	155	134	115	100	87
	18	139	120	104	90	78
	20	129	111	96	84	73
	22	119	102	89	77	67
	24	108	93	81	70	61
50 bei FLOW 55 °C RETURN 45 °C	15	181	156	135	117	102
	18	165	142	123	107	93
	20	155	134	116	100	87
	22	144	125	108	94	81
	24	134	116	100	87	75
55 bei FLOW 60 °C RETURN 50 °C	15	206	178	153	134	114
	18	191	165	143	124	107
	20	181	156	135	117	102
	22	170	147	127	110	96
	24	160	138	120	104	90

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft **N. reg. 7F270-F**

Fast calculation for Preformed plate system UNI 16 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	81	71	63	56	50
	18	69	61	54	48	42
	20	61	53	47	42	37
	22	52	46	41	36	32
	24	44	39	35	31	27
40 bei FLOW 45 °C RETURN 35 °C	15	101	89	79	70	62
	18	89	78	69	61	55
	20	81	71	63	56	50
	22	73	64	57	50	45
	24	65	57	50	45	40
45 bei FLOW 50 °C RETURN 40 °C	15	121	107	95	84	74
	18	109	96	85	75	67
	20	101	89	79	70	62
	22	93	82	73	64	57
	24	85	75	66	59	52
50 bei FLOW 55 °C RETURN 45 °C	15	141	125	110	98	87
	18	129	114	101	89	79
	20	121	107	95	84	74
	22	113	100	88	78	69
	24	105	93	82	73	65
55 bei FLOW 60 °C RETURN 50 °C	15	161	142	125	111	98
	18	149	132	117	103	92
	20	141	125	110	98	87
	22	133	117	104	92	82
	24	125	110	98	87	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperaturere

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	60	54	48	43
	18	56	51	46	41	37
	20	50	45	40	36	33
	22	43	39	35	31	28
	24	36	33	29	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	83	74	67	60	54
	18	73	65	59	53	48
	20	66	60	54	48	43
	22	60	54	48	43	39
	24	53	48	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	99	89	80	72	65
	18	89	80	72	65	59
	20	83	74	67	60	54
	22	76	68	62	55	50
	24	70	62	56	51	46
50 bei FLOW 55 °C RETURN 45 °C	15	116	104	94	84	76
	18	106	95	86	77	69
	20	99	89	80	72	65
	22	93	83	75	67	61
	24	86	77	70	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	132	119	106	96	86
	18	123	110	99	89	80
	20	116	104	94	84	76
	22	109	98	88	79	72
	24	103	92	83	75	67

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	147	127	110	96	83	72
	18	125	108	94	81	71	62
	20	111	95	83	72	62	54
	22	96	83	72	62	54	47
	24	81	70	61	53	46	40
40 bei FLOW 45 °C RETURN 35 °C	15	184	159	138	120	104	91
	18	162	140	121	105	91	80
	20	147	127	110	96	83	72
	22	133	114	99	86	75	65
	24	118	102	88	76	66	58
45 bei FLOW 50 °C RETURN 40 °C	15	221	191	165	143	125	109
	18	199	172	149	129	112	98
	20	184	159	138	120	104	91
	22	170	146	127	110	96	83
	24	155	133	116	100	87	76
50 bei FLOW 55 °C RETURN 45 °C	15	258	222	193	167	145	127
	18	236	203	176	153	133	116
	20	221	191	165	143	125	109
	22	206	178	154	134	116	101
	24	192	165	143	124	108	94
55 bei FLOW 60 °C RETURN 50 °C	15	295	254	220	191	166	145
	18	273	235	204	177	154	134
	20	258	222	193	167	145	127
	22	243	210	182	158	137	119
	24	228	197	171	148	129	112

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	106	94	83	74	66	58
	18	90	79	70	63	56	50
	20	79	70	62	55	49	44
	22	69	61	54	48	43	38
	24	58	51	46	41	36	32
40 bei FLOW 45 °C RETURN 35 °C	15	132	117	104	92	82	73
	18	116	103	91	81	72	64
	20	106	94	83	74	66	58
	22	95	84	75	66	59	53
	24	85	75	66	59	52	47
45 bei FLOW 50 °C RETURN 40 °C	15	158	140	124	111	98	88
	18	143	126	112	99	89	79
	20	132	117	104	92	82	73
	22	121	108	95	85	75	67
	24	111	98	87	77	69	61
50 bei FLOW 55 °C RETURN 45 °C	15	185	164	145	129	115	102
	18	169	150	133	118	105	93
	20	158	140	124	111	98	88
	22	148	131	116	103	92	82
	24	137	122	108	96	85	76
55 bei FLOW 60 °C RETURN 50 °C	15	211	187	166	147	131	117
	18	195	173	153	136	121	108
	20	185	164	145	129	115	102
	22	174	154	137	122	108	96
	24	164	145	129	114	102	90

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft **N. reg. 7F147**
N. reg. 7F261

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	82	74	67	61	55	50
	18	70	63	57	52	47	42
	20	62	56	50	46	41	37
	22	53	48	44	39	36	32
	24	45	41	37	33	30	27
40 bei FLOW 45 °C RETURN 35 °C	15	103	93	84	76	69	62
	18	91	82	74	67	61	55
	20	82	74	67	61	55	50
	22	74	67	60	55	50	45
	24	66	59	54	49	44	40
45 bei FLOW 50 °C RETURN 40 °C	15	123	111	101	91	83	75
	18	111	100	91	82	74	67
	20	103	93	84	76	69	62
	22	95	85	77	70	63	57
	24	86	78	71	64	58	52
50 bei FLOW 55 °C RETURN 45 °C	15	144	130	118	106	96	87
	18	132	119	107	97	88	80
	20	123	111	101	91	83	75
	22	115	104	94	85	77	70
	24	107	97	87	79	72	65
55 bei FLOW 60 °C RETURN 50 °C	15	165	149	134	122	110	100
	18	152	137	124	112	102	92
	20	144	130	118	106	96	87
	22	136	123	111	100	91	82
	24	128	115	104	94	85	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	67	62	57	52	47	44
	18	57	52	48	44	40	37
	20	51	46	42	39	36	33
	22	44	40	37	34	31	28
	24	37	34	31	28	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	84	77	71	65	59	55
	18	74	68	62	57	52	48
	20	67	62	57	52	47	44
	22	61	56	51	47	43	39
	24	54	49	45	41	38	35
45 bei FLOW 50 °C RETURN 40 °C	15	101	93	85	78	71	65
	18	91	83	76	70	64	59
	20	84	77	71	65	59	55
	22	77	71	65	60	55	50
	24	71	65	59	54	50	46
50 bei FLOW 55 °C RETURN 45 °C	15	118	108	99	91	83	76
	18	108	99	90	83	76	70
	20	101	93	85	78	71	65
	22	94	86	79	72	66	61
	24	88	80	73	67	62	57
55 bei FLOW 60 °C RETURN 50 °C	15	135	123	113	104	95	87
	18	125	114	105	96	88	81
	20	118	108	99	91	83	76
	22	111	102	93	85	78	72
	24	104	96	88	80	74	68

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for the Preformed plate system UNI 17 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	143	120	101	85	72
	18	121	102	86	72	61
	20	107	90	75	64	54
	22	93	78	65	55	47
	24	79	66	55	47	39
40 bei FLOW 45 °C RETURN 35 °C	15	179	149	126	106	90
	18	157	131	111	93	79
	20	143	120	101	85	72
	22	129	108	91	76	65
	24	114	96	80	68	57
45 bei FLOW 50 °C RETURN 40 °C	15	214	179	151	127	108
	18	193	161	136	115	97
	20	179	149	126	106	90
	22	164	137	116	98	83
	24	150	126	106	89	75
50 bei FLOW 55 °C RETURN 45 °C	15	250	209	176	149	126
	18	229	191	161	136	115
	20	214	179	151	127	108
	22	200	167	141	119	101
	24	186	155	131	110	93
55 bei FLOW 60 °C RETURN 50 °C	15	286	239	201	170	144
	18	264	221	186	157	133
	20	250	209	176	149	126
	22	236	197	166	140	118
	24	221	185	156	132	111

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	103	89	77	67	58
	18	88	76	66	57	49
	20	77	67	58	50	44
	22	67	58	50	43	38
	24	57	49	42	37	32
40 bei FLOW 45 °C RETURN 35 °C	15	129	111	96	84	73
	18	113	98	85	74	64
	20	103	89	77	67	58
	22	93	80	69	60	52
	24	83	71	62	53	46
45 bei FLOW 50 °C RETURN 40 °C	15	155	134	116	100	87
	18	139	120	104	90	78
	20	129	111	96	84	73
	22	119	102	89	77	67
	24	108	93	81	70	61
50 bei FLOW 55 °C RETURN 45 °C	15	180	156	135	117	102
	18	165	142	123	107	93
	20	155	134	116	100	87
	22	144	125	108	94	81
	24	134	116	100	87	75
55 bei FLOW 60 °C RETURN 50 °C	15	206	178	154	134	116
	18	191	165	143	124	107
	20	180	156	135	117	102
	22	170	147	127	110	96
	24	160	138	119	104	90

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

DIN Geprüft **N. reg. 7F268-F**

Fast calculation for the Preformed plate system UNI 17 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	81	71	63	56	50
	18	69	61	54	48	42
	20	61	53	47	42	37
	22	52	46	41	36	32
	24	44	39	35	31	27
40 bei FLOW 45 °C RETURN 35 °C	15	101	89	79	70	62
	18	89	78	69	62	55
	20	81	71	63	56	50
	22	73	64	57	50	45
	24	65	57	50	45	40
45 bei FLOW 50 °C RETURN 40 °C	15	121	107	95	84	74
	18	109	96	85	75	67
	20	101	89	79	70	62
	22	93	82	73	64	57
	24	85	75	66	59	52
50 bei FLOW 55 °C RETURN 45 °C	15	141	125	110	98	87
	18	129	114	101	89	79
	20	121	107	95	84	74
	22	113	100	88	78	69
	24	105	93	82	73	65
55 bei FLOW 60 °C RETURN 50 °C	15	161	142	126	112	99
	18	149	132	117	103	92
	20	141	125	110	98	87
	22	133	118	104	92	82
	24	125	110	98	87	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]				
		Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	60	54	48	43
	18	56	51	46	41	37
	20	50	45	40	36	33
	22	43	39	35	31	28
	24	36	33	29	27	24
40 bei FLOW 45 °C RETURN 35 °C	15	83	74	67	60	54
	18	73	65	59	53	48
	20	66	60	54	48	43
	22	60	54	48	43	39
	24	53	48	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	99	89	80	72	65
	18	89	80	72	65	59
	20	83	74	67	60	54
	22	76	68	62	55	50
	24	70	63	56	51	46
50 bei FLOW 55 °C RETURN 45 °C	15	116	104	94	84	76
	18	106	95	86	77	70
	20	99	89	80	72	65
	22	93	83	75	67	61
	24	86	77	70	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	132	119	107	96	87
	18	123	110	99	89	80
	20	116	104	94	84	76
	22	109	98	88	80	72
	24	103	92	83	75	67

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation 20 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	152	133	115	100	87	76
	18	129	113	98	85	74	65
	20	114	100	86	75	66	57
	22	99	87	75	65	57	50
	24	83	73	63	55	48	42
40 bei FLOW 45 °C RETURN 35 °C	15	190	167	144	126	109	95
	18	167	147	127	110	96	84
	20	152	133	115	100	87	76
	22	137	120	104	90	79	69
	24	121	107	92	80	70	61
45 bei FLOW 50 °C RETURN 40 °C	15	228	200	173	151	131	114
	18	205	180	156	136	118	103
	20	190	167	144	126	109	95
	22	175	153	132	115	101	88
	24	159	140	121	105	92	80
50 bei FLOW 55 °C RETURN 45 °C	15	266	233	202	176	153	133
	18	243	213	184	161	140	122
	20	228	200	173	151	131	114
	22	213	187	161	141	122	107
	24	197	173	150	131	114	99
55 bei FLOW 60 °C RETURN 50 °C	15	304	267	230	201	175	152
	18	281	247	213	186	162	141
	20	266	233	202	176	153	133
	22	250	220	190	166	144	126
	24	235	207	179	156	135	118

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	108	97	86	77	68	61
	18	92	82	73	65	58	52
	20	81	72	65	58	51	46
	22	70	63	56	50	44	40
	24	60	53	47	42	38	34
40 bei FLOW 45 °C RETURN 35 °C	15	136	121	108	96	86	76
	18	119	106	95	84	75	67
	20	108	97	86	77	68	61
	22	98	87	78	69	62	55
	24	87	77	69	61	55	49
45 bei FLOW 50 °C RETURN 40 °C	15	163	145	129	115	103	92
	18	146	130	116	104	92	82
	20	136	121	108	96	86	76
	22	125	111	99	88	79	70
	24	114	101	91	81	72	64
50 bei FLOW 55 °C RETURN 45 °C	15	190	169	151	134	120	107
	18	173	155	138	123	109	98
	20	163	145	129	115	103	92
	22	152	135	121	108	96	85
	24	141	126	112	100	89	79
55 bei FLOW 60 °C RETURN 50 °C	15	217	193	172	154	137	122
	18	201	179	159	142	127	113
	20	190	169	151	134	120	107
	22	179	159	142	127	113	101
	24	168	150	134	119	106	95

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation 20 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	84	76	69	63	57	52
	18	71	65	59	54	49	44
	20	63	57	52	47	43	39
	22	55	50	45	41	37	34
	24	46	42	38	35	31	28
40 bei FLOW 45 °C RETURN 35 °C	15	105	96	87	79	72	65
	18	92	84	76	69	63	57
	20	84	76	69	63	57	52
	22	76	69	62	57	51	47
	24	67	61	56	50	46	41
45 bei FLOW 50 °C RETURN 40 °C	15	126	115	104	95	86	78
	18	113	103	94	85	77	70
	20	105	96	87	79	72	65
	22	97	88	80	72	66	60
	24	88	80	73	66	60	54
50 bei FLOW 55 °C RETURN 45 °C	15	147	134	121	110	100	91
	18	134	122	111	101	92	83
	20	126	115	104	95	86	78
	22	118	107	97	88	80	73
	24	109	99	90	82	74	67
55 bei FLOW 60 °C RETURN 50 °C	15	168	153	139	126	114	104
	18	155	141	128	117	106	96
	20	147	134	121	110	100	91
	22	139	126	115	104	94	85
	24	130	118	108	98	89	80

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

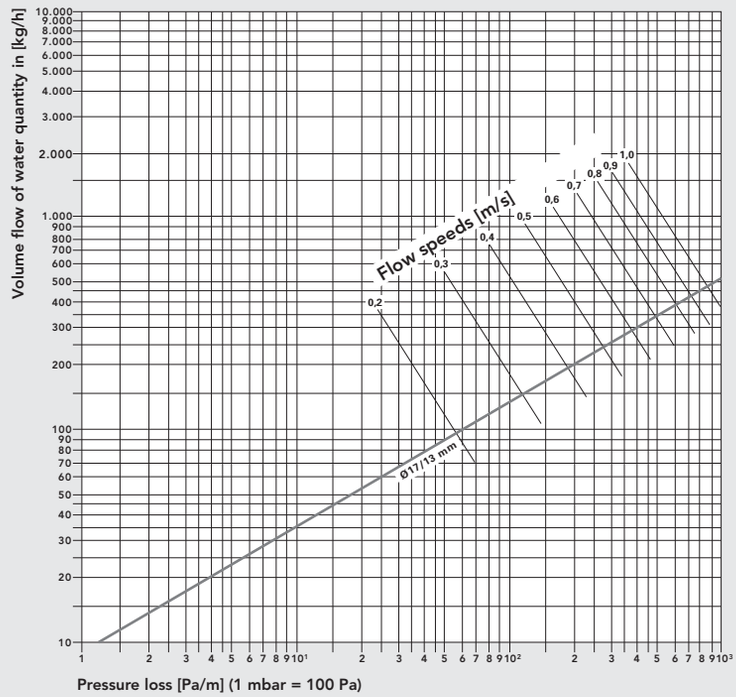
Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	69	63	58	53	49	45
	18	58	54	49	45	42	38
	20	51	47	44	40	37	34
	22	45	41	38	35	32	29
	24	38	35	32	29	27	25
40 bei FLOW 45 °C RETURN 35 °C	15	86	79	73	67	61	57
	18	75	69	64	59	54	50
	20	69	63	58	53	49	45
	22	62	57	52	48	44	41
	24	55	50	46	43	39	36
45 bei FLOW 50 °C RETURN 40 °C	15	103	95	87	80	74	68
	18	93	85	78	72	66	61
	20	86	79	73	67	61	57
	22	79	72	67	61	56	52
	24	72	66	61	56	51	47
50 bei FLOW 55 °C RETURN 45 °C	15	120	110	102	93	86	79
	18	110	101	93	85	78	72
	20	103	95	87	80	74	68
	22	96	88	81	75	69	63
	24	89	82	75	69	64	59
55 bei FLOW 60 °C RETURN 50 °C	15	137	126	116	107	98	90
	18	127	117	107	99	91	84
	20	120	110	102	93	86	79
	22	113	104	96	88	81	75
	24	106	98	90	83	76	70

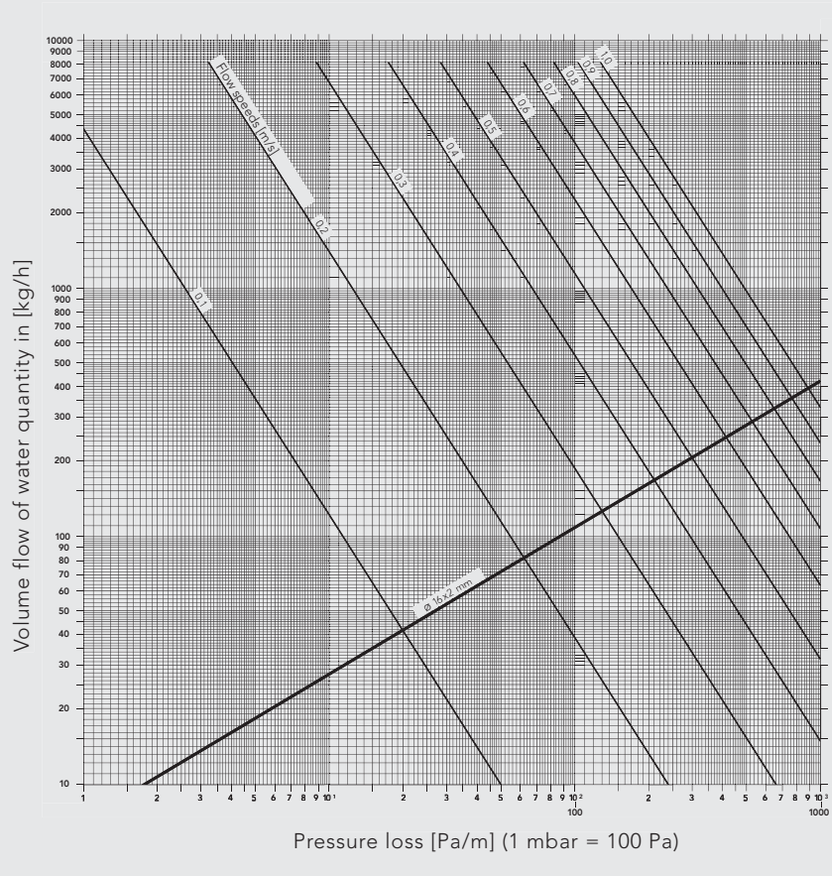
Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm and aluminium composite pipe 16 x 2 mm

Pressure loss Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm



Pressure loss in heating pipe - aluminium composite 16 x 2 mm



General information

N. reg. 7F147
N. reg. 7F261

Stapler system , Grid mat system, Stapler system and Pe-xcellent 5 underfloor heating pipe 17 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	68	61	54	48	43	53	47	42	37	33	43	38	34	30	27	32	29	25	23	20	20	18	16	14	12
	Surface temperature [°C]	21,4	20,7	20,1	19,6	19,1	23,1	22,6	22,1	21,7	21,3	24,2	23,8	23,4	23,0	22,7	25,2	24,9	24,6	24,3	24,1	26,1	25,8	25,7	25,5	25,3
35 °C (40/30)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	93	82	73	65	58	78	69	62	55	49	68	61	54	48	43	58	52	46	41	36	48	43	38	34	30
	Surface temperature [°C]	23,4	22,5	21,8	21,1	20,5	25,2	24,4	23,8	23,2	22,7	26,4	25,7	25,1	24,6	24,1	27,5	26,9	26,4	26,0	25,6	28,6	28,2	27,7	27,4	27,0
40 °C (45/35)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	117	104	92	82	73	102	91	81	72	64	93	82	73	65	58	83	74	65	58	52	73	65	58	51	46
	Surface temperature [°C]	25,4	24,3	23,3	22,5	21,7	27,2	26,2	25,4	24,6	24,0	28,4	27,5	26,8	26,1	25,5	**29,6**	28,8	28,1	27,5	26,9	**30,8**	**30,1**	**29,5**	28,9	28,4
45 °C (50/40)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	141	125	111	98	88	127	112	100	88	79	117	104	92	82	73	107	95	84	75	67	98	87	77	68	61
	Surface temperature [°C]	27,3	26,0	24,9	23,9	23,0	**29,1**	28,0	27,0	26,0	25,2	**30,4**	**29,3**	28,3	27,5	26,7	**31,6**	**30,6**	**29,7**	28,9	28,2	**32,8**	**31,9**	**31,1**	**30,4**	**29,7**
50 °C (55/45)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	165	146	130	115	103	150	133	118	105	94	141	125	111	98	88	131	116	103	92	82	122	108	96	85	76
	Surface temperature [°C]	**29,2**	27,7	26,4	25,2	24,2	**31,0**	**29,7**	28,5	27,4	26,5	**32,3**	**31,0**	**29,9**	28,9	28,0	**33,5**	**32,3**	**31,3**	**30,3**	**29,5**	**34,8**	**33,6**	**32,7**	**31,8**	**31,0**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

