

# On floor joists with HeatFloor 22

## IMPLEMENTATION

LK Underfloor heating combined with HeatFloor 22 is designed to be installed on standard wooden floor joists with a max cc of 600 mm spaced joists. The design consists of grooved 22 mm flooring grade chipboards and associated turning boards. These boards replace the standard board in a floor structure. Aluminium heat distribution plates are laid in the grooves which transmit and distribute heat from the underfloor heating pipes to the floor surface.

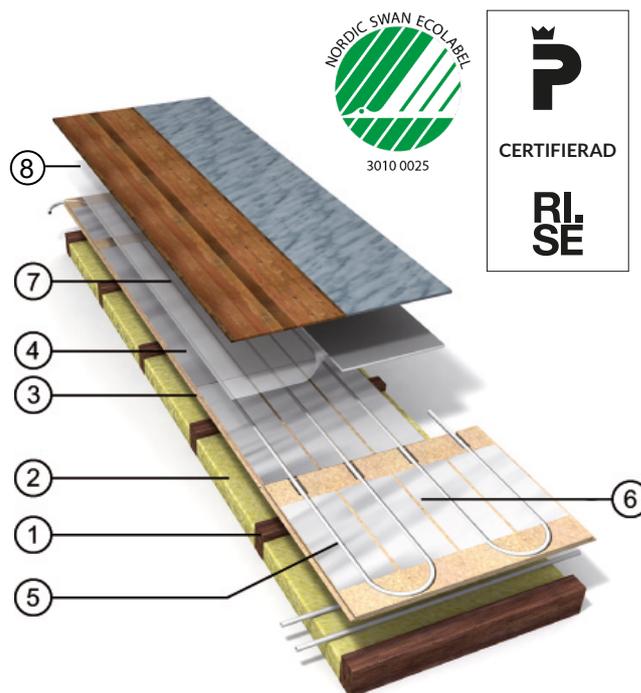
## REQUIREMENTS

The requirements for the proper functioning of the underfloor heating system is a weather-dependent control system for the supply temperature and a well implemented and documented adjustment to the primary and loop flows.

In general the guidelines apply in accordance with the local building codes and for selected bespoke design solutions. Before installing HeatFloor 22, carefully read all of the instructions.

## CONSTRUCTION OUTLINE

1. **Floor joists.**
2. **Insulation.**
3. **HeatFloor 22, Slotted board:**  
 Dim. 1800 x 600 x 22 mm (grooves c.t.c 200)  
 Dim. 1800 x 600 x 22 mm (grooves c.t.c 300)  
 The slotted board has grooves on all four sides. The slotted board has slots c.t.c 200 mm alternative c.t.c 300 mm, suitable for LK Heat distribution plate 16 and LK Universal pipe dim. 16 mm.
4. **LK Heat distribution plate 16/190:**  
 L = 1150 mm, W = 190 mm (c.t.c 200)  
 L = 1150 mm, W = 280 mm (c.t.c 300)
5. **LK Universal pipe dim. 16 mm.**
6. **HeatFloor 22, Turning board:**  
 Dim. 595 x 800 x 22 mm (c.t.c 200)  
 Dim. 595 x 1200 x 22 mm (c.t.c 300)
7. **Vapour barrier as per floor manufacturer instructions and cell foam/rag paper.**
8. **Surface layer**  
 Examples of surface layers are parquet/hardwood flooring, laminate flooring, ceramic flooring, plastic or linoleum. See more under the *Surface Layers* heading.



## WORKING PROCEDURE

Below is a description of the procedure for installing HeatFloor 22 slotted and turning boards, heat distribution plates and pipes. Plan the different tasks carefully to make this process as smooth as possible.

### Evenness and distance of floor joists

Make sure that the floor joists have the correct centreline distance depending on the selected floor structure as described here. Ceramic flooring requires a maximum cc distance of 300 mm between the joists.

**For british users** the following applies: In general the guidelines apply in accordance with the local building codes and for selected bespoke design solutions.

**For Swedish users** the below mentioned HUS -AMA requirement applies. The evenness of the floor joists should be checked to ensure the requirement in HUS AMA, table 43.DC / -1, class A is met after completion of the installation of slotted and turning board. In other words, the floor's surface evenness must meet the maximum curvature  $\pm 3$  mm at two metres and  $\pm 1.2$  mm at a 0.25 metre measurement length.



### Joist insulation

Joist insulation should fill up the entire joist cavity. The performance of the floor heating system is improved if the joist insulation abuts the underside of the slotted board, especially if the joist system is leaky/draughty.

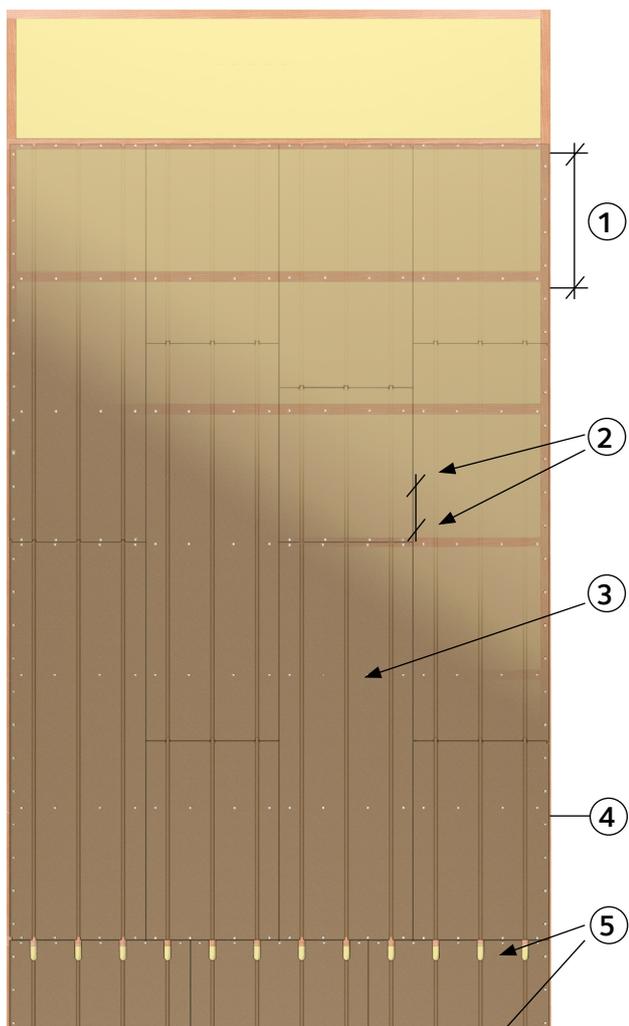
### Installation of Slotted and Turning boards