Preformed plate system UNI – Pe-xcellent 5 underfloor heating pipe 14 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	79	68	58	50	43	62	53	45	39	34	50	43	37	31	27	37	32	27	24	20	23	20	17	14	12
	Surface temperature [°C]	22,3	21,3	20,5	19,8	19,2	23,8	23,0	22,4	21,8	21,3	24,8	24,1	23,6	23,1	22,7	25,7	25,2	24,8	24,4	24,1	26,4	26,0	25,8	25,5	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	107	92	79	68	58	90	77	66	57	49	79	68	58	50	43	68	58	50	43	37	56	48	41	35	30
	Surface temperature [°C]	24,6	23,3	22,2	21,3	20,5	26,2	25,1	24,2	23,4	22,7	27,3	26,3	25,5	24,8	24,2	28,3	27,5	26,8	26,1	25,6	**29,3**	28,6	28,0	27,5	27,0
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	135	115	99	85	74	119	101	87	75	64	107	92	79	68	58	96	82	70	61	52	85	72	62	53	46
	Surface temperature [°C]	26,8	25,3	23,9	22,8	21,8	28,5	27,1	25,9	24,9	24,0	**29,6**	28,3	27,2	26,3	25,5	**30,7**	**29,5**	28,5	27,7	27,0	**31,7**	**30,7**	**29,8**	**29,1**	28,4
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	169	139	119	102	89	146	125	107	92	80	135	115	99	85	74	124	106	91	78	67	113	96	83	71	61
	Surface temperature [°C]	29,0	27,1	25,6	24,2	23,1	**30,7**	29,0	27,6	26,4	25,3	**31,8**	**30,3**	28,9	27,8	26,8	**33,0**	**31,5**	**30,3**	**29,2**	28,3	**34,1**	**32,7**	**31,6**	**30,6**	**29,8**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	191	163	140	120	104	174	149	128	110	95	163	139	119	103	89	152	130	111	96	83	141	120	103	89	77
	Surface temperature [°C]	**31,2**	29,0	27,2	25,6	24,3	**32,9**	**30,9**	**29,2**	27,8	26,6	**34,0**	**32,1**	**30,6**	**29,2**	28,1	**35,2**	**33,4**	**31,9**	**30,6**	**29,6**	**36,3**	**34,6**	**33,3**	**32,1**	**31,1**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

DIN geprüft N. reg. 7F268-F

Preformed plate system UNI, Aluminium composite pipe 16 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	80	69	60	52	45	63	54	47	41	35	51	44	38	33	28	38	33	29	25	21	23	20	17	15	13
	Surface temperature [°C]	22,4	21,5	20,7	20,0	19,4	23,9	23,2	22,5	22,0	21,5	24,9	24,3	23,7	23,3	22,9	25,7	25,3	24,9	24,5	24,2	26,4	26,1	25,8	25,6	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	109	94	82	71	61	92	80	69	60	52	80	70	60	52	45	69	59	51	45	39	57	49	43	37	32
	Surface temperature [°C]	24,7	23,5	22,5	21,6	20,8	26,3	25,3	24,4	23,6	22,9	27,4	26,5	25,7	25,0	24,4	28,4	27,6	26,9	26,3	25,8	**29,4**	28,7	28,1	27,6	27,2
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	137	119	103	89	77	120	104	90	78	68	109	94	82	71	61	98	84	73	63	55	86	75	65	56	48
	Surface temperature [°C]	27,0	25,5	24,2	23,1	22,1	28,7	27,3	26,2	25,2	24,3	**29,7**	28,5	27,5	26,6	25,8	**30,8**	**29,7**	28,8	27,9	27,2	**31,9**	**30,9**	**30,0**	**29,3**	28,6
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	165	143	124	107	93	149	129	111	96	83	137	119	103	89	77	126	109	94	82	71	115	99	86	74	64
	Surface temperature [°C]	**29,2**	27,5	25,9	24,6	23,4	**30,9**	**29,3**	27,9	26,7	25,6	**32,0**	**30,5**	**29,2**	28,1	27,1	**33,1**	**31,7**	**30,5**	**29,5**	28,6	**34,2**	**32,9**	**31,8**	**30,9**	**30,0**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	193	167	145	125	109	177	153	132	115	99	166	143	124	107	93	154	133	116	100	87	143	124	107	93	80
	Surface temperature [°C]	**31,4**	**29,4**	27,6	26,1	24,7	**33,1**	**31,2**	**29,6**	28,2	26,9	**34,2**	**32,5**	**30,9**	**29,6**	28,4	**35,3**	**33,7**	**32,3**	**31,0**	**29,9**	**34,9**	**33,6**	**32,4**	**31,4**	

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

Preformed plate system UNI, Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	80	69	60	51	45	62	54	47	40	35	50	44	38	32	28	38	33	28	24	21	23	20	17	15	13
	Surface temperature [°C]	22,3	21,4	20,6	19,9	19,3	23,9	23,1	22,5	21,9	21,4	24,8	24,2	23,7	23,2	22,8	25,7	25,2	24,8	24,5	24,2	26,4	26,1	25,8	25,6	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	109	94	81	70	60	91	79	68	59	51	80	69	60	51	45	68	59	51	44	38	57	49	42	36	31
	Surface temperature [°C]	24,7	23,5	22,4	21,5	20,7	26,3	25,2	24,3	23,6	22,9	27,3	26,4	25,6	24,9	24,3	28,4	27,6	26,9	26,3	25,7	**29,4**	28,7	28,1	27,6	27,1
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	137	118	102	88	76	120	103	89	77	67	109	94	81	70	60	97	84	72	63	54	86	74	64	55	48
	Surface temperature [°C]	27,0	25,4	24,1	23,0	22,0	28,6	27,3	26,1	25,1	24,2	**29,7**	28,5	27,4	26,5	25,7	**30,8**	**29,7**	28,7	27,9	27,1	**31,8**	**30,8**	**30,0**	**29,2**	28,6
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	165	142	123	106	92	148	127	110	95	82	137	118	102	88	76	125	108	93	81	70	114	98	85	73	64
	Surface temperature [°C]	**29,2**	27,4	25,8	24,5	23,3	**30,8**	**29,2**	27,8	26,6	25,5	**32,0**	**30,4**	**29,1**	28,0	27,0	**33,1**	**31,7**	**30,5**	**29,4**	28,5	**34,1**	**32,9**	**31,8**	**30,8**	**30,0**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	192,6	166	143	124	107	176	152	131	113	98	165	142	123	106	92	154	132	114	99	85	142	123	106	92	79
	Surface temperature [°C]	**31,3**	**29,3**	27,5	25,9	24,6	**33,0**	**31,1**	**29,5**	28,1	26,8	**34,2**	**32,4**	**30,8**	**29,5**	28,3	**35,3**	**33,6**	**32,2**	**30,9**	**29,8**	**36,4**	**34,8**	**33,5**	**32,3**	**31,3**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

DIN Geprüft N. reg. 7F403-F

Dry screed panels – 20 mm Fermacell

- FLOORTEC Aluminium composite heating pipe 16 x 2 mm
- **Fermacell 2E22 20 mm**

Average pipe temperature	Room temperature	Floor finish $R_{\lambda,B}$							
		Tiles/stone 0,00		Parquet, laminate, artificial fibres 0,05		Carpet 0,10		Velour, parquet, wooden floorboards 0,15	
		VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm
°C	°C	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²
30	15	79	60	60	48	49	40	41	35
	18	63	48	48	39	39	32	33	28
	20	52	40	40	32	33	27	27	23
	22	42	32	32	26	26	22	22	19
	24	31	24	24	19	20	16	16	14
	26	21	16	16	13	13	11	11	9
35	15	105	80	81	65	65	54	55	46
	18	89	68	68	55	56	46	47	39
	20	79	60	60	48	49	40	41	35
	22	68	52	52	42	42	35	36	30
	24	58	44	44	36	36	30	30	25
	26	47	36	36	29	29	24	25	21
40	15	131	101	101	81	82	67	69	58
	18	115	89	89	71	72	59	60	51
	20	105	80	81	65	65	54	55	46
	22	94	72	72	58	59	49	49	42
	24	84	64	64	52	52	43	44	37
	26	73	56	56	45	46	38	38	32
45	15	157	121	121	97	98	81	82	70
	18	142	109	109	87	88	73	74	63
	20	131	101	101	81	82	67	69	58
	22	121	93	93	74	75	62	63	53
	24	110	85	85	68	69	57	58	49
	26	100	76	76	61	62	51	52	44
50	15	184	141	141	113	114	94	96	81
	18	168	129	129	103	104	86	88	74
	20	157	121	121	97	98	81	82	70
	22	147	113	113	90	91	76	77	65
	24	136	105	105	84	85	70	71	60
	26	126	97	97	78	78	65	66	56
55	15	210	161	161	129	131	108	110	93
	18	194	149	149	120	121	100	102	86
	20	184	141	141	113	114	94	96	81
	22	173	133	133	107	108	89	91	76
	24	163	125	125	100	101	84	85	72
	26	152	117	117	94	95	78	80	67

Maximum surface temperature in living areas 29°C, in peripheral zones 35 °C and in bathrooms 33 °C

Heat output in accordance with DIN EN 1264

STRONGBOARD FL

- FLOORTEC Aluminium composite heating pipe 16 x 2 mm
- **STRONGBOARD FL**

Average pipe temperature	Room temperature	Floor finish $R_{\lambda,B}$															
		Tiles 0,00				Tiles 0,015				Tiles 0,05				Parquet 15 mm, wooden floorboards 20 mm 0,15			
		VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature
°C	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C
30	15	100,6	24,0	75,6	22,0	89,9	23,2	69,1	21,4	63,5	21,0	49,9	19,8	45,5	19,4	36,2	18,6
	18	80,1	25,3	60,2	23,7	71,5	24,6	55,0	23,2	50,5	22,8	39,7	21,9	36,2	21,6	28,8	20,9
	20	66,3	26,2	49,8	24,8	59,2	25,6	45,5	24,4	41,8	24,1	32,9	23,3	30,0	23,0	23,9	22,4
	22	52,3	27,0	39,4	25,9	46,8	26,5	36,0	25,6	33,0	25,3	26,0	24,6	23,7	24,4	18,9	24,0
	24	38,1	27,7	28,7	26,9	34,1	27,4	26,2	26,7	24,1	26,5	18,9	26,0	17,2	25,8	13,7	25,5
35	15	134,7	15,0	101,3	24,1	120,4	25,6	92,6	23,4	85,0	22,8	66,8	21,2	60,9	20,7	48,5	19,7
	18	114,3	28,2	85,9	25,8	102,1	27,2	78,5	25,2	72,1	24,7	56,7	23,4	51,6	22,9	41,2	22,0
	20	100,6	29,0	75,6	27,0	89,9	28,2	69,1	26,4	63,5	26,0	49,9	24,8	45,5	24,4	36,2	23,6
	22	86,9	29,9	65,3	28,1	77,7	29,2	59,7	27,6	54,8	27,2	43,1	26,2	39,3	25,8	31,3	25,1
	24	73,2	30,8	55,0	29,2	65,4	30,1	50,3	28,8	46,1	28,5	36,3	27,6	33,1	27,3	26,4	26,7
40	15	168,7	29,5	126,8	26,2	150,7	28,1	115,9	25,3	106,4	24,5	83,7	22,7	76,2	22,0	60,8	20,7
	18	148,3	30,9	111,5	27,9	132,5	29,6	101,9	27,2	93,5	26,5	73,6	24,8	67,0	24,3	53,4	23,1
	20	134,7	31,8	101,3	29,1	120,4	30,6	92,6	28,4	85,0	27,8	66,8	26,2	60,9	25,7	48,5	24,7
	22	121,1	32,7	91,0	30,3	108,2	31,7	83,2	29,6	76,4	29,0	60,1	27,7	54,7	27,2	43,6	26,2
	24	107,4	33,6	80,8	31,4	96,0	32,7	73,8	30,8	67,8	30,3	53,3	29,1	48,6	28,7	38,7	27,8
45	15	202,6	32,1	152,3	28,2	181,1	30,4	139,3	27,2	127,8	26,2	100,6	24,0	91,6	23,3	73,0	21,8
	18	182,3	33,5	137,0	30,0	162,9	32,0	125,3	29,0	115,0	28,2	90,5	26,2	82,4	25,5	65,7	24,1
	20	168,7	34,5	126,8	31,2	150,7	33,1	115,9	30,3	106,4	29,5	83,7	27,7	76,2	27,0	60,8	25,7
	22	155,1	35,4	116,6	32,3	138,6	34,1	106,6	31,5	97,8	30,8	77,0	29,1	70,1	28,5	55,9	27,3
	24	141,5	36,3	106,4	33,5	126,4	35,1	97,2	32,8	89,2	32,1	70,2	30,5	64,0	30,0	51,0	28,9
50	15	236,5	34,7	177,8	30,2	211,4	32,8	162,6	29,0	149,2	27,9	117,4	25,4	106,9	24,6	85,2	22,8
	18	216,2	36,1	162,5	32,0	193,2	34,4	148,6	30,9	136,4	29,9	107,3	27,6	97,7	26,8	77,9	25,2
	20	202,6	37,1	152,3	33,2	181,1	35,4	139,3	32,2	127,8	31,2	100,6	29,0	91,6	28,3	73,0	26,8
	22	189,1	38,1	142,1	34,4	168,9	36,5	129,9	33,4	119,2	32,6	93,8	30,5	85,5	29,8	68,1	28,3
	24	175,5	39,0	131,9	35,6	156,8	37,5	120,6	34,7	110,7	33,9	87,1	31,9	79,3	31,3	63,2	29,9
55	15	270,4	37,2	203,3	32,2	241,7	35,1	185,9	30,8	170,6	29,6	134,2	26,8	122,2	25,8	97,4	23,8
	18	250,1	38,7	188,0	34,0	223,5	36,7	171,9	32,7	157,7	31,6	124,1	29,0	113,0	28,1	90,1	26,2
	20	236,5	39,7	177,8	35,2	211,4	37,8	162,6	34,0	149,2	32,9	117,4	30,4	106,9	29,6	85,2	27,8
	22	223,0	40,7	167,6	36,4	199,3	38,8	153,3	35,3	140,6	34,3	110,7	31,9	100,8	31,1	80,3	29,4
	24	209,4	41,6	157,4	37,6	187,1	39,9	143,9	36,5	132,1	35,6	103,9	33,3	94,7	32,6	75,4	31,0

Maximum surface temperature in living areas 29°C, in peripheral zones 35 °C and in bathrooms 33 °C

Heat output in accordance with DIN EN 1264

General information

DIN Geprüft **N. reg. 7F268-F**

Preformed plate system UNI

Preformed plate | Screed emulsion | Pe-Xcellent 5 Underfloor heating pipe | Edge insulation strips

Guarantee statements available at **www.vgoelundnoot.at/garantieerklaerungen**

Description / Applications

Fig. 1: Laying of Pe-Xcellent 5 underfloor heating pipe

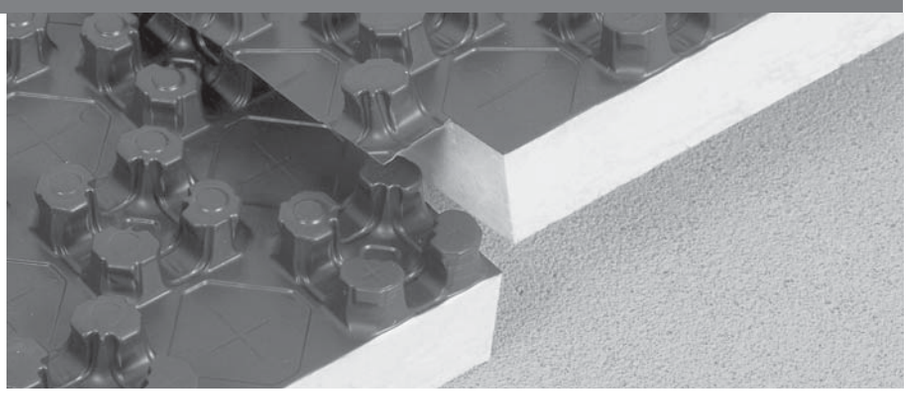


Fig. 4: Method for the linking of preformed plates together

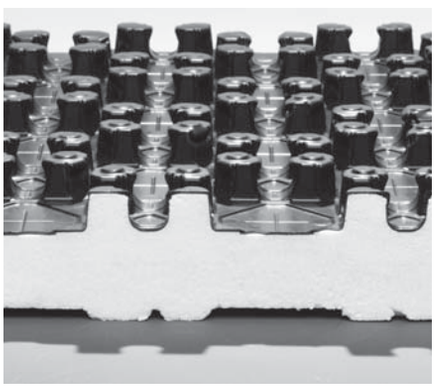


Fig. 2: Preformed plate – 30-2 mm

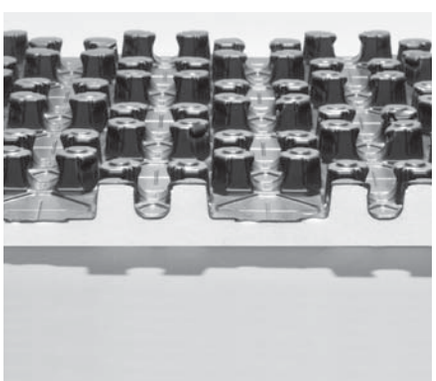


Fig. 3: Preformed plate – 11 mm

Off-cuts
A carefully-conceived overlapping method means that the preformed sheets can be laid in a way that off-cuts are unlikely to occur. (Fig. 4)

Preformed plate system
A PST preformed plate measuring 0.84 m wide and 1.44 m long provides highly-effective thermal and impact noise insulation. The 30-2 preformed plate (fig. 2) reduces impact noise by 28 dB. Another product in the range is the Preformed Plate 11 (Fig. 3), which is used in situations involving high traffic loads (of up to 75 kN/m^2).

Simply use your foot to press the flexible easy-to-lay 14-17mm system pipe into the walk-proof raised pipe-retaining burls.

Edge insulation strips
The edge insulation strip is deployed against walls, columns and doorframes. This ensures that the requirements of the DIN 18560 standard are met, by preventing the screed from coming into contact with the static elements and therefore forming a sound-bridge. It also provides a rapid and clean seal with the insulating layers on the floor. The fitting time will depend upon the size of the room involved.

Noise insulation properties
The impact noise insulation roll complies with the DIN 4109 standard "Sound insulation in buildings" and, depending on the version, provides a significant improvement in audible impact noise.

Fire protection properties in accordance with DIN 4102
FLOORTEC Impact noise insulation roll: building material class B2.

Protection against moisture
The film covering on the upper size of each element provides optimum protection against moisture and complies with the DIN 18560 standard.

In accordance with our high quality standards, all FLOORTEC products comply with the relevant quality, DIN and manufacturing standards.

Useful accessories

- Settlement joints made simple – using the rounded profile and the settlement joint strip (Fig. 1). Simply press in the rounded profile at the location where the settlement joint is to be created, pull off the adhesive strip from the settlement joint strip and stick it onto the rounded profile. This is a quick and clean way to create a separation between two areas of screed.

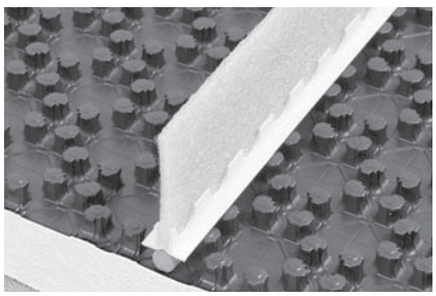


Fig. 1: Rounded profile with settlement joint strip

- The flow and return pipes in the vicinity of the settlement joint, fitted with the joint protection sheath (Fig. 2).

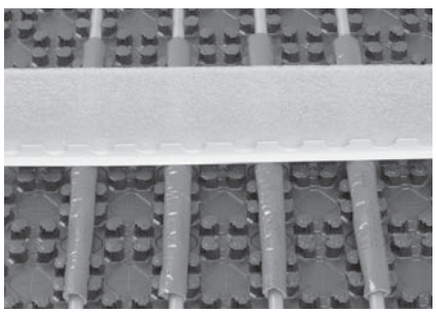


Fig. 2: Heating pipe fitted with joint protection sheath

Multi-purpose connecting element

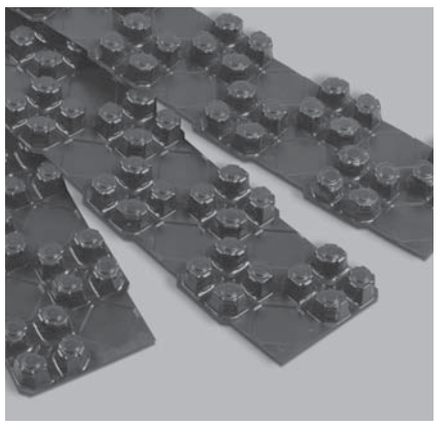
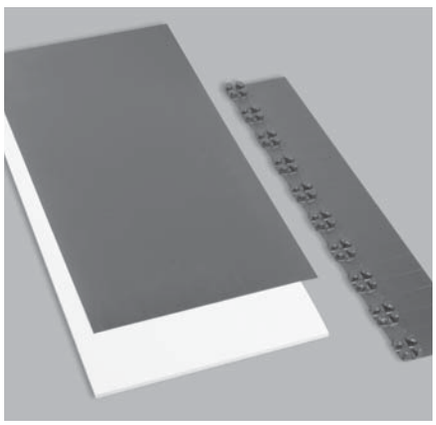


Fig. 3: FLOORTEC Multiset 30-2

FLOORTEC Multiset 30-2 – the safe way for pipes to pass through door apertures, in combination with the settlement joint strip. The pipes should be fitted with the settlement joint protection sheath (Fig. 3).



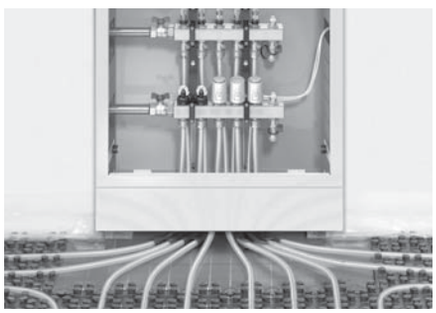
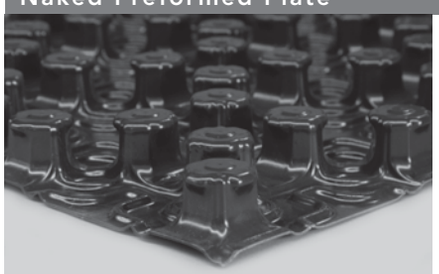
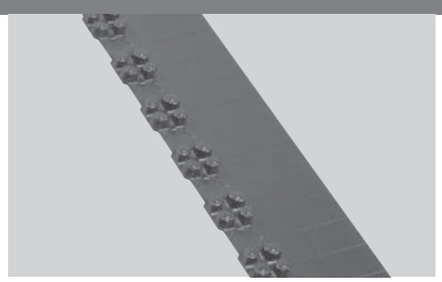


Fig. 4: Attach the heating pipe to the manifold and you're done!

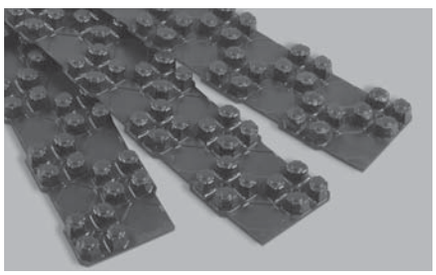
Naked Preformed Plate



Naked Preformed Plate



Doorway transition element



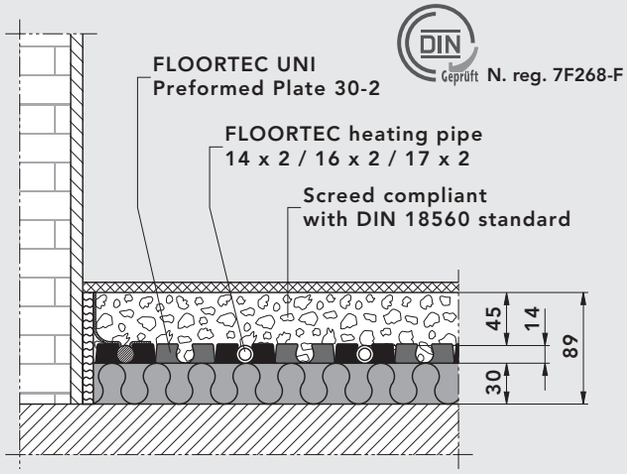
Connecting element

Retaining screw

Technical data	Naked Preformed Plate
Item no.	FBHWA014587147A0
Pipe diameter	14 - 17 mm
Useable area per plate	1,20 m²
Spacing when laid in straight runs	60 mm
Spacing when laid in a diagonal	84 mm
Dimensions of plate, including overlap	1.470 x 870 mm
Overall height of plate	20 mm
Packaging units – no. of items / per box	14
Push-button principle	ja

DIN Geprüft N. reg. 7F268-F

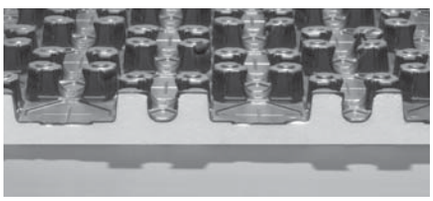
Floor sections



FLOORTEC Preformed plate system UNI 30-2
- Preformed Plate underfloor heating system
- DIN-tested
- Includes impact-noise insulation

FLOORTEC Preformed plate system UNI 11
- Preformed Plate underfloor heating system
- DIN-tested

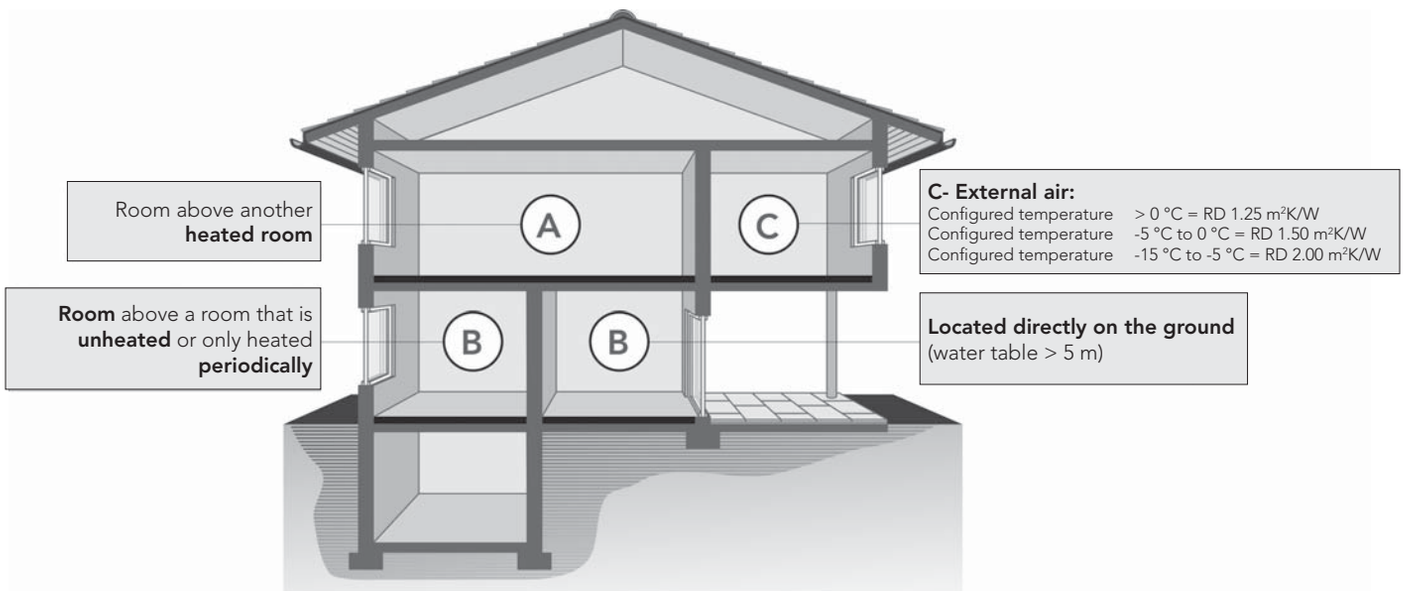
Sample construction heights for floors with high-traffic load



FLOORTEC UNI Preformed Plate 11 system

Effective Rλ:	≥ 0,34 m² K/W
Pressure load:	75 kN/m²**

Underfloor heating compliant with ÖNORM EN 1264-4

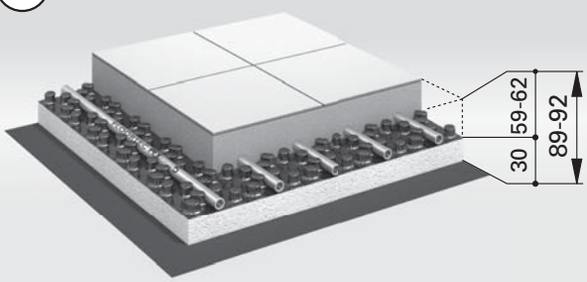


Floor sections

Minimum construction heights in accordance with ÖNORM EN 1264-4, incorporating the EnEV

Separating floor in a residential building
above rooms used for the same purpose

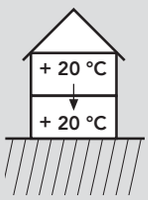
A1



FTN floor section 89-92 mm

EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 89-92

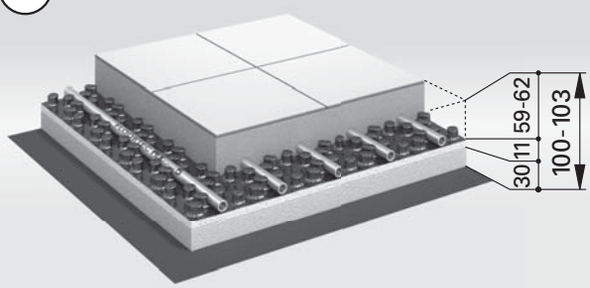
Required Rλ:	≥ 0,75 m² K/W
Effective $R\lambda_{insulation}$:	0,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0

Separating floor in a residential building
above rooms used for the same purpose

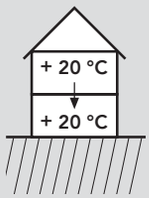
A2



FTN floor section 100-103 mm

EnEV – FLOORTEC Preformed plate system UNI 11 BH 100-103

Required Rλ:	≥ 0,75 m² K/W
Effective $R\lambda_{insulation}$:	0,97 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	0 dB*
Pressure load:	3,5 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PTS SE 30 mm insulation (part of the building itself)

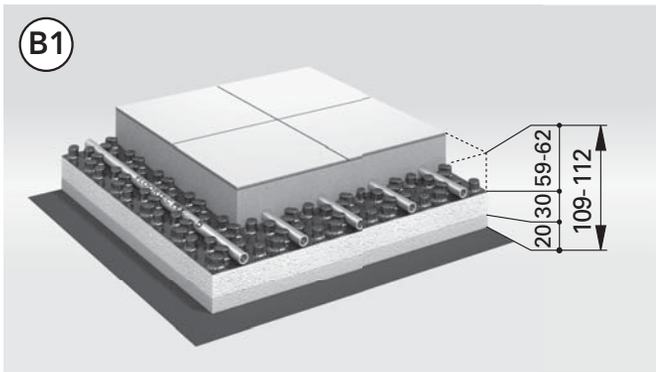
Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
A	Heated room situated below **RD = 0,75 m² K/W**	A1	FBHD4300084144A0	0,75	Thermal and impact-noise insulation 30-2	040	89-92 mm
		A2	FBHD1110084144A0	0,97	Thermal insulation 11	035	100 -103 mm
			Forms part of the building itself		Thermal and impact-noise insulation PST SE 30-3	045	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

DIN Geprüft N. reg. 7F268-F

Floor sections

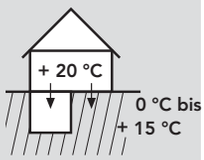
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 109-112 mm

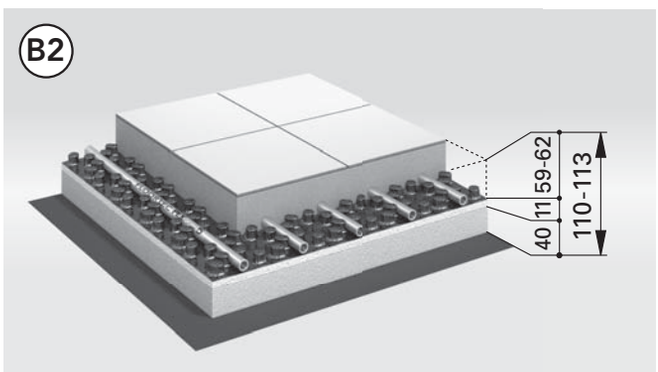
EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 109-112

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R\lambda_{insulation}$:	1,25 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0
Additional insulation PST 20 mm (part of the building itself)

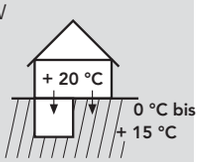
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 110-113 mm

EnEV - FLOORTEC-Noppensystem UNI 11 BH 110-113

Required $R\lambda$:	≥ 1,25 m² K/W
Effective $R\lambda_{insulation}$:	1,31 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	0 dB*
Pressure load:	5,0 kN/m²**



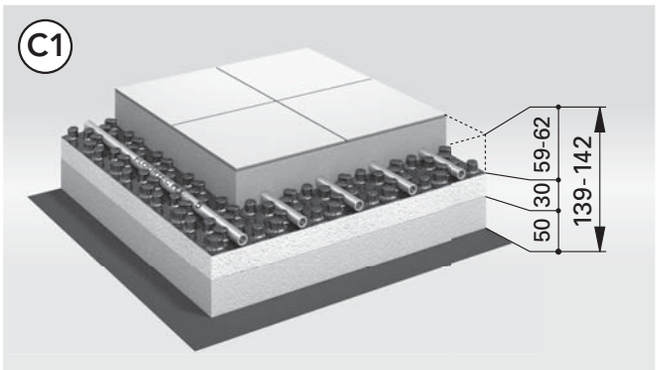
Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PTS SE 40 mm insulation (part of the building itself)

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
B	Unheated room or room heated at intervals, situated below or directly on the ground **RD = 1,25 m² K/W**	B1	FBHD4300084144A0	1,25	Thermal and impact-noise insulation 30-2	040	109 - 112 mm
			Forms part of the building itself		Thermal and impact-noise insulation PST 20-2	040	
		B2	FBHD1110084144A0	1,31	Thermal insulation 11	035	110 - 113 mm
			Forms part of the building itself		Thermal insulation PS-SE 40 mm	040	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

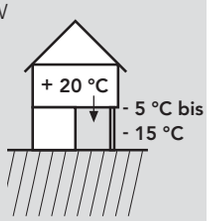
Floor sections

Separating floor in a residential building
against outdoor air



EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 139-142

Required R_λ:	≥ 2,00 m² K/W
Effective $R\lambda_{insulation}$:	2,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**

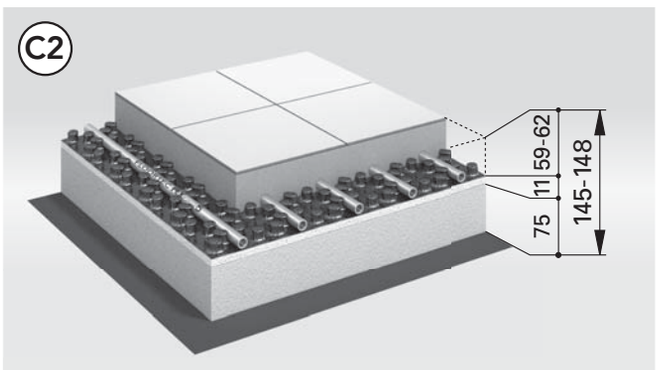


Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0
Additional insulation PUR 50 mm (part of the building itself)

FTN floor section 139-142 mm

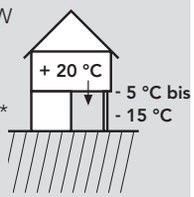
Preformed plate system

Separating floor in a residential building
against outdoor air



EnEV – FLOORTEC Preformed plate system UNI 11 BH 145-148

Required R_λ:	≥ 2,00 m² K/W
Effective $R\lambda_{insulation}$:	2,18 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	0 dB*
Pressure load:	3,5 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PS SE 75 mm insulation (part of the building itself)

FTN floor section 145-148 mm

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
C	Room above external air temperature **RD = 2,00 m² K/W**	C1	FBHD4300084144A0	2,75	Thermal and impact-noise insulation 30-2	040	139-142 mm
			Forms part of the building itself		Thermal insulation PUR 50 mm	025	
		C2	FBHD1110084144A0	2,18	Thermal and impact-noise insulation 11	040	145-148 mm
					Thermal insulation PS-SE 75 mm		

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

List of materials required

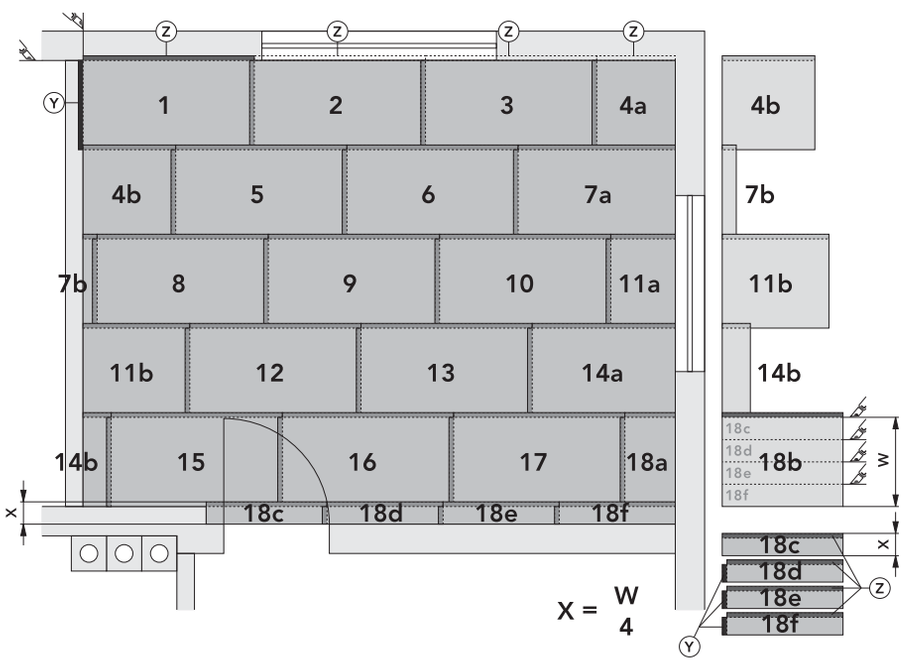
Preformed plate system UNI – Laying spacings in cm	6	12	18	24	30
Pipe with damp-proof membrane FBCXC5C1420...A0 FBCXC5C1720...A0 FBBPTAC1620.....A0	ca. 16,70 m	ca. 8,30 m	ca. 5,50 m	ca. 4,20 m	ca. 3,40 m
optionally including: FLOORTEC UNI Preformed plate FBHD4300084144A0 FBHD1110084144A0	1,00 m² 1,00 m²	1,00 m² 1,00 m²	1,00 m² 1,00 m²	1,00 m² 1,00 m²	1,00 m² 1,00 m²
Edge insulation strips per m² FBROTHEPI81600A0	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m
Screed additive per m² FBROTHECE20000A0	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.

Laying of the Preformed plate system UNI

The Preformed plate system UNI is fitted in accordance with the FLOORTEC Preformed plate system UNIs installation guide. Overlapping the covering film (25 mm) creates a closed impact noise insulation layer over the entire surface, which, after the pipes have been laid, is ready for the application of the cement or self-levelling screed. Thanks to the carefully conceived cutting and overlapping technology in each system element, the number of off-cuts remains very low. The overall surface should be laid so that it is joint-free and free of voids. Any open interfaces that are necessary due to the configuration of the building itself should be sealed off before the screed is applied. The DIN 18560 standard requires that the impact-noise insulation layer must not be interrupted.

Important: Before laying the first row of UNI System Preformed plates, the **Y** and **Z** overlap (25 mm) on the UNI System Preformed Plate **1** must be cut off. Only the **Z** overlap needs to be cut-off from System Preformed Plates **2, 3** and **4a**. The **Z** overlap must also be removed from UNI System Preformed Plate **18b**, as only then can it be sub-divided into 4 equally-sized parts (**18c, 18d, 18e** and **18f**). The **Y** and **Z** overlaps must now be recreated on the plates created in this way, except in the case of plate **18c**, which only requires the **Z** overlap. This can be achieved by turning the plate around and cutting off a 25 mm-wide strip of the polystyrene foam.

Typical installation:



Installation of edge insulation strips

The first stage in the installation process is to fit the FLOORTEC edge insulation strip to all vertical building components, such as external and internal walls, columns and door frames (Figure 1), without leaving gaps.

In order to avoid heat and sound bridges from being created, it is important that none of the underfloor heating screed, plaster or joint sealant or other materials are able to penetrate into the edge joints during the installation. Only once the floor-laying process is complete should any part of the edge insulation strip that is still visible be removed.

In the case of multi-layer insulation layers, the edge insulation strip must be fitted before the uppermost insulation layer is applied. While the screed is being applied, the edge insulation strip should be secured so that is unable to change position. Due to their exposure to heat, underfloor heating screeds experience a greater expansion than unheated floor constructions. For this reason, a gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used with System Preformed Plates.

The edge insulation strip is made up of closed-cell PE-foam, with a side-bonded film apron compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid on top of the preformed plate (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges.

The rounded PE profile is also used with this in order to fix the film strip in position (Fig. 2).

Figure 1: Edge insulation strip with additional strip of film

Figure 2: Fixing the additional strip of film

Installation of System Preformed Plates

Installation is carried out across the full surface-area of the room, in accordance with the current regulations. In the case of floors between equally heated spaces and over spaces used for a different purpose, that standard is the ÖNORM EN 1264. In the case of ceilings on top of unheated spaces, on top of the ground itself or over external air, installation is carried out in accordance with EnEV.

The large-sized system elements (1.2 m2) are installed, as usual, from left to right (Figure 1). Thanks to the carefully-developed cutting and overlapping technology, there will be hardly any off-cuts. Most of the time, the next row will begin with the piece cut off at the end of the previous one.