Install slotted and turning boards, and a row of turning boards as per the image below. Delay installing a row of turning boards where the underfloor heating pipe enters the room. Make sure the grooves between the boards are aligned with each other.

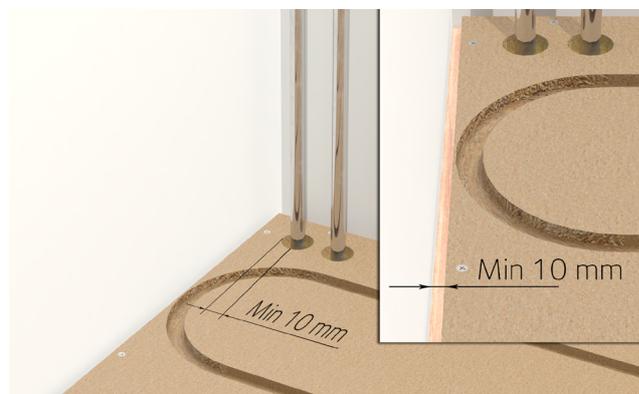
4. One row of screws in each joist.
5. Each board must be screwed into at least two joists.

### General

The slotted and turning boards are mounted perpendicular to the joists. The maximum allowed distance between the joists is 600 mm (for ceramic flooring the maximum is 300 mm). The boards should always be supported by joists or noggings along all the walls. A 10 mm expansion joint need to be accommodated against walls and other fixed objects.



1. Generally, a joist distance of up to 600 mm applies. For ceramic surface layers, a joist distance of up to 300 mm applies.
2. Slotted boards can be laid with staggered short joints, min displacement of 200 mm.
3. Where the short joints of the board meet the joists, a row of screws is screwed in each short joint.



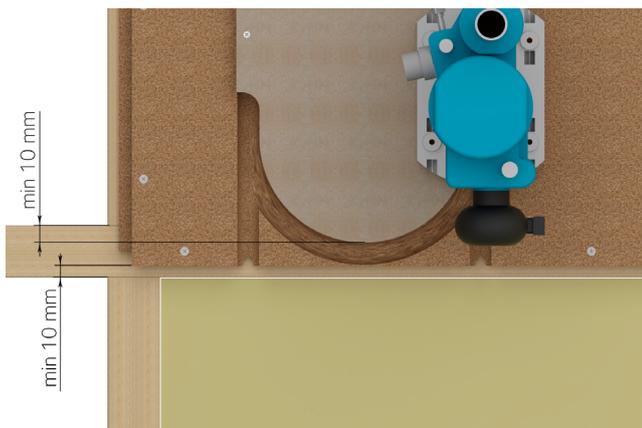
Distance to the wall and fixed objects.

The slotted board with dimensions 1820x600x22 mm has a tongue or groove on all sides allowing the boards to be laid continuously, i.e. the short joints on the slotted board can be joined between joists. Short joints are to be offset relative to each other in adjacent rows. If they end up in the same joist section, there must be a minimum distance of 200 mm between the short joints.

Turning boards do not have a tongue or groove on the long sides. When the short side of the slotted board meets the long edge of the turning board the slotted board's tongue is cut away. Note that the joint between the slotted board and turning board always end up in the middle of a joist. The turning-board's turning groove should always be supported by a joist. Ensure that the inner radius of the turning groove rests on at least 10 mm of the joist.

If you choose to mill your own turning boards, instead of using the supplied turning boards, the turning groove must be supported by a joist or noggings edge. When milling your own turning board, use LK Router steel HF22 to ensure a correctly performed groove profile. Use LK Router template HF 22 for a correctly executed turning radius.





Milling of turning grooves, ensure that the inner radius of the turning groove rests on at least 10 mm of the joist.

### Adhesive

The boards are carefully glued with two beads of glue to the joists and noggings pieces. The tongue and groove must be glued liberally to ensure that a small surplus is squeezed out when installing. The excess adhesive should be wiped off. The amount of adhesive required is about 1.3 l per 10 m<sup>2</sup> of floor area. Ensure that the pipe slots on the boards are aligned with each other.

### Type of glue

When installing standard P6 boards, use PVAc glue class D2 or D1 depending on temperature during installation. At temperatures above +10°C, use Cascol Indoor 3304 or similar, and at temperatures below +10°C, use Cascol Winter 3303 or similar.

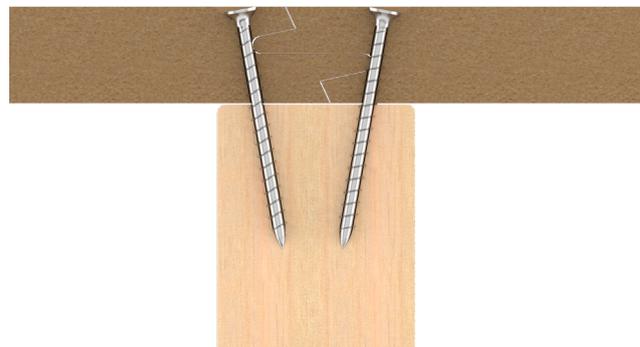
When installing moisture resistant P7 boards, use a moisture resistant PVAc glue class D3, such as Cascol Outdoor 3337 or similar.



Bonding of HeatFloor 22 in the tongue and groove to the floor joist.

### Screwing the slotted and turning boards

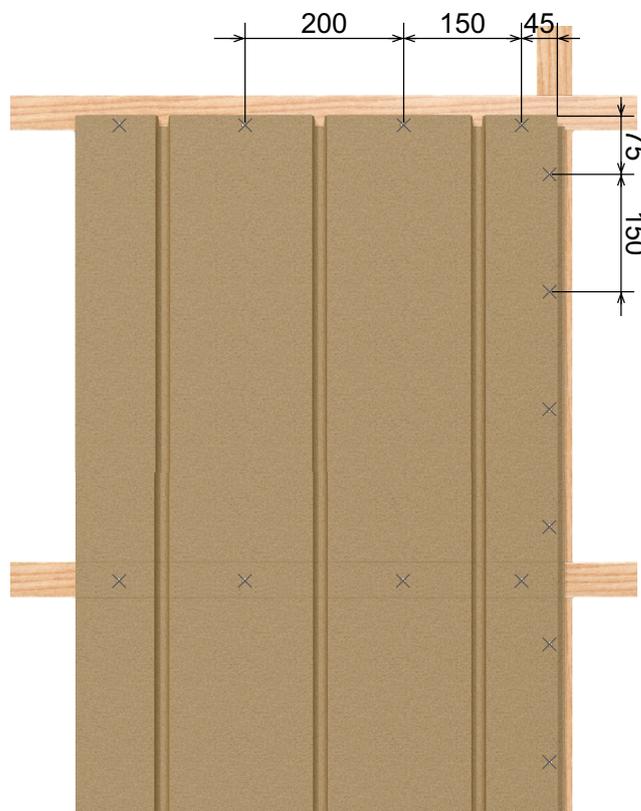
Use chipboard screws 4.2x55 mm which are recessed about 2 mm into the boards.



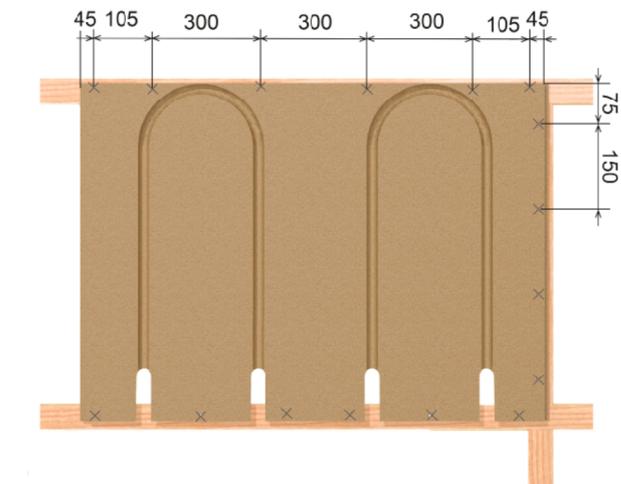
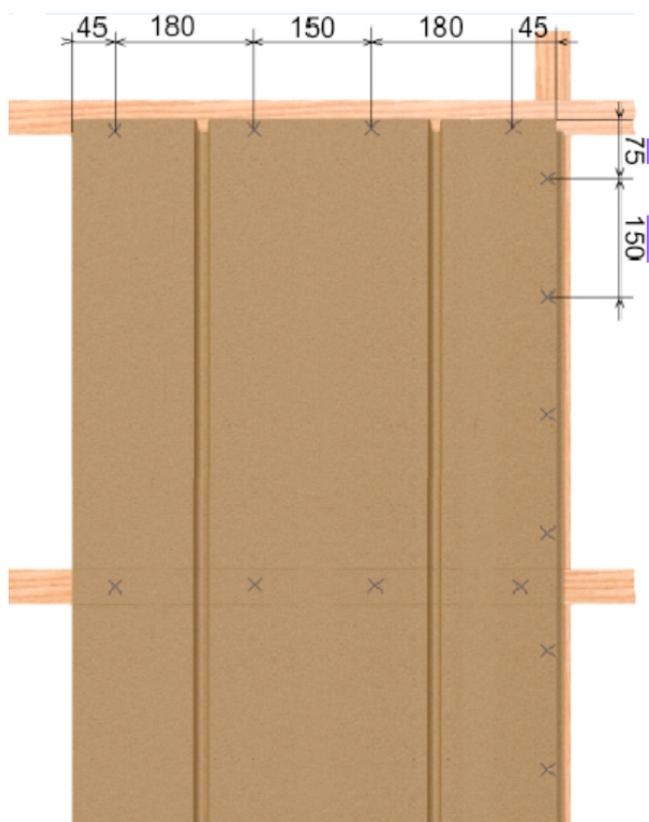
Screwing the HeatFloor 22 in the floor joist.

### Screwing the slotted boards

The slotted boards must be screwed to all supported outer edges and short sides and to all floor joists. Where the short joints on the slotted boards meet above the floor joist, a row of screws is screwed into each board. The same applies when the slotted board meets a turning board. The screws are positioned as shown below.



X marks screw placement, HF22 c.t.c 200.



X marks screw placement, HF22 c.t.c 300 mm.

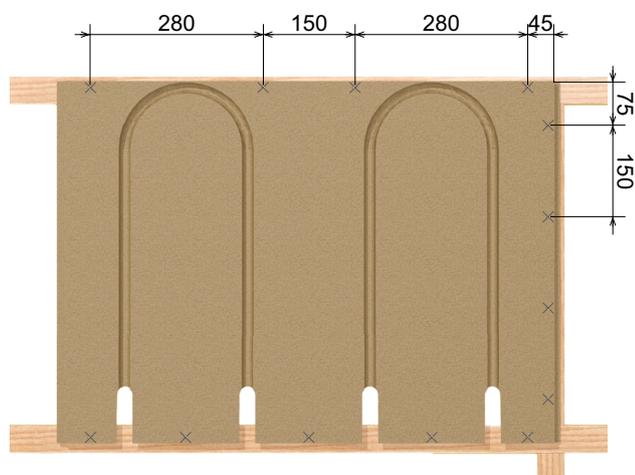
X marks screw placement, HF22 c.t.c 300.