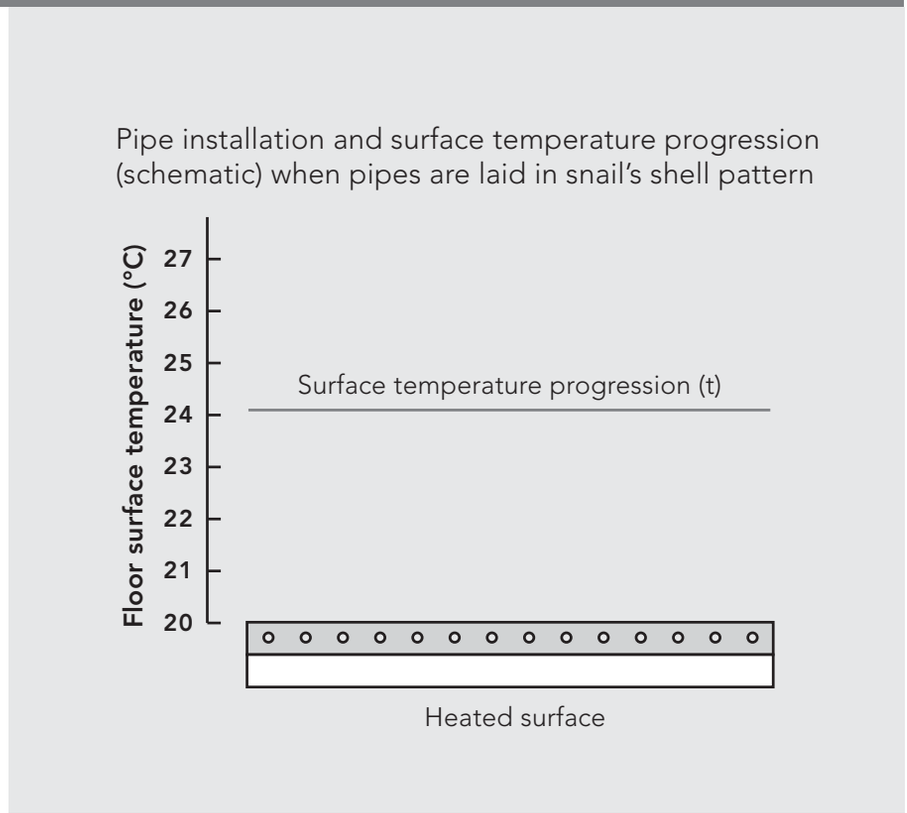
Adjoining edges must be connected together using the FLOORTEC connecting element, in order to prevent the formation of heat and sound bridges and to prevent screed water from penetrating the gap.

Figure 1:
Installation of system elements

Possible configurations/pipe installation

The snail's shell installation pattern (Figure 2), on the other hand, offers an even surface temperature progression, as the flow and return sections of the pipe are located alternately adjacent to one another. Once installed, the spacing between heating pipes will be between 60 and 300 mm. In living spaces, the maximum floor temperature dictates that the minimum spacing is 120 mm, whilst the spacing must also not exceed 300 mm, as this will create variations in temperature across the floor. Nowadays, the snail's shell installation pattern is preferred for the installation of underfloor heating pipes using self-levelling screeds.

In order to achieve higher heat flows, it is also possible to reduce the spacing between the pipes. This technique is often used at the edges of the room, in front of windows and external surfaces, in order to compensate for the cold radiation effect. Installers are able to choose to set up the areas at the edge of the room as a separate heating loop (Figure 4) or to integrate them into the existing heating loop (Figure 3). These are then referred to as integrated peripheral areas.



Surface temperature progression when pipes are laid in snail's shell pattern

Figure 2:
Snail's shell installation pattern

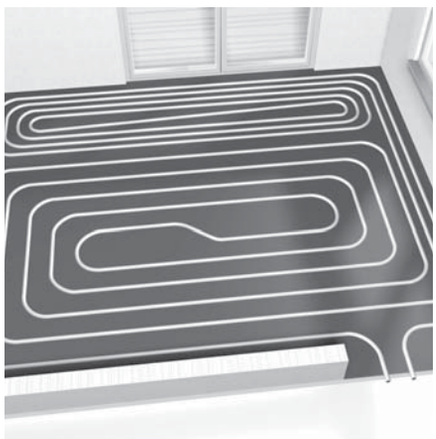


Figure 3:
Snail's shell installation pattern with integrated peripheral area

Figure 4:
Snail's shell pattern with separate peripheral area

Safety pipe

Installation of heating pipes
The installation of the heating pipes is carried out using the spacings determined in the project planning documentation.
Starting at the heating loop manifold, the heating pipe is laid onto the system elements in accordance with the specified spacing. Bend radii of below 5 x Da are not permitted. Heating loops should, if possible, be laid from a single length of pipe; joints should be avoided and if they are required, should only be located in a straight section of pipe and should be indicated on the revised plan. Heating pipes must consist of heating loops no longer than 120m (using 14 x 2 mm FLOORTEC Pe-Xcellent 5) or 140 m (using 16 x 2 mm FLOORTEC aluminium composite pipe or 17 x 2 mm FLOORTEC Pe-Xcellent 5 pipe). Protective bushings should be used whenever the heating pipes are required to pass through movement joints, walls or ceilings. The heating pipes are fixed to the FLOORTEC Preformed Plates by pressing the heating pipe down into the raised burls.

Pressure test
Once installation is complete, the system should be filled and vented. The installed system should be subjected to a pressure test lasting at least 24 hours, in accordance with ÖNORM EN 1264. The test pressure should be at least double the maximum permitted operating pressure of the heating system, or a minimum of 6 bar. The tightness and test pressure should be recorded in accordance with the tightness testing protocol. If there is a risk of frost, a frost protection compound should be added to the heating fluid.
If, in the future, a frost protection compound is no longer required in order to operate the system, it should be removed by draining the system and flushing it at least 3 times with water. While the screed is being applied, the heating loops should also be subjected to test pressure, so that any external damage is immediately noticeable. Once the pressure test is complete, all adapters on the heating loop manifold should be checked.

Laying the System Preformed Plate – step by step


Install the edge insulation strip with lateral film apron.

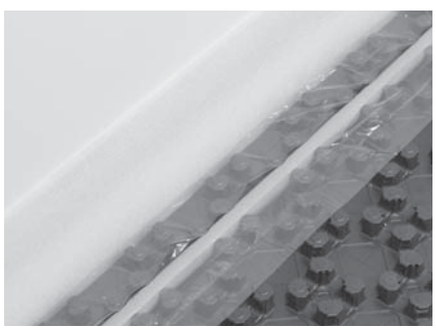

Lay the plates from left to right.


Continue laying the FLOORTEC System Preformed Plates.


Always begin the next row with the piece cut off at the end of the previous row.


The plates can be laid quickly and cleanly, using the overlapping technique.


Fix the film on the edge insulation strip with….


...the rounded PE profile.


Simply use your feet to press the flexible and easy-to-lay Pe-Xcellent 5 underfloor heating pipe (14 x 2 mm, 17 x 2 mm) or the aluminium composite pipe (16 x 2) into the walkable raised burls on the preformed plates.

DIN Geprüft **N. reg. 7F147**

Stapler system.

Guarantee statements available at **www.vgoelundnoot.at/garantieerklaerungen**

Description / Area of application

An underfloor heating system is only as good as its individual components and the way in which their functions have been harmonised with one another. From a technical perspective, each FLOORTEC underfloor heating system has been conceived for the area of application concerned so as to ensure optimum integration between the components concerned, thereby guaranteeing the functional capability of the system.

All FLOORTEC underfloor heating systems can be installed by two people and no off-cuts are generated.

Heat and impact-noise insulation roll
A track of PST Styropor, 1 metre wide and 10 m long, forms a highly-effective heat and impact-noise insulation system (Figure 1). Angled cuts have been inserted into the track at regular intervals. This enables it to be coiled up into an oval shape for transportation purposes and enables the tracks to be laid quickly once on site. After installation, the cuts will close up again, forming a homogenous insulating layer.

Webbing film
A connecting film has been laminated onto the heat and impact-noise insulation roll (figure 2). The tacker cover layer made from webbing film forms the basis for a rapid, problem-free and safe installation. Installation: the Tacker installation device pushes the Tacker heating-pipe retention clips (Figures 3 and 4), which are fitted with barbs on each side, over the heating pipe and down into the insulating layer. The Tacker heating-pipe retention clips are therefore hooked into the PST and are held safely in position in the insulating layer by the webbing film. The webbing film incorporates a high degree of protection to prevent the clips from being torn out, thereby ensuring that the underfloor heating pipe is held firmly in place at all times.

A lined grid has been printed on onto the upper side of the webbing film, in order to ensure that a uniform spacing is maintained while laying the underfloor heating pipe.

The very latest feature of the insulating rolls is that they incorporate a 3 cm overlapping self-adhesive strip at the joints.

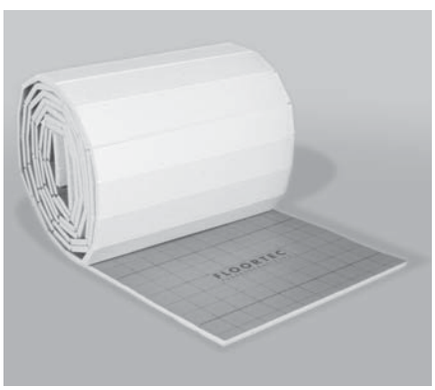


Figure 1:
FLOORTEC insulation roll 30-2

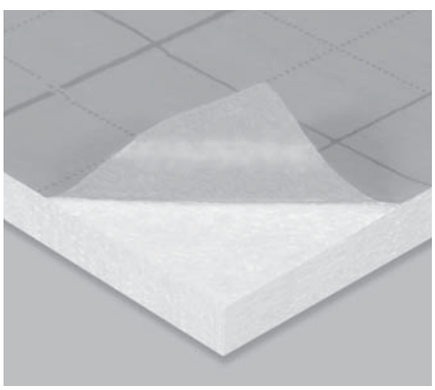


Figure 2:
Insulation roll with webbing film

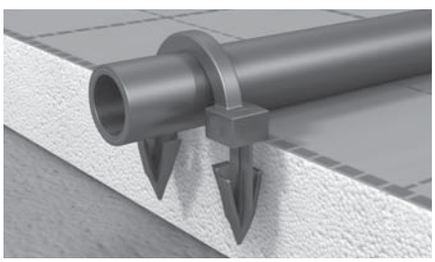


Figure 3:
3D Tacker clips

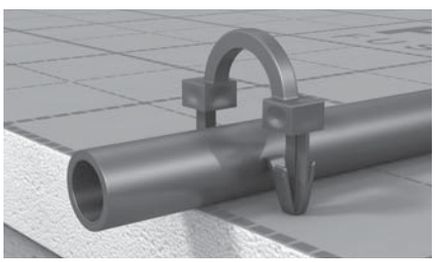


Figure 4:
3D Tacker clips

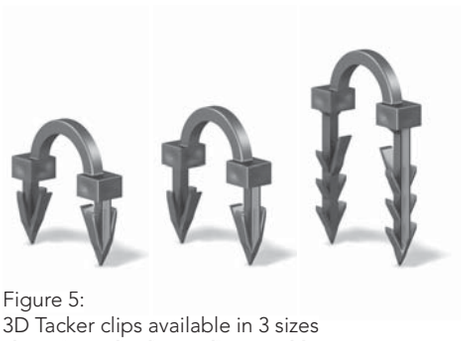


Figure 5:
3D Tacker clips available in 3 sizes
short (standard), medium and long

Description / Areas of application

Edge insulation strip
The edge insulation strip (Figure 5) is used to form a seal against vertical elements such as walls, columns or doorframes, fulfilling the requirement of the DIN 18560 standard by preventing the screed from coming into contact with static elements and forming sound bridges. The edge insulation strip forms a rapid and clean seal with the insulation layers on the floor.
The installation time will depend upon the situation in each room.

Installation of the edge insulation strip
The first stage is to install the FLOORTEC edge insulation strip (Figure 5) to all vertical parts of the building such as outer and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other foreign substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, a gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with Tacker Plates. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron and pre-prepared tear-off slits compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be fixed together using self-adhesive tape (Figure 6).

Off-cuts
All FLOORTEC system elements can be laid without off-cuts. The latest feature of the insulation rolls is that they now have a 3-cm overlapping self-adhesive strip at the edges. Even small off-cuts can be laid and used, which means no material is wasted.

Noise protection properties
The impact-noise insulation roll complies with the DIN 4109 standard "Sound Insulation in Buildings" and, depending on the version, provides considerable protection against impact noise.

Fire protection properties compliant to DIN 4102
The FLOORTEC impact-noise insulation roll: construction material class B2.

Moisture protection
The film cover on the upper side of the element guarantees optimum protection against moisture, compliant with DIN 18560.

PUR – folding strip WLG 025
Made from CFC-free PUR foam system with Tacker-compatible aluminium strip webbing, gridded covering layer and ALU/PE foam strip below – 5 mm (Figure 7).

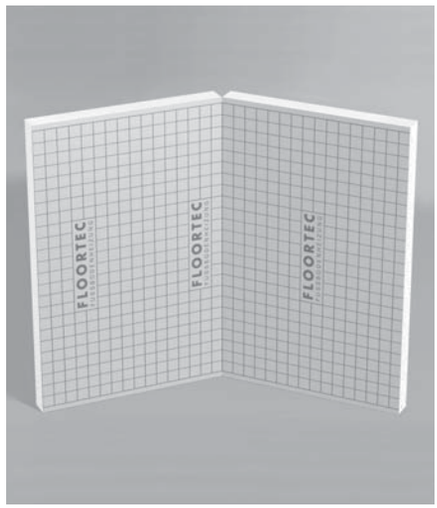


Figure 7: PUR folding strip – WLS 025

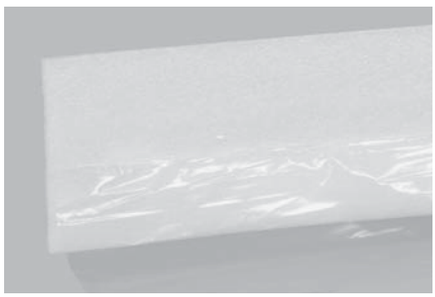


Figure 5: FLOORTEC edge insulation strip

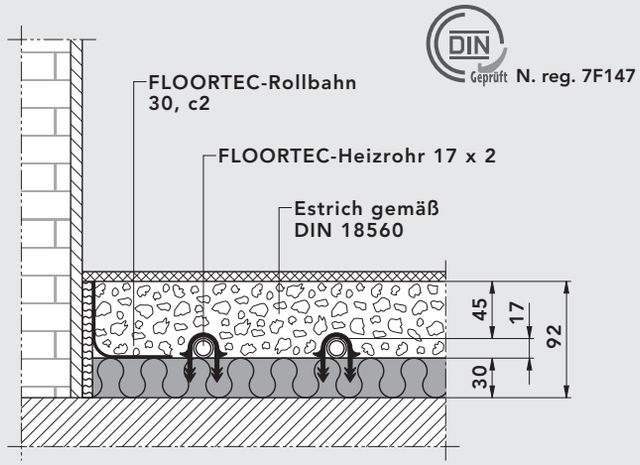

Figure 6: Sealing down the film apron

FLOORTEC 3D UNI Tacker installation device
Suitable for use with all FLOORTEC Tacker clips (SHORT, MEDIUM and LONG). FLOORTEC Tacker installation devices are used as a time-saving means of attaching heating pipes to an underfloor consisting of genuine FLOORTEC Stapler system impact-noise insulating plates, incorporating a patented anchoring webbing.

In line with the high level of quality we set out to provide, all FLOORTEC products meet the relevant quality, DIN and manufacturing standards.

DIN Geprüft N. reg. 7F147

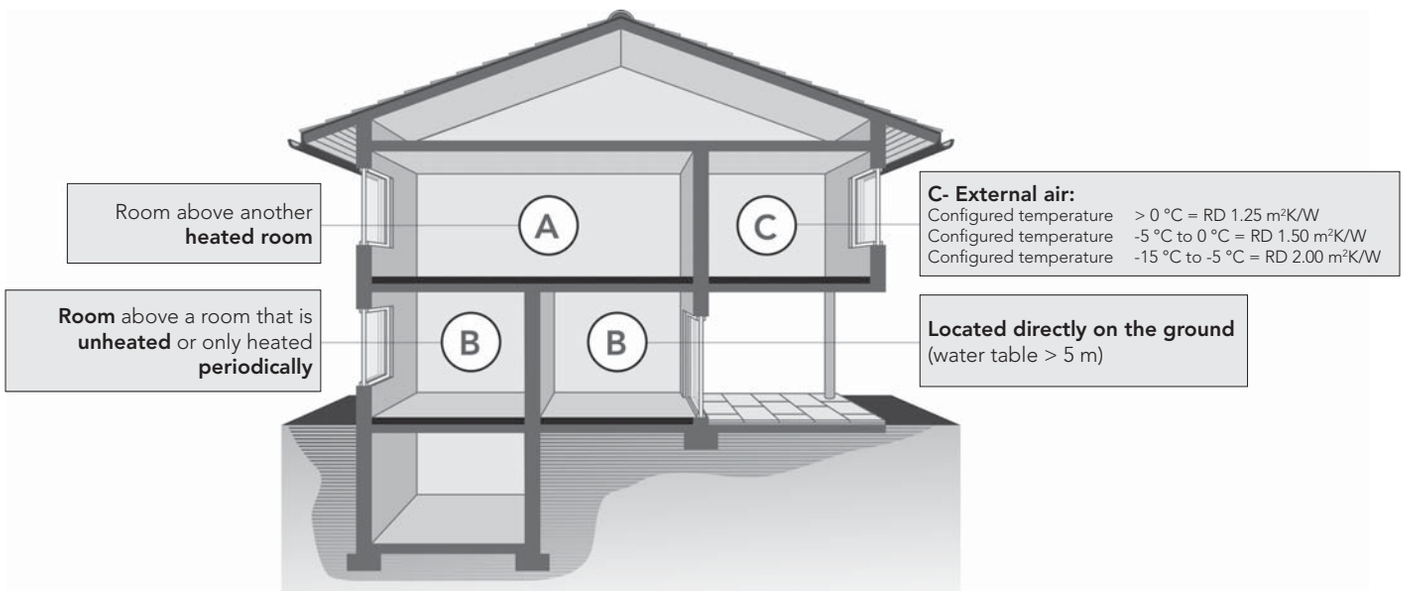
Floor sections



FLOORTEC Track roll 30, c2
- Stapler system underfloor heating technology
- DIN-tested
- Plastic gridded cover layer including webbing
- Heat and impact-noise insulation, covering an area of 10 m²

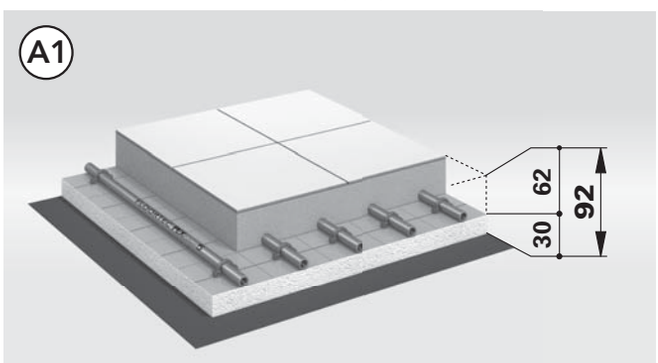
FLOORTEC PUR folding plate
- Stapler system underfloor heating technology
- Aluminium covering layer
- 5 mm PE impact-noise insulation
- 2 folding tracks

Underfloor heating, incorporating the ÖNORM EN 1264-4



Minimum construction heights, in accordance with ÖNORM EN 1264-4, including the EnEV

Separating floor in a residential building
above rooms used for the same purpose

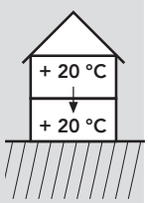


FTT floor section 92 mm

EnEV - FLOORTEC-Stapler system 30-2 TD BH 92

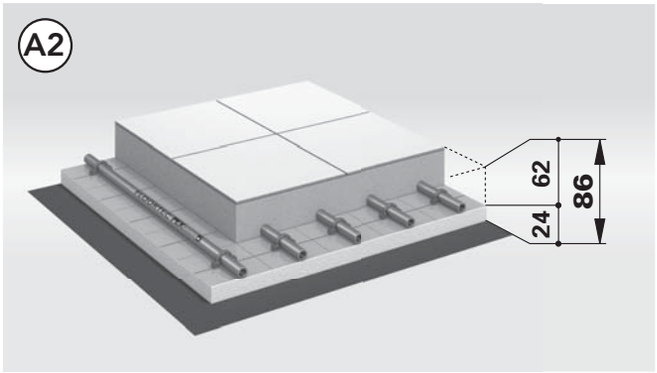
Required R_{λ}:	≥ 0,75 m² K/W
Effective $R_{\lambda\ insulation}$:	0,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**

Floor construction consisting of:
Impact-noise insulation 30-2mm FBIC4301001000A0



Floor sections

Separating floor in a residential building
above rooms used for the same purpose

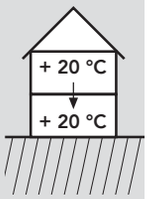


FTT floor section 86 mm

EnEV - FLOORTEC-Stapler system PUR 24 TD BH 86

Required R_{λ}:	≥ 0,75 m² K/W
Effective $R_{\lambda\ insulation}$:	0,86 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	20 dB*
Pressure load:	50 kN/m²**

Floor construction consisting of:
PUR folding plate 24 mm FBIF7241250160A0



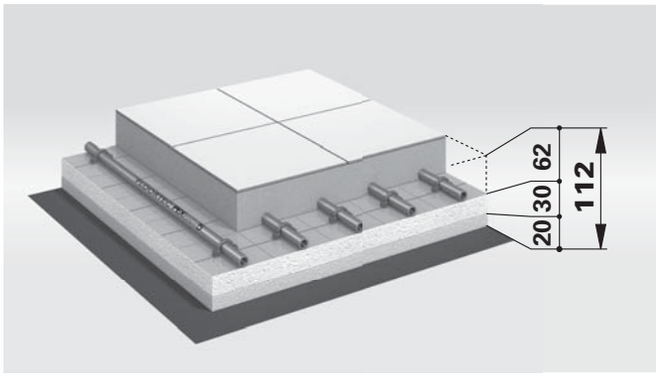
Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
A	Heated room situated below **RD = 0,75 m² K/W**	A1	FBIC4301001000A0	0,75	Thermal and impact-noise insulation 30-2	040	92 mm
		A2	FBIF7241250160A0	0,86	PUR Folding strip 24 mm including impact-noise improvement (20 dB)	025	86 mm

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m2 for perpendicular floor service load, as set out in DIN 1055.