### Screwing of turning boards

The turning board is screwed to all the supported outer edges and where the turning board meets a slotted board. The amount and location of the screws is shown in the figure below.

Turning boards HF22 c.t.c 200 mm is screwn according to the figures.

Turning boards HF22 c.t.c 300 mm is screwn according to the figures.



X marks screw placement, HF22 c.t.c 200 mm.



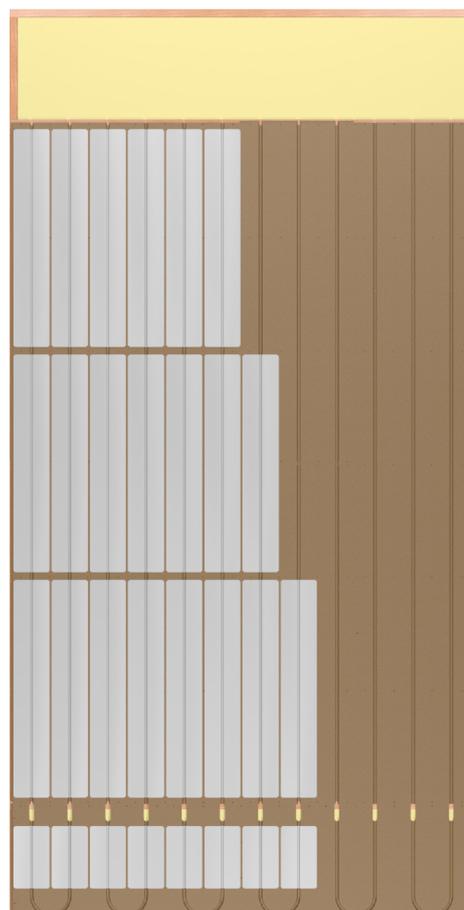
## Installation of LK Heat distribution plates



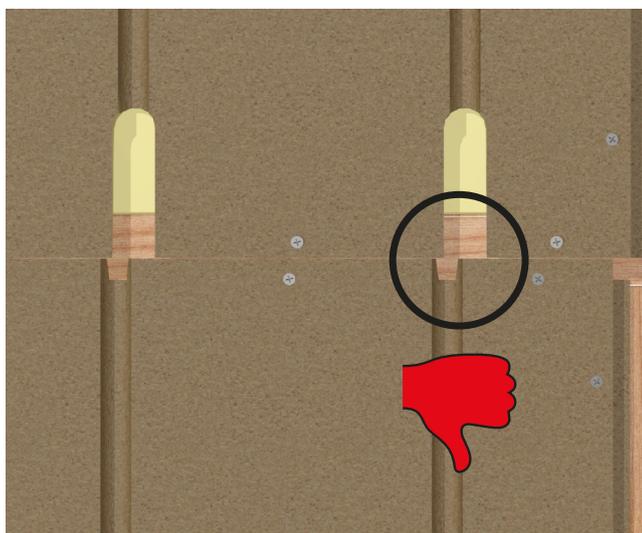
**NOTE!**

Carefully check that the grooves are aligned with each other before laying the plates. If the grooves are misaligned, the heat distribution plates must not pass a board joint. This might otherwise cause the plate to buckle and create noise in the structure.

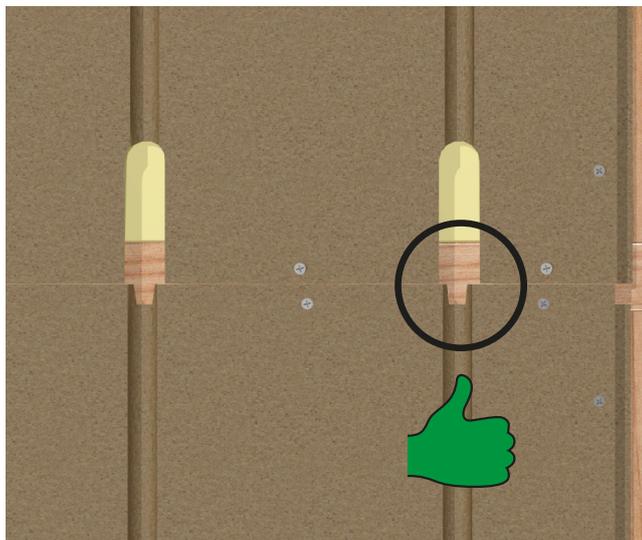
Before laying the heat distribution plates, the boards and slotted boards should be thoroughly cleaned using a vacuum cleaner. LK Heat distribution plates are then laid and pressed down into the board grooves at a distance of 10 – 100 mm. The length of the plates is easily adjusted using the plate's breaking notch.



*Laying of heat distribution plate.*



*Wrong, the tracks are not aligned*



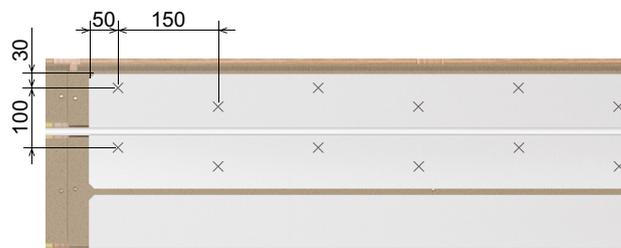
*Right!*



**NOTE!**

Screwing the plate must take place after laying the pipe. Use screws with flat heads, such as mounting screws, length 14–20 mm.

For surface layers of ceramics, the LK Heat distribution plate screws are inserted and tightened in a zigzag pattern as shown below. However, it should be performed after laying the pipe.



*The distribution plate screws are inserted and tightened in a zigzag pattern.*



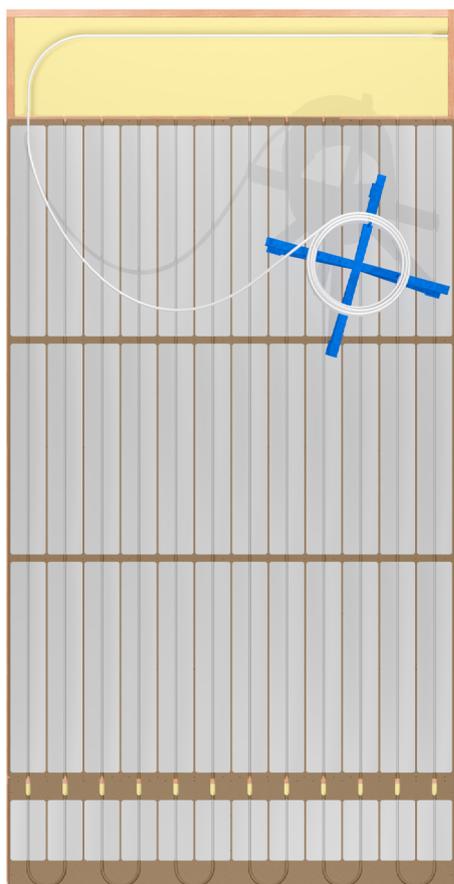
## Installation of underfloor heating pipes



**NOTE!**

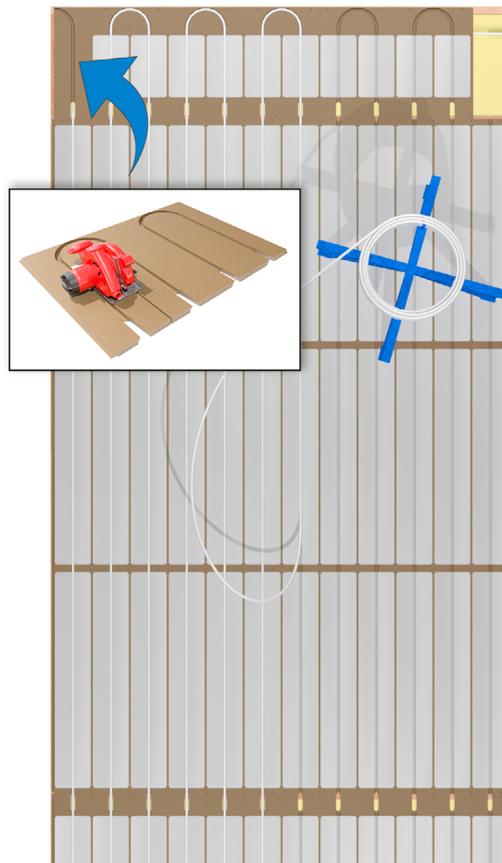
Wait to fit the remaining turning board until the pipe has been laid in the room and is connected to the manifold. Once this is done, glue and screw the last board in place in accordance with the above instructions for gluing and screwing.

The pipe is laid according to the agreed routing drawing. Observe the flow direction to ensure that the supply pipe runs along the outer walls as far as possible. Before laying the pipe check there are no impurities in the plates (vacuum the grooves). Mark the circuits with name and number according to the floor heating drawing. Connect the underfloor heating pipe to the heating circuit manifold and run the pipe up to the open floor joist cavity to the slotted board as shown below.



Now install the turning boards in the remaining open joist cavity. Use the oblong holes on the turning boards to move the pipe from the floor joist up and down. Glue and screw the turning boards and supplement with plates in accordance with the instructions above.

Press or tread down the pipe into the plate's groove. Following installation, the pipe must be pressed down in the groove and is not to come into contact with the overlying surface layer.



As a tool for laying the pipes, use LK Pipe winder. Pipes must be cut using pipe cutters designed for PE-X/PE pipes.

### SURFACE LAYER

#### Parquet/hardwood floors

Floor joist spacing for this structure is a c.t.c of up to 600 mm.

The underfloor heating is initially covered with a vapour barrier (ageing-resistant plastic) according to the instructions of the floor manufacturer and then with rag paper or cell foam. Now lay the parquet/hardwood floor with a minimum 14 mm thickness along the direction of the underfloor heating pipes. Each floor supplier's instructions and GBR guidelines for hardwood floors on underfloor heating must be observed.

If another direction of lay is required, the parquet can be pre-laid according to two methods:

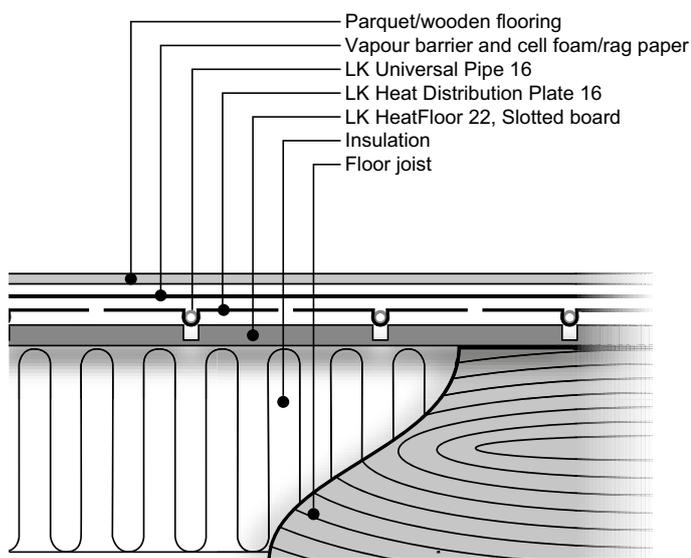


### 1. On a sub-floor

The parquet floor can be laid on a on a sub-floor, e.g. Byggelit's 12 mm floor leveller or equivalent grade-2 boards. The sub-floor must be fitted according to the supplier's instructions for fitting on wooden floors. The sub-floor is screwed to the slotted boards using board screws with a minimum length of 30 mm in a grid pattern with a coordinated screw distance of approx. 200 mm and a distance from the boards' outer edges of approx. 20 mm. When a 12-mm sub-floor is laid, parquet flooring with a maximum thickness of 13 mm can be used due to the construction's overall heat resistance. Given the heat resistance of this structure, the floor thickness must not exceed 25 mm; consult LK.