DIN Geprüft N. reg. 7F147

Floor sections

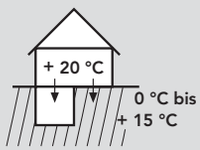
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTT floor section 112 mm

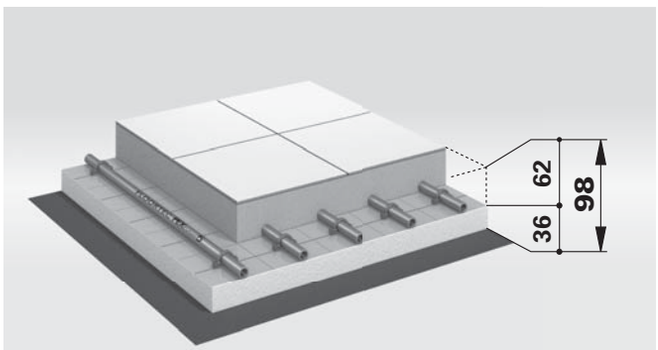
EnEV - FLOORTEC-Stapler system 30-2 TD BH 112

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\ insulation}$:	1,25 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**



Floor construction consisting of:
Impact-noise insulation 30-2 mm FBIC4301001000A0
Additional insulation PS SE 20 mm (part of the building itself)

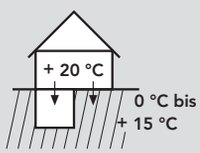
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 98 mm

EnEV - FLOORTEC-Stapler system PUR 36 TD BH 98

geforderter R_{λ}:	≥ 1,25 m² K/W
wirksamer $R_{\lambda\ Dämm}$:	1,34 m² K/W
Trittschall-Verbesserungsmaß $L_{w,R}$:	20 dB*
Druckbelastung:	50 kN/m²**



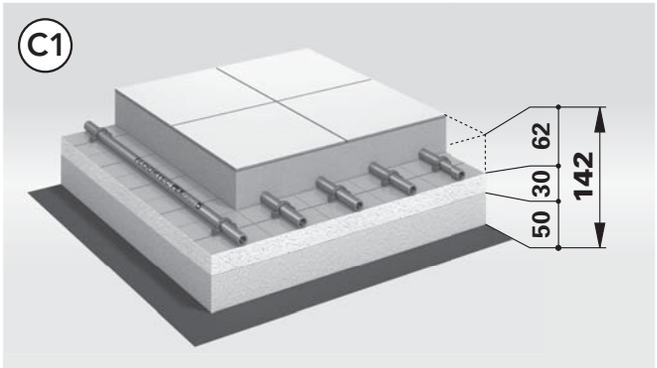
Floor construction consisting of:
PUR Folding plate 36 mm FBIF7361250160A0

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
B	Unheated room or room heated periodically situated below, or directly on the ground **RD = 1,25 m² K/W**	B1	FBIC4301001000A0	1,25	Thermal and impact-noise insulation 30-2	040	112 mm
			Forms part of the building itself		Thermal insulation PS-SE 20 mm	040	98 mm
		B2	FBIF7361250160A0	1,34	PUR Folding strip 36 mm inc. impact-noise improvement (20 dB)	025	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m2
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

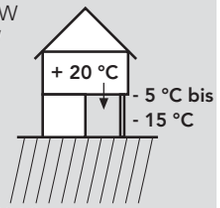
Floor sections

Separating floor in a residential building
above external air



EnEV - FLOORTEC-Stapler system 30-2 TD BH 142

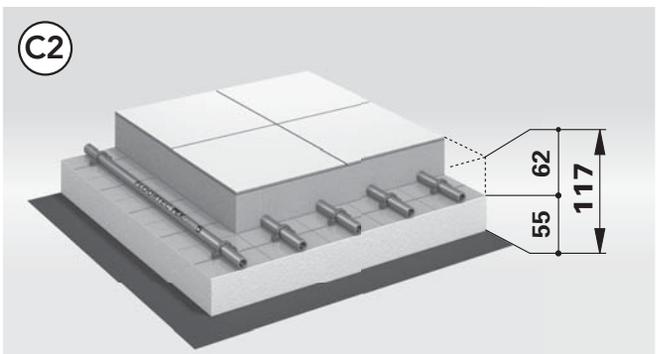
Required R_λ :	≥ 2,00 m² K/W
Effective $R_{\lambda\ insulation}$:	2,00 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**



Floor construction consisting of:
Impact-noise insulation 30-2 mm FBIC4301001000A0
Additional insulation PS SE 50 mm (part of the building itself)

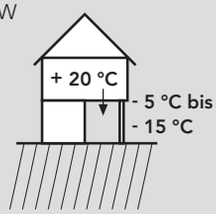
FTT floor section 142 mm

Separating floor in a residential building
above external air



EnEV - FLOORTEC-Stapler system PUR 55 TD BH 117

Required R_λ:	≥ 2,00 m² K/W
Effective $R_{\lambda\ insulation}$:	2,10 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	20 dB*
Pressure load::	50 kN/m²**



Floor construction consisting of:
PUR Folding plate 55 mm FBIF7551250160A0

FTN floor section 117 mm

Stapler system

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
C	Outer air temperature below **RD = 2,00 m² K/W**	C1	FBIC4301001000A0	2,00	Thermal and impact-noise insulation 30-2	040	142 mm
			Forms part of the building itself		Thermal insulation PS-SE 50 mm	040	
		C2	FBIF7551250160A0	2,10	PUR Folding strip 55 mm inc. impact-noise improvement (20 dB)	025	117 mm

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

Installation of system elements additional insulation

Two methods for installing the system elements have been found to be satisfactory:

• Continuous installation:
The first FLOORTEC system elements are first laid along a wall (consecutive numbers 1 to 6). The installer then begins the next row by laying the remaining portion of element 2 (no. 2 in the picture). It is essential to make sure that the edge that is cut by hand is placed against the edge insulation strip.

• Important:
When two layers are being installed one on top of another (additional insulation), it is always important to make sure that the joints in the second layer do not coincide with those in the first layer. Wherever two system elements come together, the joint should be sealed using adhesive tape, in order to prevent the screed from penetrating beneath the insulation. If an anhydrite self-levelling screed is being used, all joints, therefore including the film apron of the edge insulation strip, must be sealed tightly using adhesive tape. Installation is carried out across the full surface-area of the room, in accordance with the current regulations. In the case of floors between equally heated spaces and over spaces used for a different purpose, the applicable standard the ÖNORM EN 1264. In the case of floors on top of unheated spaces, on top of the ground itself or over external air, installation is carried out in accordance with EnEV.

The prefabricated system rolls can be laid quickly and almost entirely without off-cuts.

Pieces can be cut to fit any remaining areas using a separating knife and any off-cuts can be reused. Any edges must be cut to fit against the edge insulation strips. Any joints between elements must be covered using the self-adhesive FLOORTEC adhesive tape, in order to avoid heat and sound bridges.

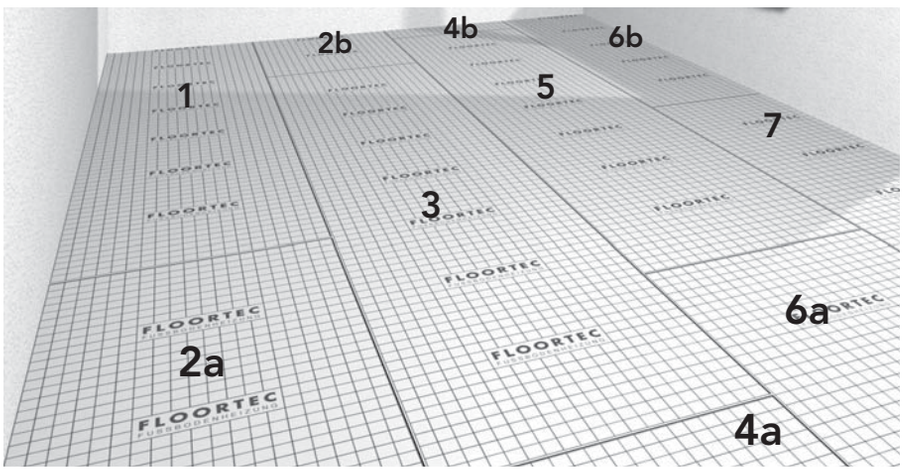
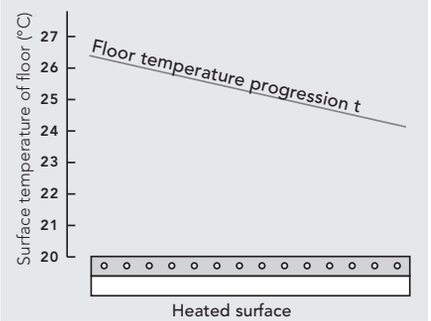


Figure 1: Continuous installation

Floor temperature progression when heating pipe routed in a meandering pattern (schematic)



Oberflächentemperaturverlauf bei der mäanderförmigen Installation.

• Cross-joint installation:
The first row of system elements is installed in a similar way to the one used in the continuous installation method. When installing the next row, the installer begins with a new element no. 3. The off-cuts of the elements are used to complete gaps in the vicinity of the wall. In this cases too, it is essential to make sure that the edges cut by hand are always placed against the edge insulation strip.

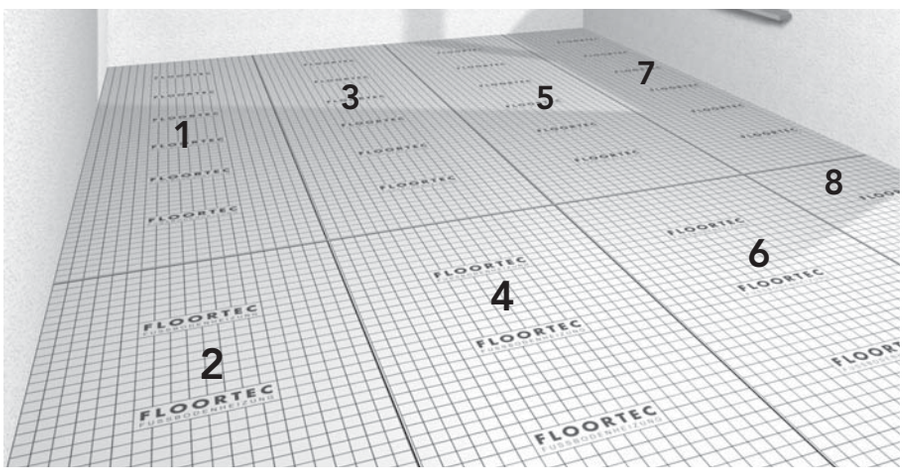
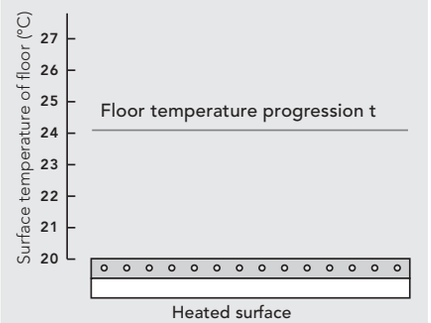


Figure 2: Cross-joined installation

Floor temperature progression when heating pipe routed in a snail's shell pattern (schematic)



Development of surface temperature when heating pipe laid in a snail's shell pattern.

Possible installation configurations/pipe installation

Heating pipes can be laid in one of two basic patterns:
Each method of installation has been assigned a characteristic and highly simplified surface temperature progression.

In the case of the meandering installation pattern (Figure 1), the heated water normally enters the room with the flow on the outer surface of the room and cools off as it flows through each of the meanders. As a result, surface temperatures are higher near the point where the heated water enters the room.

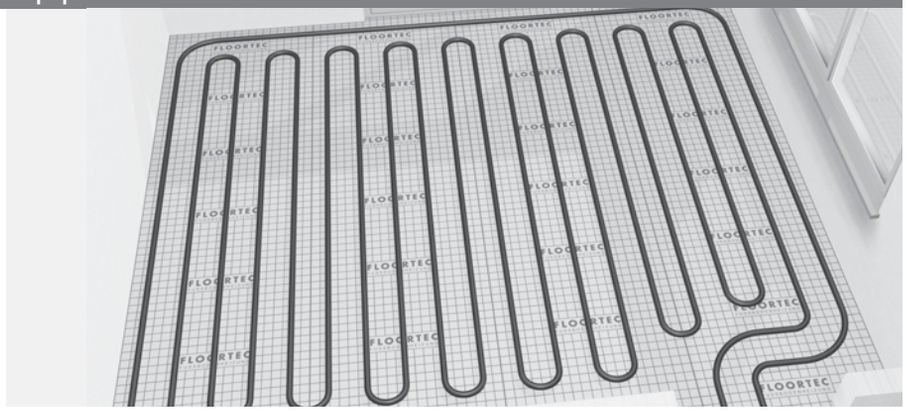


Figure 1: Meandering installation pattern

The snail's shell installation pattern (Figure 2), on the other hand, offers a more even surface temperature progression, as the flow and return sections of the pipe are located alternately adjacent to one another.
Once installed, the spacing between heating pipes will be between 100 and 300 mm. In living spaces, the maximum surface temperature of the floor dictates that the minimum spacing must be 150 mm, whilst the spacing must also not exceed 300 mm, as this will create variations in temperature across the floor. Nowadays, the snail's shell installation pattern is generally preferred for the installation of underfloor heating pipes underneath a self-levelling screed. In the case of dry-laid systems, the meandering pattern is preferred, due to the configuration of the heat conduction modules.

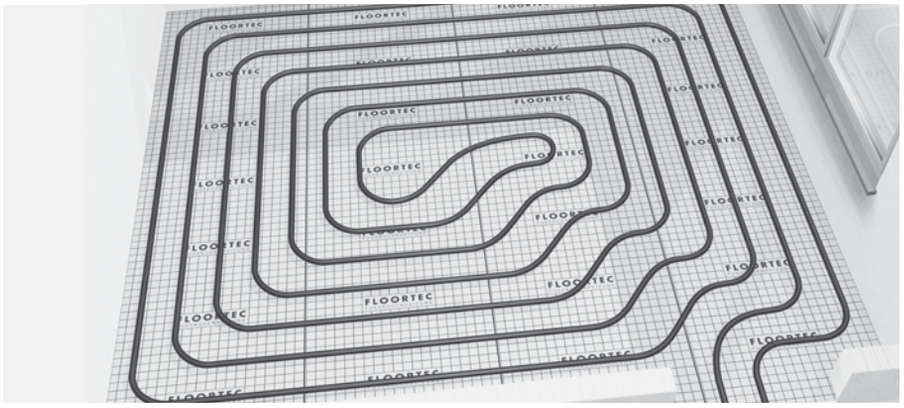


Figure 2: Snail's shell installation pattern

In order to achieve higher heat flows, it is also possible to reduce the spacing between the pipes. This technique is often used at the edges of the room, in front of windows and external surfaces, in order to compensate for the cold radiation effect. Installers are able to choose to set up the areas at the edge of the room as a separate heating loop (Figure 3) or to integrate them into the existing heating loop (Figure 4).

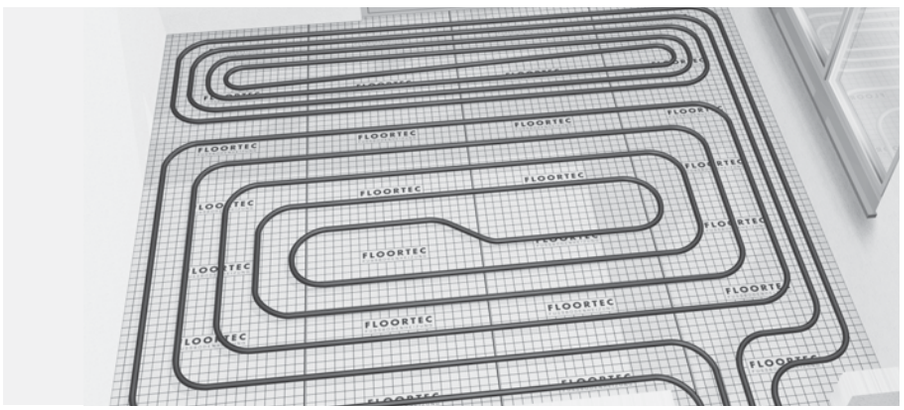


Figure 3: Snail's shell pattern with separate peripheral area

These are then referred to as integrated peripheral areas, which can be configured either using a meandering pattern or a snail's shell pattern.

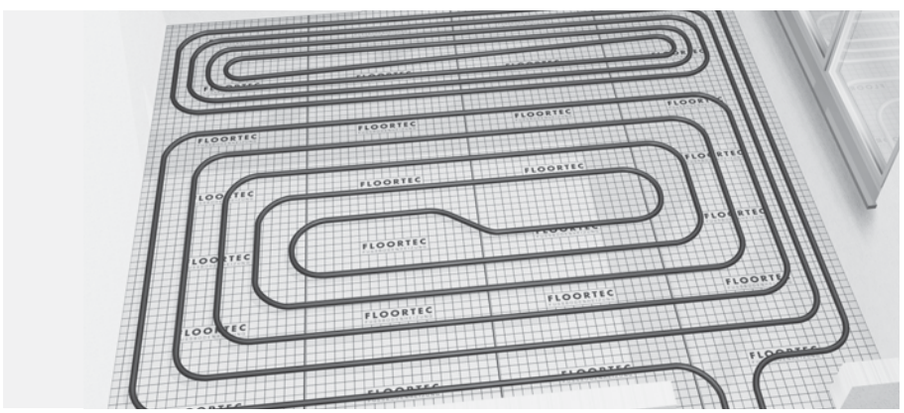


Figure 4: Snail's shell installation pattern with integrated peripheral area

DIN Geprüft N. reg. 7F147

Safety pipe

Installation of heating pipe
The installation of the heating pipes is carried out using the spacings determined in the project planning documentation.
Starting at the heating loop manifold, the heating pipe is laid onto the system elements in accordance with the specified spacing. Bend radii of below 5 x Da are not permitted. Heating loops should, if possible, be laid from a single length of pipe; joints should be avoided and if they are required, should only be located in a straight section of pipe and should be indicated on the revised plan. Heating pipes using 17 x 2 Pe-Xcellent 5 piping must consist of heating loops no longer than 140 m. Protective bushings should be used whenever the heating pipes are required to pass through movement joints, walls or ceilings. The heating pipes are fixed to the FLOORTEC Thermal and Impact-Noise Insulation roll using the Tacker installation device.

Pressure test
Once installation is complete, the system should be filled and vented. The completed system should be subjected to a pressure test lasting at least 24 hours, in accordance with ÖNORM EN 1264. The test pressure should be at least 1.3 times' the maximum permitted operating pressure of the heating system. The tightness and test pressure should be recorded, in accordance with the tightness testing protocol. If there is a risk of frost, a frost protection compound should be added to the heating fluid.

If, in the future, a frost protection compound is no longer required in order to operate the system, it should be removed by draining the system and flushing it at least 3 times with water. While the screed is being applied, the heating loops should also be subjected to test pressure, so that any external damage is immediately noticeable. Once the pressure test is complete, all adapters on the heating loop manifold should be checked.

System installation – step by step

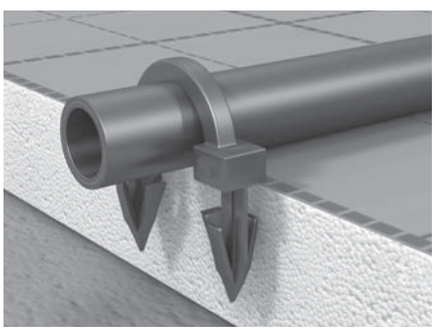

Install the edge insulation strip with its attached film apron.


Unroll and lay out the Stapler system elements.


Seal the edge insulation strips using adhesive tape (if a self-levelling screed is to be applied)

The rolls of insulation include a 3-cm self-adhesive strip and overlap at the joins.


Fasten the Stapler system heating pipe to the system elements, using the….


...patented anchoring clips.


Attach the heating pipe to the manifold and you're done!

List of materials required

Stapler system – pipe spacings in cm	5	10	15	20	25	30
Pipe with damp proof membrane **FBCXC5C1420...A0** **FBCXC5C1720...A0** **FBCXC5C2020...A0** **FBBPTAC1620.....A0**	approx. 17,50 m	approx. 9,70 m	approx. 6,40 m	approx. 4,90 m	approx. 3,70 m	approx. 3,30 m
FLOORTEC Insulation roll **FBIC4301001000A0**	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2
Pipe clips 6 mm **FBIACLI1200000A0**	approx. 34 Stk.	approx. 16 Stk.	approx. 10 Stk.	approx. 9 Stk.	approx. 8 Stk.	approx. 6 Stk.
Edge insulation strips per m^2 F**BROTHEPI81600A0**	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m^2 F**BROTHECE20000A0**	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

3D UNI Tacker device

- FLOORTEC 3D UNI Tacker device, suitable for the installation of all types of FLOORTEC Tacker clips (SHORT, MEDIUM and LONG). FLOORTEC Tacker device for the rapid installation of heating pipes to genuine FLOORTEC Stapler system impact-noise insulation underfloors with integrated patented woven anchoring layer.

Item no: FBIATOOL203D00A0

Stapler system

- 3D SHORT Tacker clip (standard), 38 mm for Pe-Xcellent 5 underfloor heating pipe 14 – 17 x 2 mm

Item no: FBIACLI1203DS0A0

- 3D MEDIUM Tacker clip

42 mm for Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm
U clips in magazine form for the rapid fixing of heating pipes onto genuine FLOORTEC Stapler system impact-noise thermal insulation with integrated woven anchoring layer, using the 3D UNI tacker device.

Item no: FBIACLI1203DM0A0

- 3D LONG Tacker clip

58 mm for special floor constructions

Item no: FBIACLI2203DL0A0

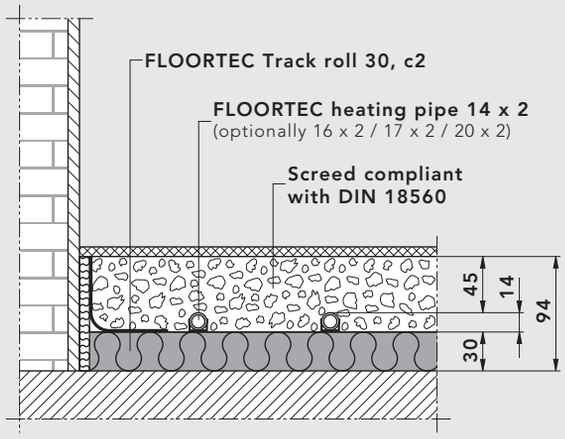
Rail-mounting system

Guarantee statements available at **www.vgoelundnoot.at/garantieerklaerungen**

List of materials required

Stapler system – pipe spacings in cm	5	10	15	20	25	30
Pipe with damp proof membrane **FBCXC5C1420...A0** **FBCXC5C1720...A0** **FBCXC5C2020...A0** **FBBPTAC1620.....A0**	approx. 17,50 m	approx. 9,70 m	approx. 6,40 m	approx. 4,90 m	approx. 3,70 m	approx. 3,30 m
Cliprail **FBJIU051420100A0**	1,00 m	1,00 m	1,00 m	1,00 m	1,00 m	1,00 m
Covering film **FBROTHECOFOIL0A0**	1,00 m²	1,00 m²	1,00 m²	1,00 m²	1,00 m²	1,00 m²
Clip **FBJIAUCL000000A0**	3 Stk.	3 Stk.	3 Stk.	3 Stk.	3 Stk.	3 Stk.
Edge insulation strips per m² **FBROTHEPI81600A0**	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m² **FBROTHECE20000A0**	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

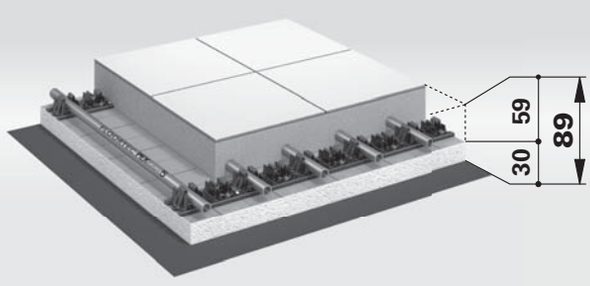
Floor sections



Important!
All floor sections have been calculated as if they are using Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm!

FLOORTEC Stapler system
- Underfloor heating Stapler system – technology

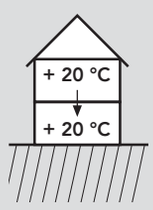
Separating floor in a residential building
above rooms used for the same purpose



FTV floor section 89 mm

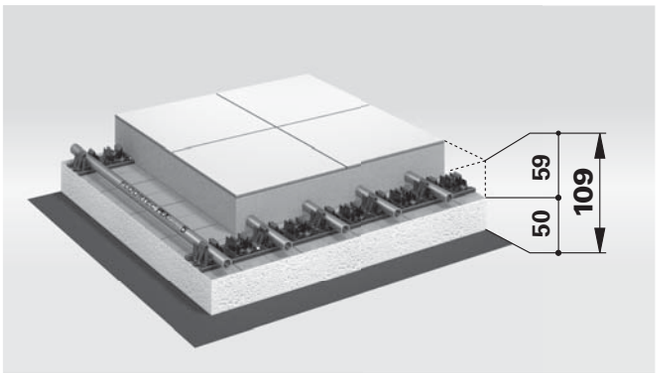
EnEV – FLOORTEC Stapler system 30-2 BH 89
Required R_{λ}: ≥ 0,75 m² K/W
Effective $R_{\lambda, insulation}$: 0,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$: 28 dB*
Pressure load: 5,0 kN/m²**

Floor section consisting of:
FLOORTEC 30-2 mm insulation
and Cliprail FBJIU051420100A0



Floor sections

Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces

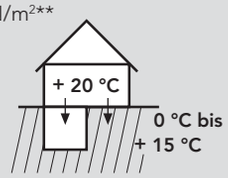


FTV floor section 109 mm

EnEV – FLOORTEC Stapler system PS 50 BH 109

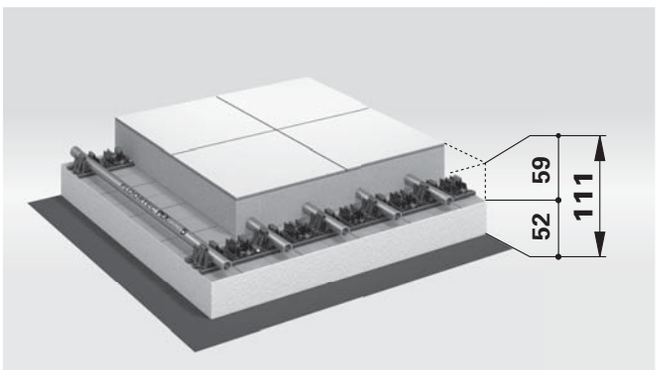
Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\ insulation}$:	1,25 m² K/W
Pressure load:	3,5 kN/m²**

Floor construction consisting of:
PS SE 50 mm insulation
(part of the building itself)
and Cliprail FBJIU051420100A0



- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

Separating floor in a residential building
above external air

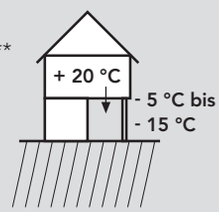


FTV floor section 111 mm

EnEV - FLOORTEC-Stapler system 52 BH 89

Required R_{λ}:	≥ 2,00 m² K/W
Effective $R_{\lambda\ insulation}$:	2,08 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	50,0 kN/m²**

Floor construction consisting of:
PUR folding plate 52 mm
(part of the building itself)
and Cliprail FBJIU051420100A0



Installation of the edge insulation strip

The first stage is to install the FLOORTEC edge insulation strip (Figure 1) to all vertical parts of the building such as external and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other foreign substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, an expansion gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with the Stapler system. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron and prepared tear-off slits compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be fixed together using self-adhesive tape (Figure 2).

Figure 1: FLOORTEC edge insulation strip

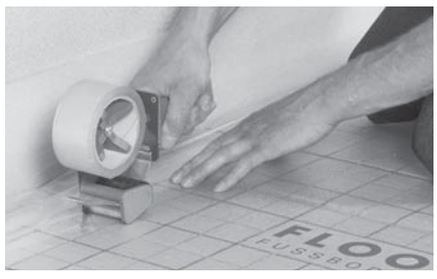


Figure 2: Sealing down the film apron

DIN Geprüft **N. reg. 7F261**

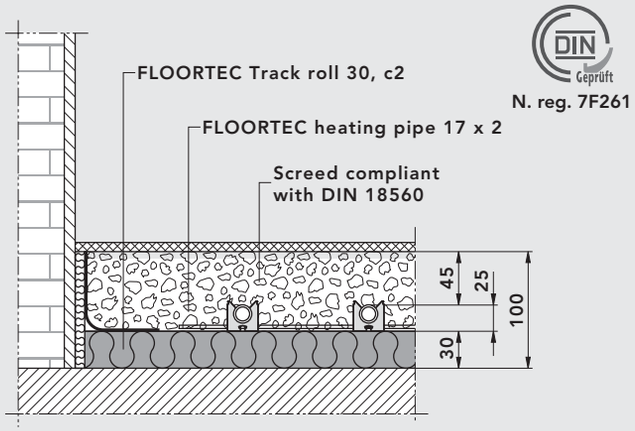
Grid mat system

Guarantee statements available at **www.vgoelundnoot.at/garantieerklaerungen**

Materialbedarf Übersicht

Grid mat system – pipe spacings in cm	5	10	15	20	30
Pipe with damp proof membrane **FBCXC5C1720...A0** **FBBPTAC1620.....A0**	approx. 20 m	approx. 10 m	approx. 6,60 m	approx. 5 m	approx. 3,30 m
Grid mat **FBGMG3...A0**	1,00 m²	1,00 m²	1,00 m²	1,00 m²	1,00 m²
Covering film **FBROTHECOFOIL0A0**	1,00 m²	1,00 m²	1,00 m²	1,00 m²	1,00 m²
Mesh connector **FBGAMCP0000000A0**	2 Stk.	2 Stk.	2 Stk.	2 Stk.	2 Stk.
Mesh clip **FBGAPCP1617000A0**	23 Stk.	15 Stk.	10 Stk.	7 Stk.	4 Stk.
Edge insulation strips per m² **FBROTHEPI81600A0**	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m² **FBROTHECE20000A0**	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

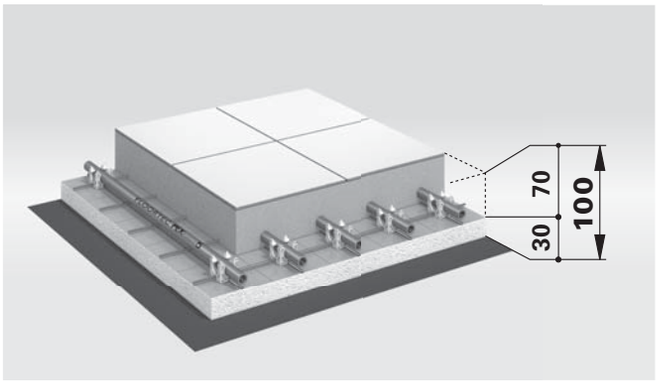
Floor sections



FLOORTEC Grid mat system
- Underfloor heating Grid mat system – technology

Floor sections

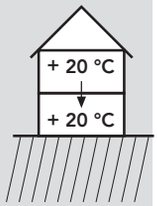
Separating floor in a residential building above rooms used for the same purpose



FTG floor section 100 mm

EnEV - FLOORTEC-Grid mat system BH 100

Required R_{λ}:	≥ 0,75 m² K/W
Effective $R_{\lambda\ insulation}$:	0,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Compression load:	5,0 kN/m²**

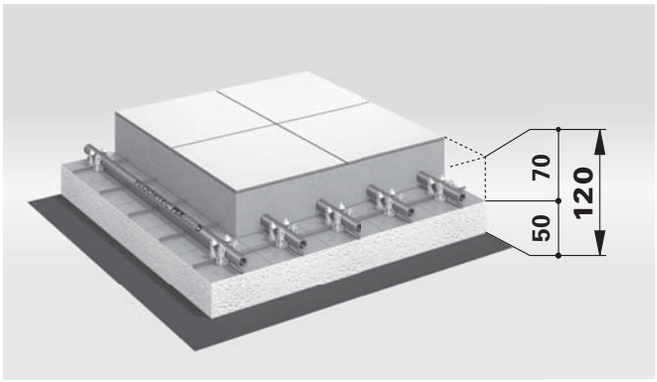


Floor section consisting of:
WTS track roll 30-2 mm FBIC4301001000A0
and mesh FBGMG3…….A0

- The height indications (in mm) relate to a screeded layer without floor covering. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces

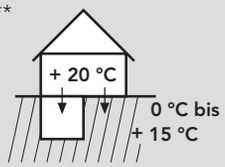
Grid mat system



FTG floor section 120 mm

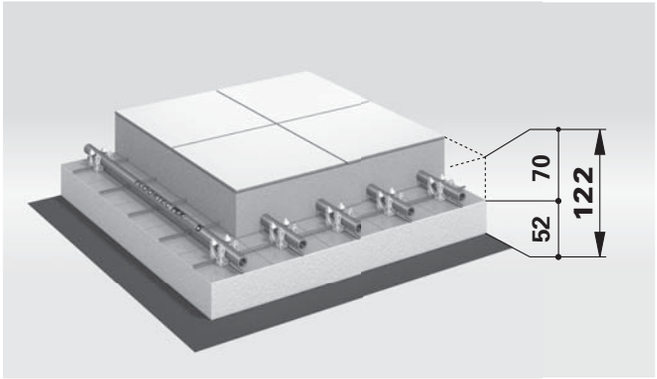
EnEV – FLOORTEC Mesh system 50 BH 120

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\ insulation}$:	1,25 m² K/W
Compression load:	5,0 kN/m²**



Floor construction consisting of:
PS SE 50 mm insulation
(fitted by the building contractor)
and Grid mat FBGMG3…….A0

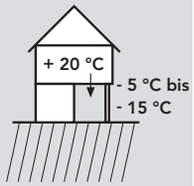
Separating floor in a residential building
above external air



FTG floor section 122 mm

EnEV - FLOORTEC-Grid mat system 52 BH 122

Required R_{λ}:	≥ 2,00 m2 K/W
Effective $R_{\lambda\ insulation}$:	2,08 m2 K/W
Compression load:	50 kN/m2**



Floor construction consisting of:
PUR 52 mm insulation
(fitted by the building contractor)
and Grid mat FBGMG3……A0

Installation of the edge insulation strip

The first stage is to install the FLOORTEC edge insulation strip (Figure 1) to all vertical parts of the building such as external and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, an expansion gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with the Grid mat system. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron compliant with DIN 18560. It is important to ensure that the PE film attached to the edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be masked using self-adhesive tape (Figure 2).

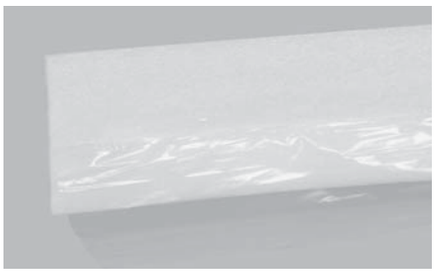


Figure 1: FLOORTEC edge insulation strip

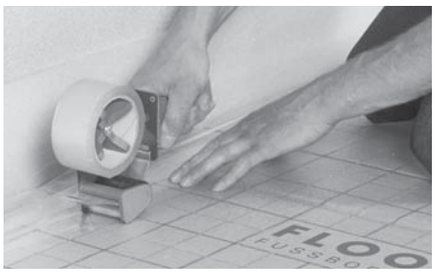
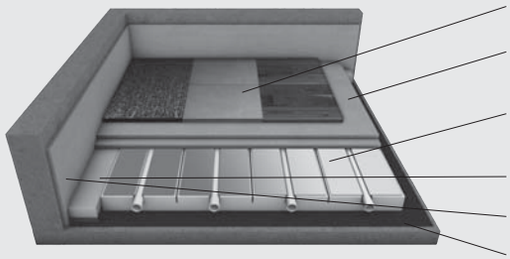


Figure 2: Sealing down the film apron

Dry system

33– kg / 53 m²
≤ 2,0 kN / m²
≤ 2,0 kN
*≥ 20 cm²



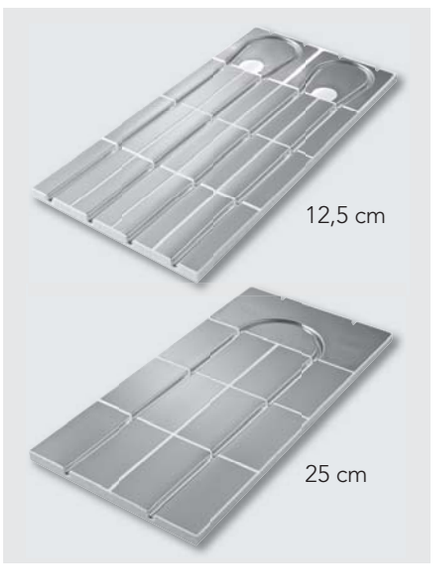
Carpet / Tiles / Parquet / Laminate / Plastic
Dry screed element (Fermacell)
FLOORTEC EPS + Dry system plate EPS + FLOOTEC aluminium composite pipe 16 x 2 mm
Wooden framing (30 mm)
EPS edge insulation strip
Damp proof membrane, if applicable

Guarantee statements available at **www.vgoelundnoot.at/garantieerklaerungen**

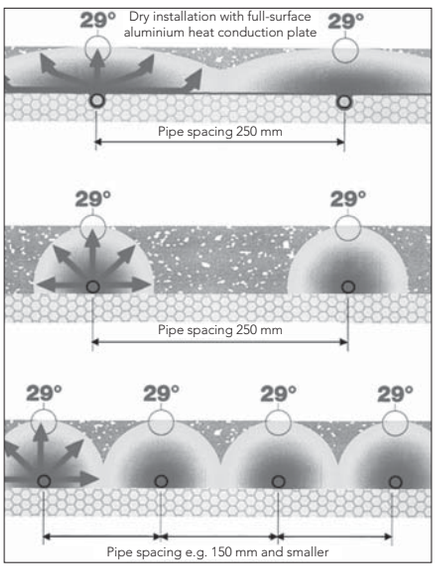
General

Wet and dry:
the difference between the systems
In a conventional dry system, the pipes are fitted within an insulation layer made from polystyrene. Without a heat conduction plate, the heat in the pipe would only be transferred at the points where the pipe comes into contact with the support layer and screed layer. In a wet system, in other words, in an underfloor heating system in which the pipes are almost completely enveloped by the screed, the transfer of heat takes place across the entire surface area of the pipe.
It is in this respect that dry systems fitted with aluminium heat conduction plates demonstrate their particular strength. The pipe first transfers its heat to the heat conduction plate and then via a significantly increased area to the supporting or screed layer.
The distinction between wet systems and dry systems does not, therefore, relate to the question as to whether the load distribution layer (or the screed) is a wet, self-levelling screed or a dry screed, but whether the heating pipe lies within a "wet" screed or a dry insulation layer.

Turning elements
One of the particular features of the FLOORTEC Dry system is the distinction between straight elements and turning elements.
The unique FLOORTEC Dry system does not only include a full-surface heat conduction plate made from 0.5 mm thick aluminium on its straight elements, but also on its turning elements as well. The heat conduction plate is glued to the underfloor and insulation plate at the factory. The benefit of this is that the areas in which the pipe changes direction, which generally account for around 20% of the area of the room, also form a usable heating surface. And it is at the edges of the room (next to external walls in particular) that protection against cold external air is especially desirable.
Brief explanation:
If the areas in which the pipe changes direction do not include a heat conduction plate, the heating effect of those areas is almost zero. As an area of around 25 cm is generally required for the pipe to change direction and that is the case on both sides, the effective heating area of the floor is reduced by around half a metre. In a room that is 2 metres wide, this is equivalent to 25% of the area of the room. If the room is 3 metres wide, it would be 16%.On the other hand, the additional heat transfer achieved by a pipe spacing of 12.5 cm, compared to a pipe spacing of 25 cm, is around 15-30% (depending on the type of floor construction). If we then take account of the fact that the FLOORTEC system elements do not display that weakness, it is only too easy to recognise that installing a pipe at a spacing of 12.5 cm (turning element without a heat conduction surface) provides no effective benefits compared to the installation of a heating pipe at a spacing of 25 cm, in which the pipe-turning areas also incorporate an aluminium heat conduction plate (FLOORTEC Dry system). Quite the opposite: in order to achieve a roughly comparable heating capacity within the room, a heating pipe measuring double the number of linear metres would need to be fitted and larger manifolds would need to be installed.



Turning elements incorporating pipe spacings of 25 cm and 12.5 cm



Comparison of the FLOORTEC Dry system with other systems on the market that incorporate a heat conduction plate.

DIN Geprüft N. reg.7F403-F

General information

Aluminium versus steel as a heat conducting medium. The difference.

The thermal conductivity of aluminium is > 200 W/mK, whereas steel achieves a thermal conductivity value of around 50 W/mK. This means that an aluminium plate will dissipate the heat four times more rapidly than steel.
Note:
The thermal conductivity of screeds is approximately 1 to 1.5 W/mK.

The greater the heating capacity at the same system temperatures, the lower the system temperatures that are required to achieve the same heating capacity.leistungswerten.

The progression in heating costs provides an additional reason to opt for a system with a high heating capacity per m^2, or for a system with the lowest possible heat source excess temperature per m^2.

The lower the necessary system temperatures, the lower the ongoing heating costs will be. The reason for this is that if one reduces the heat source excess temperature by 1 K, a saving of 2% will be achieved in the heating costs.

Performance comparison: Wet and dry systems / effective heating surface areas

Wet system *)	FLOORTEC Dry system
Pipe spacing 25 cm **40 W/m²** (= 100 %)	Pipe spacing 25 cm **52 W/m²** (= 130 %)

Note: Approximate indications per m2 when heating pipes covered with a cement screed to a depth of 45 cm and a tiled surface are operated at a heat source excess temperature of 10 K (e.g. 33/27/20 °C heat output), using an aluminium composite heating pipe.

*) Details may vary from those indicated, depending on the supplier and the system involved

Necessary system temperatures for a desired heating capacity of 50 W/m²

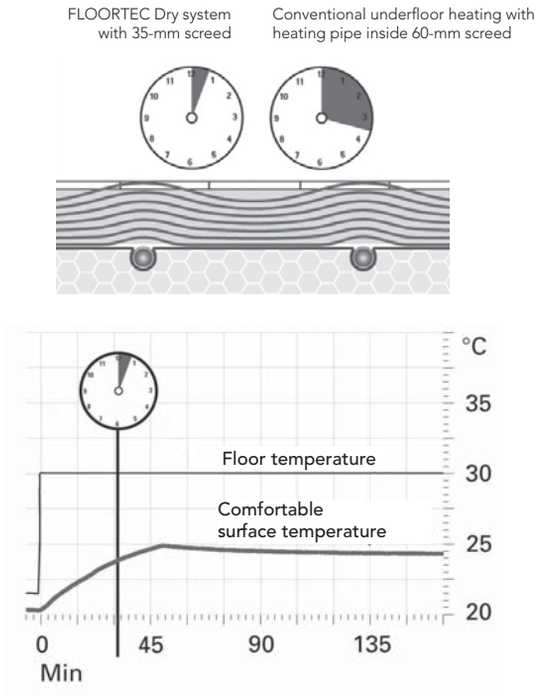
Wet system *)	FLOORTEC Dry system
Pipe spacing 25 cm **13,5 K** **(36/31/20 °C)**	Pipe spacing 25 cm **9,5 K** **(32/27/20 °C)**

Note: Approximate indications per m2 when heating pipes covered with a cement screed to a depth of 45 cm and a tiled surface.