### 2. On floor joists with a maximum c.t.c distance of 400 mm.

Provided that the c.t.c distance of the floor joists is a maximum of 400 mm, a parquet floor of at least 14 mm thickness can be placed floating in the same direction as the floor joists.



HeatFloor 22 installed on floor joists (max joist distance 600 mm). Surface layer of parquet or hardwood floor min 14 mm.

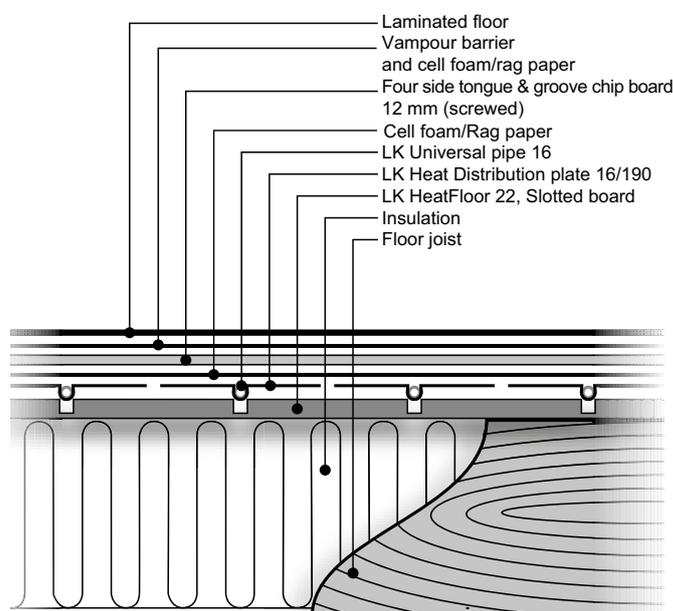
### Laminate flooring

Floor joist spacing for this structure is maximum c.t.c 600 mm.

The floor heating is initially covered with a vapour barrier (ageing-resistant plastic) and then with rag paper or cell foam. Now lay laminate flooring with a minimum thickness of 9 mm along the direction of the underfloor heating pipes.

When another laying direction is preferred, the laminate flooring can be installed on an intermediate floor, Byggelit's 12 mm ROT flooring or equivalent P2 quality boards. The intermediate floor can now be laid according to the flooring manufacturer's instructions concerning installation on wooden floors. Fasten the intermediate floor to the slotted boards using particle board screws, length minimum 30 mm, with at least 200 mm mutual screw distance and at about 20 mm distance from the outer edges of the boards.

On an 12 mm intermediate floor you can use a 13 mm thick laminate flooring, with regard to the total thermal resistance of the structure.



HeatFloor 22 installed on floor joists (max joist distance 600 mm). Screwed intermediate floor with a surface of laminate flooring.

### Plastic or linoleum carpets

Below are three different design solutions for plastic or linoleum. Be aware that the structures have different requirements in terms of maximum floor joist spacing. Also note if the structure is designed for dry or wet rooms.

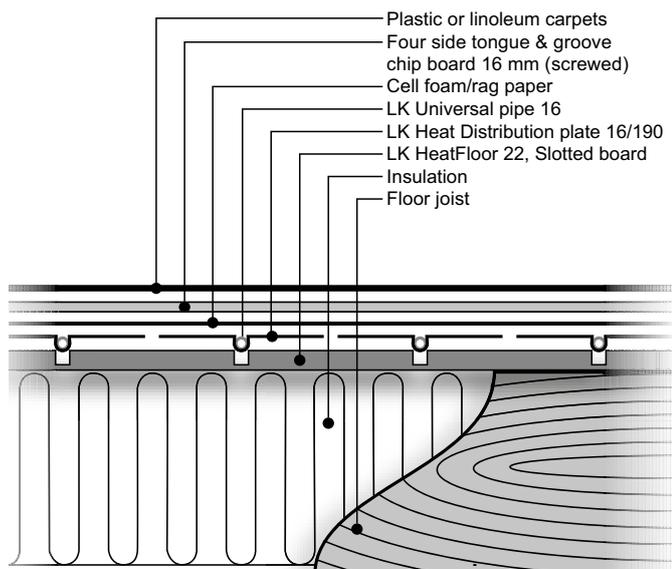
#### Dry rooms

Floor joist spacing for this structure is maximum c.t.c 600 mm. When installing plastic or linoleum carpet as the surface layer, an intermediate floor of Byggelit's groove and tongue 16 mm flooring particle board with a vapour barrier on cell foam or rag board.



The intermediate floor should be laid with at least 200 mm staggered short joints and with a displacement of 10 mm along the walls and fixed objects. The intermediate floor is glued tongue and groove, use Casco installation adhesive 3303 or equivalent. The amount of adhesive used should be sufficient so that a small surplus is squeezed out during installation. Excess adhesive is then wiped off.

Laying the carpet can then be carried out in accordance with the instructions from the relevant supplier.



HeatFloor 22 installed on floor joists (max joist distance 600 mm). Surface layer of plastic or linoleum carpet in dry rooms.

### Wet rooms

Floor joist spacing for this structure is maximum c.t.c 600 mm.

When laying wet room carpet in wet rooms, an intermediate floor of Byggelit's 16 mm tongue and groove flooring particleboard is screwed to the slotted boards in a 200 mm grid and with a 20 mm clearance from the outer edge.

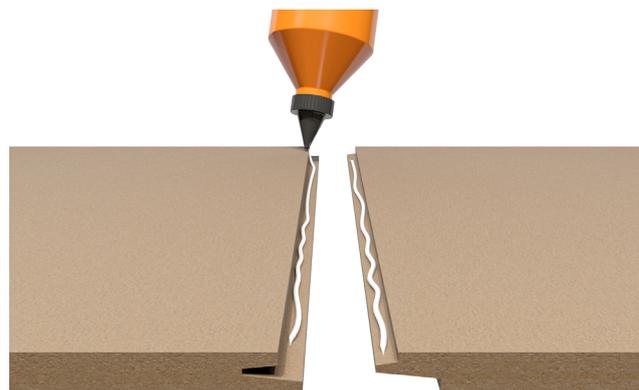
The intermediate floor should be laid with at least 200 mm staggered short joints and with a displacement of 10 mm along the walls and fixed objects.



**NOTE!**

Ensure that the heating pipes are not damaged during screwing.

The intermediate floor is glued tongue and groove, use Casco installation adhesive 3303 or equivalent. The amount of adhesive used should be sufficient so that a small surplus is squeezed out during installation. Excess adhesive is then wiped off.

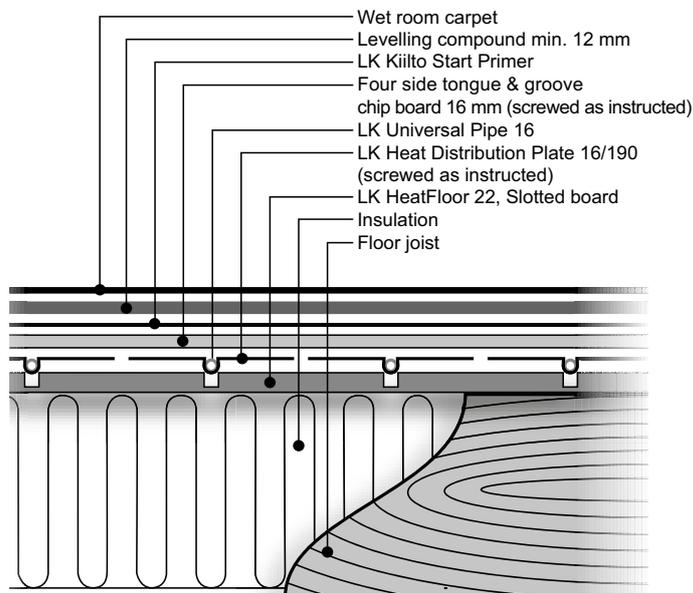


Bonding of intermediate floor 16 mm.

In conjunction with the installation of the intermediate floor, the position of the pipe should be marked to avoid damage to the pipe at the next step, when screwing the intermediate floor.

The intermediate floor is screwed to the slotted boards into a grid with a mutual screw distance of about 200 mm and at a distance from the outer edges of the boards of about 20 mm.

The intermediate floor is then primed and the levelling compound for constructing the slope in wet rooms is applied, min. 12 mm at floor drains. Follow the relevant supplier's and GVK's advice and instructions.



HeatFloor 22 installed on floor joists (max joist distance 600 mm). Surface layer of wet room carpet. 600 mm).

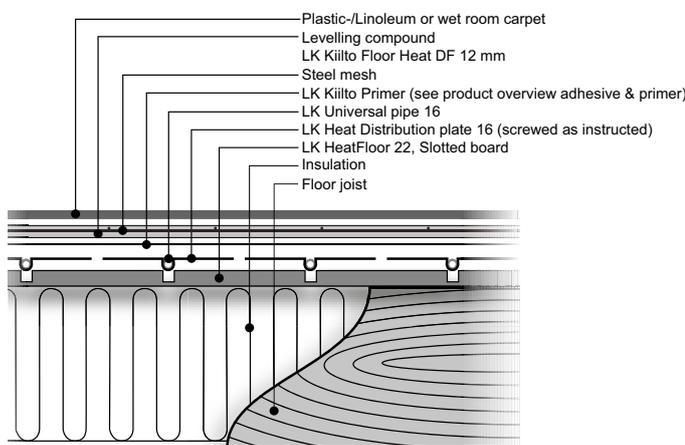


Floor construction for wet or dry rooms with levelling compound

Floor joist spacing for this structure is a c.t.c of up to 300 mm. This design is suitable for plastic, linoleum or wet room carpet and also for ceramic surface layers.

After the pipes have been laid, the LK Heat distribution plate must be screwed in a “zig-zag” pattern c.t.c 150 mm. Use appropriate screws with flat heads, such as mounting screws (length 14-20 mm). Make sure that the floor and heat distribution plates are clean, and vacuum carefully. If there is oil or grease on the plates, wash off the oil/grease. Seal any holes in the floor as well as the oblong holes ahead of the next work stage, priming.

Now prime the entire surface with LK Kiilto Primer (see product overview adhesive & primer), drying time 1-2 hours. Add LK Steel mesh 70x70x2.5 mm. Allow the mesh mats to overlap one another by at least 70 mm. Cover the installation with LK Kiilto Floor Heat DF. The compound should be at least 12 mm thick. Laying the carpet can then be carried out in accordance with the instructions from the relevant supplier.



*HeatFloor 22 installed on floor joists (max joist distance 300 mm). Plastic or linoleum carpets in dry rooms and wet room carpet in wet rooms.*

Ceramic or natural stone

Below are three different design solutions for ceramic flooring. Be aware that the structure requires a maximum c.t.c floor joist spacing of 300 mm. Also note if the structure is designed for dry or wet rooms.