*) Details may vary from those indicated, depending on the supplier and the system involved

General information

Reaction time
The effect of the comparatively large heating capacity per m2 arises as a result of the dry method of construction and the aluminium heat conduction plate (see illustrations).
The purpose of the aluminium heat conduction plate with a thermal conductivity of > 200 W/mK (the thermal conductivity of steel is approx. 50 W/mK and of screed approximately 1.4 W/mK) is to dissipate the heat from the heating pipe across a large area and to transfer the heat rapidly to the screed across the entire surface area of the floor. There is no difference with regard to the screed that lies above the pipes (the thickness of the screed above the pipe). On the one hand, however, the mass of screed that in a wet system would envelop the pipe is not present in the dry system, whilst on the other hand, the screed is heated from below across its entire surface area. This gives rise to a significantly more rapid reaction speed than can be achieved using a wet system.



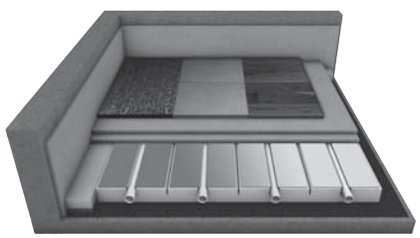
Thermographic images
The strength and type of material of the heat conduction plate has a major influence on the thermal conductivity. For example, a heat conduction plate made from a piece of aluminium 0.5 mm thick cannot be compared to a "system plate" onto which has been pressed a thin film of metal. That would simply serve the purpose of providing a visual effect, and would not enhance the thermal conductivity.

Variations in floor construction
All types of floor construction can, in principle, be created using a dry system (these can be used on top of a cement underfloor, a wooden beam construction or a raised floor system). There really are no limitations. There are also next to no limitations with regard to the types of material that can be placed on top of the underfloor heating system. Almost everything is possible – a conventional cement or anhydrite screed, a dry screed with screed tiles, dry screed elements made from plaster, cement or poured asphalt.

It is also possible to lay laminate flooring or real wood parquet directly on top of the FLOORTEC Dry system. Specialist solutions are available for particular problems. For example, tiles with a special substrate layer can be laid directly on top of the FLOORTEC system plates, enabling an overall floor section height of only 45 to 50 mm to be achieved (details on page 100)

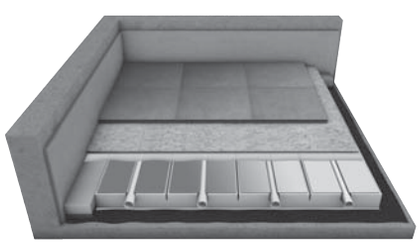
Dry system

Dry screed element (Fermacell 20 mm)



33– kg / 53 m²
≤ 2,0 kN / m²
*≤ 2,0 kN
*≥ 20 cm²

STRONGBOARD FL | Tile



~ 37 kg / m²
≤ 2,0 kN / m²
*≤ 2,0 kN
*≥ 20 cm²

DIN Geprüft N. reg.7F403-F

Benefits

In order to operate a conventional heating system that makes use of radiators, flow temperatures of between 50 and 70 °C are generally required, so that a flow of air is generated within the room concerned and the radiator is able to dissipate its heat into the room. A state-of-the-art surface heating system generally operates at a flow temperature of between 30 and 45 °C, however, depending on the construction of the floor itself. Reducing the heating water temperature gives rise to a considerable potential saving. These low heating water temperatures also take the form of system-based requirements that serve the purpose of enabling the economical use of heat pumps. The use of solar panels is also available as an additional source of renewable energy.
The perception of having achieved the comfortable temperature in the room occurs between 1 and 2 Kelvin (degrees of room temperature) sooner than is the case when the room is heated using a conventional radiator-based system. By reducing the room air temperature by the same amount of 1 to 2 Kelvin in comparison to a conventional radiator-based heating system, an additional saving of 6 to 12% can be achieved. Put simply, this is due to the reduction in the difference between the room temperature and the outside temperature.
The underfloor heating is integrated into the floor, which means that when planning the architecture of a building or designing a room, it is not necessary take account of any heated surfaces.

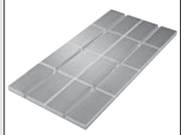
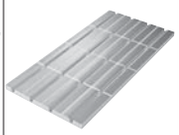
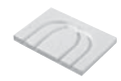
Conclusion

- No variation in temperature on the floor surface, thanks to the use of aluminium heat conduction plates.
- The shortest possible reaction time, due to the thin construction that lies on top of the aluminium heat conduction plate and due to the heat dissipation area. It is not the pipe that transfers the heat upwards, but the large surface area of the aluminium.
- The aluminium heat conduction plate is glued to the insulating layer in the factory. This means that no further action is required to lay the heat conduction profile.
- The FLOORTEC Dry system is the only system that includes the pipe turning areas, through the use of aluminium heat conduction plates.
- For floor constructions with wet or dry screeds, a complete separation of roles is achieved by means of the separation between the heating and the screed, due to the separation and conduction layer.
- Is also suitable for cooling

Compared to other manufacturers, the spacing between the FLOORTEC Omega channels in which the aluminium composite pipe is located is < 16mm. While the heating pipe is in use, this guarantees almost 100% contact between the heat conduction plate and the pipe, thereby ensuring the optimum transfer of heat.

In a direct comparison, the installation of the aluminium composite pipe therefore appears more time-consuming, however it enables air columns between the pipe and the plate to be excluded. This is especially significant, due to the fact that air is an insulator.

System elements

Pipe spacing [mm]	250		125		250 / 125	
	Straight element with heat conduction plate	Head element with heat conduction plate	Peripheral zone element	Head element with heat conduction plate	Edge filler piece without aluminium	Dual-turn head element without aluminium
						
Dimensions of system plates W x L x D [mm]	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**250 x 375 x 30**
Item number	FBF41843050100A0	FBF51843050100A0	FBF41443050100A0	FBF51443050100A0	FBFAW003501000A0	FBF01843037025A0
	Material properties					
Base plate	EPS 035 DEO dm					
Heat conduction plate	Aluminium 0.5 mm with pipe grooves (omega shape, edged)					
Fire-resistance class	B 1					
Raw density	30 kg/m³					
Heat conductivity category	WLG 035					
Compressive strength on compression 10% in kPa (kN/m²)	240 kPa (10 kN/m²)					

Accessories

Image	Item no.	Description
	**FBROTHEPI81600A0**	**FLOORTEC** edge insulation strip 8 x 160 x 25,000 mm
	**FBFAW0RAHOLZTDA0**	**FLOORTEC** Dry system wooden framing 1000 x 45 x 30 mm
	**FBFAC00000CP0000**	**FLOORTEC** Load distribution plate 1000 x 1000 mm

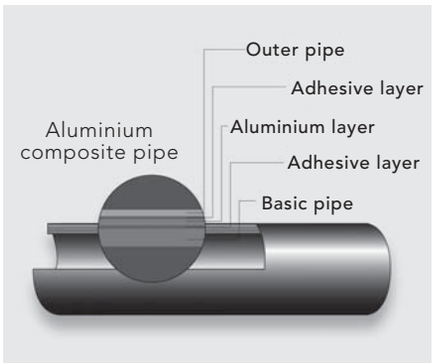
Heating pipe

FLOORTEC Aluminium composite pipe 16 x 2 mm

The FLOORTEC Aluminium composite pipe combines all of the benefits of plastic and metal pipes:

- 100% oxygen-tight and water vapour diffusion-tight
- Minimal linear expansion
- Thermal conductivity is better than that of plastic pipes
- Minimal sound transfer
- Easy to bend, even at low temperatures, highly resistant to pressure and temperature
- Smooth surfaces = minimal loss of pressure
- As light as a plastic pipe
- Retains its curved shape and is dimensionally stable

A PB, PE or RT pipe or a PE-X-pipe may not be used, as their high linear expansion may give rise to cracking noises.



DIN Geprüft N. reg.7F403-F

Technical data	
Material	Highly temperature-resistant polythene, with an aluminium layer
Pipe dimension [mm]	16 x 2
Weight [kg per linear metre]	0,104
Water capacity [litres per linear metre]	0,113
Roll length [m]	200 / 400
Max. operating temperature [°C]	90
Max. operating pressure [bar]	8
Thermal conductivity [W/mK]	0,43
Linear expansion coefficient [mm/mk]	0,026
Surface roughness k (according to Prandtl-Colebrook) [mm]	0,007
Oxygen diffusion in the total area of application [mg/ l d]	< 0,005
Minimum bend radius = 5 x dA [mm]	80

Edge insulation strip / technical data	
Material	**PE-edge insulation strip**
Dimensions [mm]	160 x 8
Film apron to be stuck to the separating layer	Yes
Can be used for	All types of screed that are applied cold

Function
The edge insulation strip is intended to insulate all vertical parts of the building from the noise that is generated within the screed plate, dry screed plate and the floor coverings (tiles, parquet).

Installation
The edge insulation strip must be fitted to all walls and vertical parts of the building, such as pipes. If the height of the floor section will exceed the width of the edge insulation strip, the edge insulation strip is applied before the final insulation layer is applied.
The edge insulation strip must always extend to the upper surface of the floor covering. The edge insulation strip must be secured in order to prevent it changing position while the screed is being applied. Care should be taken to ensure that the corners are formed correctly and that sufficient overlap is allowed any joints.
The edge insulation strip may only be secured above screed level.

Important!

The edge insulation strip may only be cut off once the entire floor covering has been fitted (in the case of tiled floors especially, only once the grout has been applied).


PE edge insulation strip

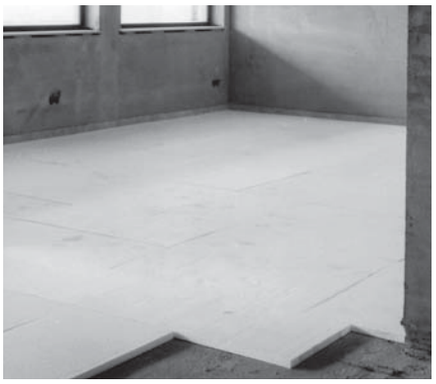
Requirements regarding the sub-floor

The FLOORTEC Dry system imposes particular demands with regard to the sub-floor, especially when directly compared to the installation of a wet system. Any unevenness in the sub-floor that is not levelled out will, for example, give rise to hollows that could lead to the breakage of the load distribution layer. The reason for this is that in certain situations, the bridging section may become too large for the load distribution layer (span).

Before installation, you should check:
Site
- Clean, dry and swept clean
- Windows have been installed and glazed (or emergency glazing installed, at the very least)
- Plastering and installation work have been completed
- The height of the floor section, including the floor covering, is known (setting-out)

Sub-floor
- Concrete floor: completely dry
- Wooden joisted floor: sufficient stability
- Floor is completely even, including in every corner

Unevenness
Depending on the type of floor section required, the degrees of unevenness permitted in the DIN 18202 standard must not be exceeded. In the case of a floor section that makes use of wet screeds above the heating layer, the tolerances given in Table 4, line 2 will apply. In the case of a floor section constructed using wet screed over the heating layer, the tolerances of Table 4, line 2 apply. In the case of a floor section constructed using a dry system with dry screed plates, laminate or solid wood plank flooring or special constructions for tiles, such as bare PERMAT or Lazemoflex, the values in Table 4, line 4 will apply, as these types of floor section are incapable of compensating for any unevennesses in the sub-floor, in other words, the elements must be perfectly flat and flush with one another.
It is also important to ensure that the angle tolerances in Table 5 are not exceeded, as a dry system floor cannot be adjusted later to account for any unevennesses.



Dry system

TIP
The angle tolerances must also be adhered to, as the floor covering may otherwise, especially in the case of a dry system floor, be fitted with a slope. The subsequent adjustment of a sloping floor is generally more expensive than it would be before the underfloor heating elements have been installed.

Levelling of unevenness / levelling of heights in accordance with DIN 18560

If the permitted tolerances have been exceeded, retrospective measures (in accordance with DIN 18560) will need to be taken in order to rectify those faults. It is therefore recommended, in the case of new-build projects in particular, to inform the contractor that is responsible for the construction of the surfaces that require laying, namely the cellar ceiling and the ceilings of each floor of the building, of the intention to fit a dry system that imposes increased requirements with regard to the evenness and angular nature of the floors. Informing the contractor well in advance may save on the cost of subsequent improvement work. In cases that nevertheless require subsequent levelling work to be carried out, especially during the rehabilitation and renovation of older properties, the following types of treatment are available in order to create an even floor surface.

Levelling using	Self-levelling levelling compound	Levelling fill	Levelling screed	Levelling mortar with air voids or polystyrene components
Unevenness	< 30 mm	> 10 mm to > 100 mm	> 30 mm to 80 mm	> 40 mm to 100 mm
Benefits	Self-levelling Also suitable for the treatment of parts of a room (flow creates transition to untreated sections)	Suitable for sections of floor Can be used to fill in bundles of pipes Installed dry – no additional moisture introduced into the building Available in small quantities	Stable underfloor Additional work on the surface is no problem Bundles of pipes can generally be covered without any problem	Tolerance levelling and insulation in one product Dries rapidly for further processing of surfaces
Manufacturer	Maxit	Knauf Perlite	Maxit	Maxit
Walkable	After 24 hours	Walkable after the load distribution layer has been fitted	After 24 to 48 hours	After 24 to 48 hours
Ready for installation of floorcovering	After 24 to 72 hours, depending on the thickness of the layer (manufacturer's instructions)	Immediately	Generally after 28 days, if the levelling screed or levelling mortar is cement-based	
Note	Used to level small areas and minor discrepancies in height Also suitable for use in parts of areas Maximum layer thickness as specified by the manufacturer must be observed	Used to correct moderate discrepancies in height and medium-sized areas	Suitable for medium-sized areas, depending on the version used	Use only makes sense to level large areas

The manufacturer's processing instructions must be followed. These should be requested from the manufacturer directly.

* If a levelling fill is used, an additional load distribution layer must always be installed immediately above the levelling fill, in order avoid the occurrence of a point load on top of the fill during the later stages of floor construction (especially when laying pipes and the possible migration of the fill materials that could occur).

Additional heat insulation

EPS (DEO)
Expanded rigid foam from 20 mm – high compressive strength from 200 kPa
XPS (DEO)
Expanded rigid foam from 30 mm increased compressive strength (from 300 kPa at 30 mm, 500 kPa from 40 mm)
Wood fibre insulation (DEO)
Thermal insulation 150 kPa

Requirements with regard to the sub-floor

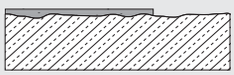
A level, smooth and load-bearing subfloor is essential evenness tolerances compliant with DIN 18202, Table 3

		Local measurements as limit values in mm at a spacing between measuring points in m				
Line	Relates to	0,1 m	1 m	4 m	10 m	15 m
4	Finished level floors with increased requirements, e.g. with self-levelling fillers	1 mm	3 mm	9 mm	12 mm	15 mm

Wooden beam floors must be twist-resistant and deflection-free

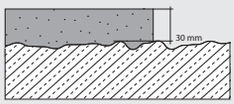
Recommended actions, according to the height of unevennesses

A Unevennesses from 3 mm to 30 mm



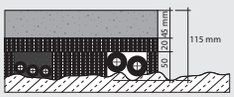
Small unevennesses can be levelled by skimming: up to 6 mm of skim (e.g. weber.floor 4010), up to 30 mm with a filler (e.g. weber.floor 4160)
Subfloors should first be primed (e.g. weber.floor 4716)

B Unevennesses from 30 mm



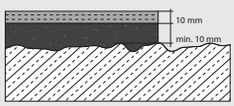
Bound fill (such as Fermacell)
Levelling screed (e.g. weber.floor 4341) – alternative dry method available – dry filling → D
Sub-floor should be primed first of all (e.g. weber.floor 4716)
Pipe channels of up to 50 mm can be levelled using composite screed (if pipes are higher → C)

C Bridging over pipes from 30 mm and increased-height construction > 110 mm



With a screed on top of a layer of insulation

D Dry fill between 10 and 50 mm for small unevennesses



Bound fill (such as Fermacell)
Cover with a load distribution plate (10 mm plaster fibreboard)

Insulating layers below the FLOORTEC Dry system

Impact-noise insulation

Purpose
Impact-noise insulation is intended to minimise the noises generated by walking in the neighbouring dwelling, in stairwells or in one's own home. This type of insulation has a particular effect upon the quality of life, especially in the case of buildings that contain more than one apartment or in multi-storey office buildings.

DIN 4109 imposes precise requirements for a variety of residential buildings and workplaces that must be adhered to in order to provide the level of protection required in living areas.

Planning
The requirements and the planning of the impact-noise insulation should be carried out by a trained building planner, in order to ensure that the installation is in keeping with the state of the art. Subsequent measures to improve insulation levels against impact noise are usually not possible without great expense.

Materials
The types of material that have proven their worth for the purpose of impact-noise insulation especially include EPS plates or wood fibre boards. The use of mineral insulation panels is not permitted.

	Improvement in impact-noise □, LW, R Db*
20 mm impact-noise insulation EPS DES 040 dm, sg 20-2	**28**
30 mm impact-noise insulation EPS DES 040 dm, sg 30-3	**29**

*) when combined with a 70 kg/m2 screed

Note/TIP
Below the FLOORTEC Dry system, no insulation materials that are too soft may be used for the purpose of insulation or impact-noise insulation. Otherwise, this could lead to difficulties when the pipe is laid in the system plate, or could cause the dry elements applied above to become unstable.

Installation

Impact-noise insulation must be laid in a continuous layer and as near as possible to the source of the impact-noise itself. If installation pipes have been laid on the subfloor, these should be laid within the levelling insulation layer, the height of which should at least correspond to the height of the empty pipes or the insulated supply pipes.
It is also necessary to take into account that the entire floor construction is free of sound bridges and is insulated against any vertical parts of the building.

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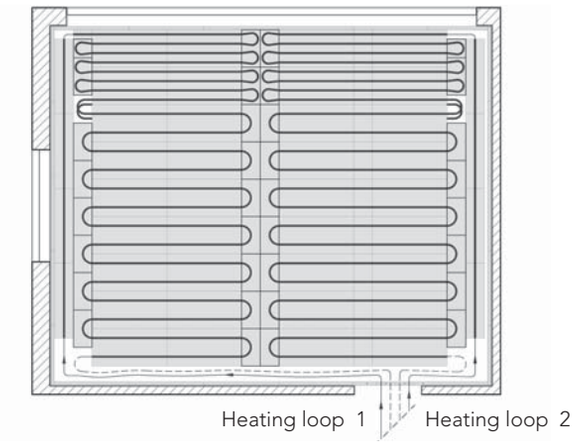
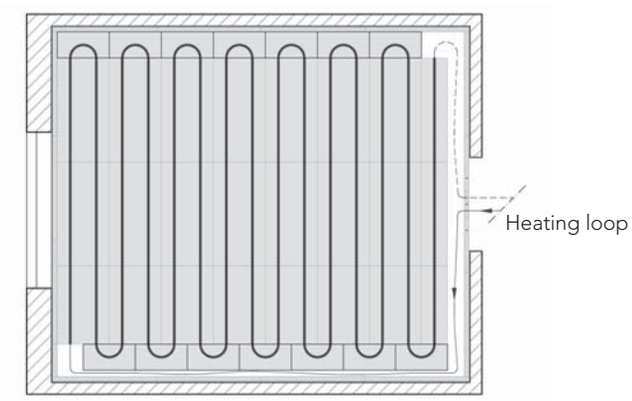
Residential room – 2 heating loops – 28 m²



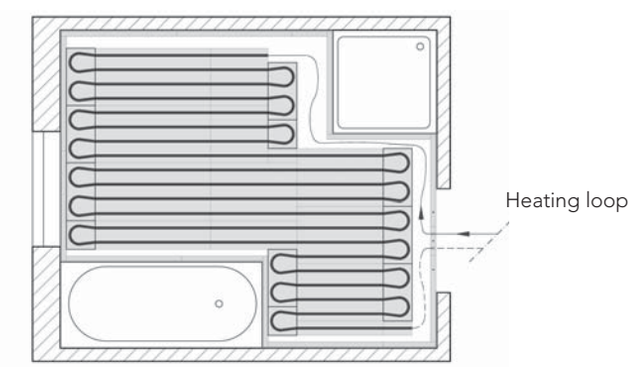
Start off in front of the French window with laying pattern for peripheral areas (125 mm). After 1 metre, switch to the pattern for residential rooms. Always select equally sized heating loops. Lay the supply pipes along the outer wall and cut any missing pipe channels out of the RA elements in an undulating shape using a hot-cutter.

Bedroom – 1 heating loop – 17 m²



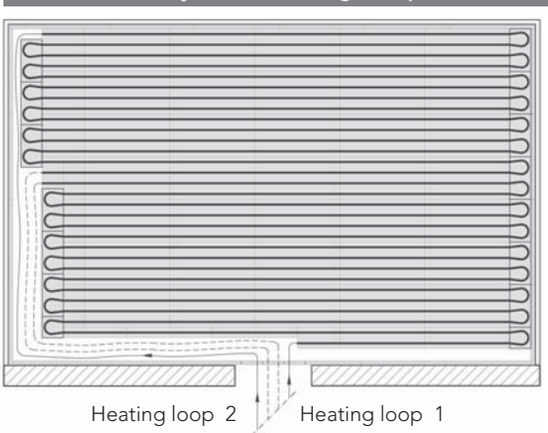
In rooms without floor-level windows, the installation pattern for residential rooms can be used. The heating loop begins in front of the window and the supply pipe is laid along the outer wall and the pipe channels are cut out of the RA elements using a hot-cutter.

Bathroom – 1 heating loop – 9 m²



Unheated shower and bathtub areas are laid out with RA elements and edged with framing wood. The heated area is then laid out using the pattern for peripheral areas (125 mm).
Installation tip: secure the head sections whenever there are frequent changes of direction or short lengths of pipe.

Conservatory – 2 heating loops, 24 m²



For areas with large areas of external glazing, the installation pattern for peripheral areas is recommended (125 mm). Supply pipes are cut into the RA elements in an undulating shape using the hot-cutter.

Dry screed plates

In order to lay dry screed plates, a stable and load-bearing sub-floor will be required, with sufficient lateral load distribution and a low vibration capacity when subjected to dynamic loads.
In the vicinity of corridors and doors, the additional load distribution plates will be required at the joints of the dry screed plates.

The particular benefits of dry screed:

- The low height of the floor section; a height from approx. 62 mm, including tiles, is possible
- No waiting times when laying the dry screed on top of the underfloor heating
- No waiting times between the installation of the dry screed and the installation of the final floor covering
- No moisture is introduced to the building, making dry screed ideal for use in the renovation of old buildings or situations in which the construction of the floor generates problems
- Ideally suited for the installation on top of wooden beamed floors
- Simple, clean and quick to process

Unevennesses and levelling of heights

The use of fills under the dry screed plates or underfloor heating is ideally suited for the levelling out of heights, thermal insulation and impact-noise insulation. The use of fills generally requires a minimum application quantity of 10 mm.
An additional layer of cover plates must be applied on top of the fill. Various types of product are available for this purpose. In addition to the use of single-layer dry screed plates, fibreboards or OSB boards can be used. It is not permissible for FLOORTEC Dry system plates to be laid on top of a fill. Cover plates are necessary, in order to avoid the formation of distortions in the fill that could be caused by the unavoidable walking over the filled area that would occur while laying the system elements and the aluminium composite pipe. Distortions of that type in the fill would no longer ensure that the dry screed plates were laid fully flat on top of the FLOORTEC Dry system plates and that could result in the formation of fractures.

Typical floor section

The maximum permitted flow temperature using KNAUF Perlite Aquapanel ® Cement Board Floor panels is 70 °C. This maximum flow temperature is only required, however, in the case of a floor section with 35 mm dry screed plates and a textile floor covering with poor thermal conductivity, combined with a heating requirement of 100 Watts/m2 in the room concerned. As such combinations occur only rarely, a flow temperature of 35 to 40 °C can generally be expected. Please consult the following tables and diagrams in order to find the specific performance data.

In order to enable all construction materials to adapt effectively to the operating temperature that is ultimately used, the temperature of the underfloor heating should be increased gradually at first.

Information

If you have any further questions regarding underfloor heating and dry screeds, please contact us directly or if you have any specific questions regarding the different types of floor sections, have any other technical questions or would like information about any additional installation instructions, please contact:

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T: +49 231 99 80 01, F: +49 231 99 80-138
www.knauf-perlite.de

Fermacell GmbH
Düsseldorfer Landstraße 395
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Underfloor heating and parquet flooring / General

Contrary to frequently-voiced opinions, there is absolutely nothing wrong with fitting wooden parquet flooring on top of underfloor heating. It is true, of course, that wood has an insulating effect and not every type of wood is equally well-suited for installation on top of an underfloor heating system. It is therefore important to remember that oak or Douglas fir are generally better-suited than beech or maple. The reason for this has nothing to do with their ability to tolerate temperature, but with the way in which the different types of wood respond to changes in humidity and moisture levels. That is why it is important to ensure that during the winter months, heated rooms maintain a sufficient relative humidity of 50-60%.

It is also important to remain aware of the fact that wood is not an inert material and is continually changing. Gaps can never be entirely ruled out. If the manufacturer's installation and processing instructions are adhered to, it can mostly be assumed that the number of gaps that will be formed will be kept within limits.

A number of different types of parquet can be fitted on top of an underfloor heating system. The most frequently encountered type will certainly be the floating or glued-down installation of 2 or 3-layered parquet strips on a screeded floor. These often take the form of ready-sealed parquet, which once installed requires no final treatment. A glued-down 2 or 3-layered parquet floor is preferable to a floating parquet floor, as the heat transfer is significantly better in the case of a glued-down floor, due to the fact that air pockets have an insulating effect. The use of impact-noise insulation mats or layers of felt beneath the parquet floor will also reduce the effectiveness of the underfloor heating. Please be aware that glue should only be applied to parquet flooring on the surface that touches the layer beneath, and not to the tongue and groove. If glue is also applied to the tongue and the groove, each individual plank will no longer be able to move independently.

That will then cause the floor to form what is, in effect, a single, large panel of wood, which can only move across its entire length and breadth. This may result in the formation of visible cracks measuring several centimetres.

The manufacturer of the parquet flooring of your choice will be able to provide you with the relevant heat conductivity resistance. The spread that exists between the various values for heat conductivity resistance is very high, as they fluctuate, depending on the type of wood and the number of layers involved.

With regard to the permissible surface temperatures, it is important to be aware that the majority of parquet flooring manufacturers have approved their flooring products for a maximum surface temperature (measured directly on the upper surface of the wood) of 27 °C, assuming that each individual type of parquet flooring or type of wood has been approved for use in conjunction with underfloor heating in the first place.

Direct installation of solid wood planks

An alternative approach is to install solid wooden planks directly on top of the FLOORTEC Dry system plates. A variation that is frequently encountered is to lay solid wooden planks onto a system of battens. The battens do not, however, play any part in dissipating the load that is brought to bear on the floor, but actually connect the solid wooden planks together. In the solution shown in the floor section illustrated, the planks lie directly on top of the system plates, thereby ensuring a good heat flow from the underfloor heating to the wooden planked floor.

In installations of this type, it is important to remember that the battens must be no thicker than 28 mm and the planked floor must be screwed down (and not nailed!) to the battens. The system of battens effectively hovers above the underfloor insulation. This serves to ensure that the planked floor does derive support from the battens, thereby ensuring that no air cushions are created beneath the wood.

In this type of installation, it is a good idea before the wooden floor is fitted to lay the separation and sliding layer on top of the FLOORTEC Dry system plates. This will provide additional protection to the wood against increases in moisture levels from below (similarly, the same also applies to the floating installation of planked flooring).

For further information, please contact the manufacturer of your parquet flooring. The manufacturer must be the one that provides fundamental approval for the installation of a parquet floor on top of underfloor heating.

Project planning datasheet

Tailor-made planning to produce a cost-effective heating system...

That is why we need to collect detailed information so that we can produce a precise and detailed plan of your surface heating solution.

That information will include:

- **EnEV Energy certificate**
- **An outline drawing to scale**
- **Precise sectional drawings**
- **Heat protection certificate or precise details of the part of the building involved**

In order to make your task and our task easier, please fill in the full address of all persons involved below.

And please do not forget:
Our calculation can only be as precise as your details allow it to be!.

Wholesale organisation:

Branch _____

Contact person _____

Street _____

Postcode, locality _____

Telephone _____

Fax _____

Heating engineer:

Name of company _____

Contact person _____

Street _____

Postcode, locality _____

Telephone _____

Fax _____

Building-owner:

Name _____

Street _____

Postcode, locality _____

Telephone _____

Please complete this form in full!

Details:

Item required for this form to be processed:
Full house-plans to a scale of 1:50 or 1:100.

Note: If insufficient information is provided, standard values will need to be used in order to perform the calculation. In the case of the different versions of insulation available, the minimum requirements in accordance with ÖNORM EN 1264 will be included.
Floor coverings will be defined in terms of the DIN standard value.
Room temperatures will be compliant with the standard.

System:
◯ FLOORTEC Preformed plate system UNI ◯ FLOORTEC 3D Stapler system
◯ FLOORTEC Dry system ◯ _____

Heating pipe:
Pe-Xcellent: ◯ 14 x 2 mm ◯ 17 x 2 mm
◯ 20 x 2 mm
Aluminium: ◯ 16 x 2 mm

Heating system:

Surface heating	◯ In the cellar	◯ On the ground-floor	◯ On the upper floor	◯ In the attic
Radiators	◯ In the cellar	◯ On the ground-floor	◯ On the upper floor	◯ In the attic

Unheated storeys	◯ Cellar	◯ Attic
Building has a cellar	◯ Yes	◯ No

U-values [W/m²k]:

Cellar	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Ground floor	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Attic	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Heating: ◯ Boiler ◯ Heat pump
max. flow temperature _____ °C

Location of manifold – please mark this clearly on your plans!

Manifold cabinet: ◯ Recessed into plasterwork ◯ Mounted on top of plasterwork

Manifold cabinet size for heat meter ◯ Yes ◯ No

Control ◯ Yes ◯ No

Other: _____

Record for initial heating as a function-test for pipe systems on insulating panels in wet screed

Client: _____

Building/property: _____

Section or part of building
Storey/dwelling: _____

Part of complex: _____

Requirements
Initial heating must be carried out on the underfloor heating system in order to carry out a functional test. The test will provide the heating engineer with evidence that a fault-free installation has been fitted. Whenever a cement-based screed has been used, the tasks listed below may not begin until at least 21 days after screeding work is complete and no sooner than 7 days (or any period specified by the manufacturer) after screeding work is complete when a calcium sulphate screed has been used.

In accordance with DIN 1264-4, the flow temperature of between 20 °C and 25 °C must be maintained for at least 3 days and after that the maximum rated temperature must be maintained for at least 4 days. Any instructions issued by the manufacturer that contradict the standard or this protocol (e.g. in the case of self-levelling screeds) should be observed and recorded.

Documentation

1) Type of screed (name of manufacturer, if applicable) _____
   Binder used _____
   Predetermined setting time _____

2) Completion of work on the heating screed (date)

3) Start of initial heating (date)

4) Temperature increased to maximum rated temperature (date):
   Maximum flow temperature t_v max = _____ °C maintained for at least 4 days

5) End of initial heating (date)
   If a risk of frost applies, relevant protective measures (e.g. frost protection operation) should be initiated.

6) Was initial heating interrupted? ◯ Yes ◯ No
   If yes: from _____ to _____

7) The rooms were ventilated draught-free and all windows and doors closed once the surface heating was switched off.
   ◯ Yes ◯ No

8) The heated floor area was left uncovered during initial heating
   ◯ Yes ◯ No

9) The system was approved for further construction work at an external temperature of _____°C.
   The system was not operational at that time.
   The floor was heated at that time at a flow temperature of _____°C.

Record for initial heating as a functional test for pipe systems on insulation panels in a wet screed

Important:

Depending on the heat capacity of the heat source, initial heating should be carried out in stages if necessary. All heating loops within each screeded area must however be heated simultaneously.

Initial heating does not serve to ensure that the screed has achieved the moisture content required for floor covering to be applied.

When switching off the surface heating after the heating-up phase, the screed should be protected from drafts or excessively rapid cooling until it has cooled completely.

Confirmation

Place/date	Place/date	Place/date
Building-owner/Client Stamp/Signature	Site manager/Architect Stamp/Signature	Heating engineer Stamp/Signature

CM-measurement – working instructions

The purpose of the CM (combination moisture) measurement is to determine the moisture content in the screed in order to decide whether the screed is ready for the floor covering to be applied. Samples may only be taken for the purpose of CM measurement at the designated measuring points. It is essential to ensure that when preparing the samples, as little moisture is lost as possible. This means therefore:

- That the taking and preparation of samples must be carried out as quickly as possible
- That the preparation of samples may not be undertaken in direct sunlight or in a draught
- That the sample should only be broken into small pieces in order for it to be completely pulverized in the CM-device, with the help of the 4 ball-bearings.

Before samples are taken, the following measures should be taken:

- Check, whether the CM-device is airtight (if necessary using a calibration substance), replacing the rubber seal if necessary.
- Place 4 ball-bearings inside the CM device.
- If necessary, attach a weighing scale to the container of the device.
- Have a bowl, hammer and spoon at the ready.
- Prepare the record (indicating the construction site, storey, room, testing date, tester and test outcome)

When carrying out the test, you should proceed as follows:

1. Always take an average sample from the entire cross-section of the screed. In the case of parquet floors, the boundary values conventionally require the lower to middle area to be measured. The average sample taken from under a parquet floor must therefore be taken from the lower to middle area.

2. Break up the average sample in the bowl into sufficiently small pieces in order to enable it to be completely pulverized in the CM-device due to the action of the ball-bearings.

3. Weigh off the test material with the spoon: Calcium sulphate screed 100 g, recently-laid cement-based screed 20 g, screed that is almost ready for the application of the floor covering 50g

4. Carefully place the test material into the CM device, along with the ball-bearings. This can be carried out more easily by using a funnel with a large outlet.

5. Hold the CM device at an angle and fill the glass ampoule with calcium carbide.

6. Close the CM device firmly and the shake vigorously, until the indication on the manometer rises.

7. Completely pulverize the test material using the ball-bearings, by making circular movements and vigorous movements back and forth. Ensure that the manometer is not placed under pressure. Duration: 2 minutes.

8. Five minutes after sealing the CM device as under no. 7, shake for a further minute.

9. Ten minutes after sealing the CM device, briefly shake once again (for 10 seconds) and read off the value. Determine the moisture according to the calibration chart and enter it in the record. Note: in the case of screeds bound together with calcium sulphate, a further rise in pressure is possible. Disregard this, as it is due to chemically (firmly) bound water.

10. Empty the CM device and clean it. Important: while emptying, checking the test material. If it has not been completely pulverized, repeat the test including the taking of samples and then break up the test material into even smaller pieces using the hammer.

11. Dispose of the test material, in accordance with the manufacturer's instructions.

Documentation (record for CM-measurement in accordance with working instructions)

Client: _____

Building/Property: _____

Section or part of building
Storey/Dwelling: _____

Part of complex: _____

For details of requirements, please see the preceding work instructions.

Documentation

Measurement no.	1	2[1]	3[1]
Room no.			
Tester			
Date			

Weight	g			
Manometer reading	bar			
Water content[2]	%			
Screed thickness	mm			

[1] Only required, if the screed was too moist at the time of the previous measurement
[2] From the conversion table supplied by the manufacturer of the CM device; this is equivalent to the CM percentage

Confirmation

Place/date	Place/date	Place/date
Building-owner/Client Stamp/Signature	Site manager/Architect Stamp/Signature	Heating engineer Stamp/Signature

Record relating to the heating of the screed so that it is ready to receive the final floor covering

Client: _____

Building/Property: _____

Section or part of building
Storey/Dwelling: _____

Part of complex: _____

Requirements
Heating in order to ensure that the screed is ready to receive the final floor covering must be carried out in accordance with the requirements of Procedural Protocol NB1 and NB2. The steps listed below under documentation must be undertaken in that regard.

Heating in order to ensure that the screed is ready to receive the final floor covering should generally be carried out immediately after the initial heating. The heating should not be switched off or the flow temperature reduced. At that point in time, a cement screed will be at least 28 days old, whilst a calcium sulphate screed will be at least 14 days old. These numbers of days must be added to the numbers of days required for the heating of the screed that are listed below, when estimating the number of days until the screed is ready for the final floor covering. Generally speaking, a period of at least 14 days should be scheduled for the heating of screeds up to 70 mm thick, whilst screeds thicker than 70 mm will require a correspondingly longer period of time.

Documentation

Did the heating of screed to make it ready to receive the final floor covering begin immediately after the initial heating?

Yes ◯ Please continue in Table 2

No ◯ Please continue in Table 1

Heating began on _____ (Night-time reduction and temperature control relating to external temperature switched off)

Table 1

Days of heating	Target flow temperature	Actual flow temperature as read	Date, time	Tester
Day 1	25 °C			
Day 2	35 °C			
Day 3	45 °C			
Day 4	55 °C			

[1] or the maximum rated flow temperature

Please continue in Table 2

Record relating to the heating of the screed so that it is ready to receive the final floorcovering

Table 2

Days of heating	Target flow temperature	Flow temperature as read	Date, time	Tester
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	Film test carried out[2)3)]			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	Film test carried out once again[2)3)]			
Day ...	Readiness tested[2)]	CM measurement		

Table 3: Reducing the temperature having determined the readiness of the screed (without night-time set-back)

Days of heating	Target flow temperature	Flow temperature as read	Date, time	Tester
Day ...	45 °C [1)]			
Day ...	35 °C			
Day ...	25 °C			
Day ...	Heating onto automatic			

1) Heating of screed automatically controlled?
◯ Yes ◯ No (preceding records no longer apply)

What make/type?

2) Heating of screed completed (date):

3) During the heating, were the rooms ventilated according to the instructions of the screed manufacturer?
◯ Yes ◯ No

4) Was the heated area of floor free of building materials and other items covering it or placed above it?
◯ Yes ◯ No

5) Did more than 7 days elapse between the final cooling day or the determination of the moisture content and the day on which the laying of the floor covering commenced?
◯ Yes ◯ No

6) If so, the system should be heated again for at least two days before laying begins according to the instructions or otherwise at the maximum rated flow temperature and a new moisture measurement carried out. Have the maximum moisture values given in Table 4 not been exceeded?
◯ Yes ◯ No

[1)] or the maximum rated flow temperature
[2)] according to the indication/instruction of the building-owner/architect
[3)] If moisture is detected, heating should be carried out again. If no moisture is detected, carry out a CM measurement.

Record relating to the heating of the screed so that it is ready to receive the final floor covering

Table 4

	Floor covering	Cement-based screed – target (%)	Calcium sulphate screed – target (%)
ObBo 1	Textile floor coverings and elastic floor coverings	1,8	0,3
ObBo 2	Parquet	1,8	0,3
ObBo 3	Laminate flooring	1,8	0,3
ObBo 4	Ceramic tiles or natural/concrete working stones	2,0	0,3

Table 5: Moisture levels detected

Room no.	Room	Floor covering	Measuring point, if applicable	Target value – Target (%)	Actual value – Target (%)

Laying of floor covering began on (date): _____

Laying of floor covering completed on (date): _____

Confirmation by date/signature (In so far as involved, assigned, monitored or carried out)

	Assigned by building-owner/client:	Monitored by Site Manager/Architect:	Carried out by heating engineer	Carried out by person laying floor covering
Heating to make screed ready for floor covering				
Film test				
Moisture measurement				

Preparatory measures for the laying of floor coverings on cement-based screeds and calcium sulphate screeds

Initial remarks
In order to guarantee optimum functionality in the long term, every heated floor requires planning and coordination with regard to the heating system, the insulating layer, the screed and the various types of floor covering. When carrying out the construction of these types of floors, it is extremely important that the floor fulfils the requirements applicable to the trade, in addition to the relevant standards. The goods supplied and the work carried out must correspond to the state of the art, the current datasheet, the installation and laying guidelines of each of the system-provider and manufacturer in each case.

Screed/functional testing/Readiness to receive the final floor covering
Once the screed has been applied and has completed the corresponding drying period and once initial heating has taken place, determining whether the screed is ready to receive the floor covering forms a pre-requisite for the application of the floor covering. In so far as the screed is to be made ready to receive the floor covering by heating it up, the heating of the construction should be undertaken in accordance with the P7 "Protocol for the heating of the screed". This forms a pre-requisite for the preparation and laying of all types of floor covering. Before laying the floorcovering, the readiness of the screed must be evidenced by the carrying out of a CM measurement in accordance with P6 "CM-measurement". The maximum moisture levels of the screed specified in Table 4 of P7 "Protocol for the heating of the screed" form the indicator that the screed is ready for the laying of the floor covering. If, during the CM-measurement, the values listed in Table 4 are exceeded, further heating and drying measures must be carried out. Once these have taken place, the readiness of the screed must be determined by carrying out a further CM measurement. In order that the number of the marked measurement points is sufficient, electronic or interim film tests are recommended in order to estimate the moisture content, before a further CM measurement is carried out. Sufficient dryness will have been practically achieved, if at the maximum flow temperature there are no traces of moisture under a 50 cm by 50 cm PE-film secured at the edges with adhesive tape, before a period of 24 hours has elapsed. The interim tests and the additional CM measurement(s) are specialist services. The CM measurement may only be carried out at the designated measurement points. Moisture tests carried out at measurement points that are unmarked may give rise to damage to the heating system.

Special measures (heating to make the screed ready for the floor covering, laying and use)
The Client is obliged to carry out and confirm the heating to make the screed ready for the floor covering in accordance with P7 "Protocol for the heating of the screed". In doing so, he/she must observe the following details:

• When heating the screed in a hot-water surface heating installation, a flow temperature of 25 °C should be set and then increased each day by 10 K, until the maximum heat output is achieved (a flow temperature no higher than 55 °C). This should then be maintained until the screed is ready for the floor covering. When cooling down, the flow temperature should be reduced by 10 K each day, until a flow temperature of 25 °C is achieved. The heating up and cooling down phases should be carried out in accordance with the indicated time schedule. During heating up and cooling down, the moisture in the room should be released by means of brief ventilation at fixed intervals. Draughts should be avoided.

• While heating is underway, the heated area of floor should be free of building materials and other items covering it or placed above it.

• The time schedule contains the minimum number of heating days over and above the initial heating period and relates to screeds of up to 70 mm thick. Every additional day provides additional security. Heating to make the screed ready to receive the final floor covering should take place immediately before the floor coverings are actually laid.

• The floor coverings should be laid at a screed surface temperature of no less than 18 °C (depending on the ambient temperature, this is equivalent to a flow temperature of 20-25 °C and at a relative humidity specific to the materials concerned. The screed temperature must be held for at least 3 days prior to, during and after laying has been carried out.

• In the case of hydraulic laying mortars without additives, the surface temperature of the screed must be at least 5 °C.

• Once glued-down floor coverings have been completed, the values listed above for the screed temperature and humidity must be maintained for 7 days (e.g. for curing and drying times of adhesives, etc.).

• In the case of floating floors, especially laminate flooring, the evenness requirements in accordance with DIN 18202, Table 3, line 4 are of particular importance. It is necessary to pay attention to the selection of suitable heat insulation substrate, in combination with the floor element.

• The room air conditions required for the floor covering itself should also be adhered to while the floor covering is in use. The relevant instructions in the care instructions should be followed.