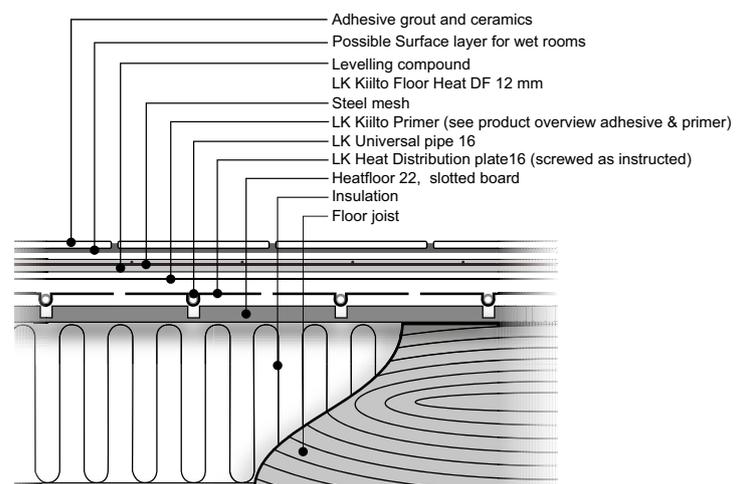
Ceramics in wet or dry rooms with levelling compound

Floor joist spacing for this structure is a c.t.c of up to 300 mm. This design is suitable for ceramic surface layers as well as for plastics, linoleum or wet room carpet.

After the pipes have been laid, the LK Heat distribution plate must be screwed in a “zig-zag” pattern c.t.c150 mm. Use appropriate screws with flat heads, such as mounting screws (length 14-20 mm). Make sure that the floor and heat distribution plates are clean, and vacuum carefully. If there is oil or grease on the plates, wash off the oil/grease.

Seal any holes in the floor as well as the oblong holes ahead of the next work stage, priming.

Now prime the entire surface with LK Kiilto Primer (see product overview adhesive & primer), drying time 1-2 hours. Add LK Steel mesh 70x70x2.5 mm. Allow the mesh mats to overlap one another by at least 70 mm. Cover the installation with LK Kiilto Floor Heat DF. The compound should be at least 12 mm thick. Now apply the surface layer for wet rooms and ceramics, follow the supplier's instructions as well as BKR's industry guidelines.



*HeatFloor 22 installed on floor joists (max joist distance 300 mm). Ceramic surface layer in dry and wet rooms.*



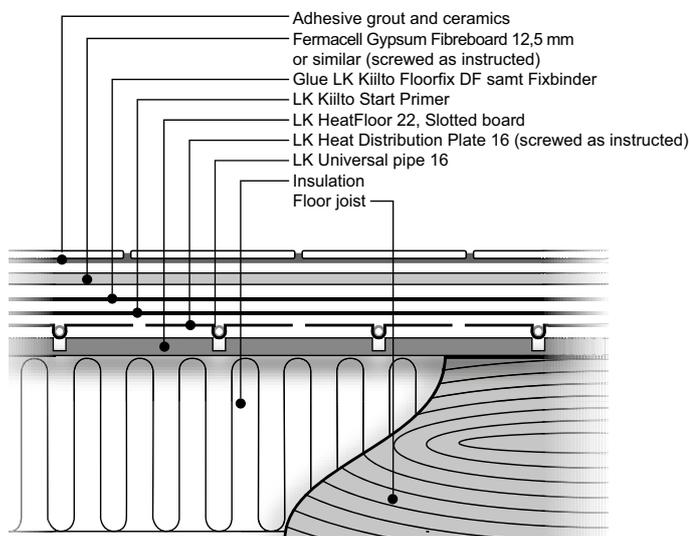
### Ceramics in dry rooms - Board solution

Floor joist spacing for this structure is a c.t.c of up to 300 mm. This design is suitable for ceramic surface layers as well as for plastics, linoleum or wet room carpet. After the pipes have been laid, the LK Heat distribution plate must be screwed in a "zig-zag" pattern c.t.c 150 mm. Use appropriate screws with flat heads such as mounting screws (length 14-20 mm).

Make sure that the floor and heat distribution plates are clean, and vacuum carefully. If there is oil or grease on the plates, wash off the oil/grease. Now prime the entire surface with LK Kiilto Start Primer, drying time 1-2 hours.

Now glue a dimensionally stable 12.5 mm Fermacell fibre gypsum board or equivalent on the floor with LK Kiilto Floorfix DF mixed with LK Kiilto Fixbinder and water. Apply the adhesive using a flat trowel, after which the adhesive is combed out with a notched trowel (8 mm notches). Installation of the dimensionally stable board must occur within 10-15 minutes of applying the adhesive. In connection with the installation of the boards, the placement of the pipes needs to be marked to avoid damage to the pipe at the next step, screwing into dimensionally stable boards.

The boards are screwed in using drywall screws 3.9x30 mm along the boards' short and long sides and between the pipe rows. Start by screwing the board edges 50 mm in from the corners and after that at a distance of 300 mm. Screw between the pipe rows at a distance of max 500 mm. When the adhesive has dried after around 32-48 hours, the tiling can begin.



HeatFloor 22 installed on floor joists (max joist distance 300 mm). Ceramic surface layer in dry rooms with board solution.

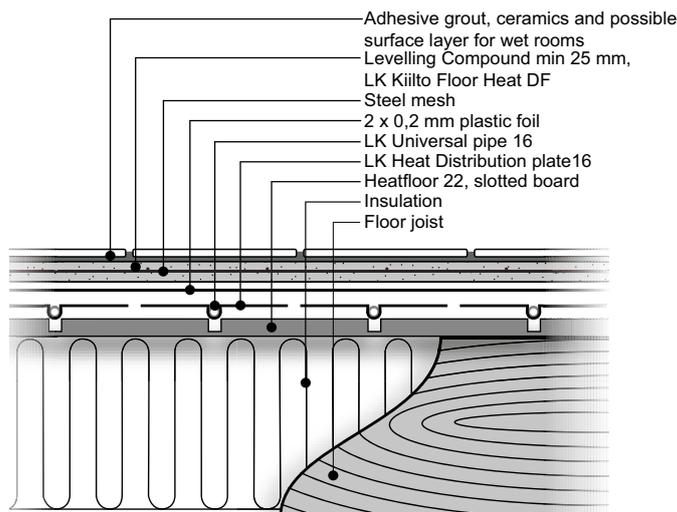
Alternative solution using levelling compound for ceramics in dry rooms.

Floor joist spacing for this structure is maximum c.t.c 300 mm. This design is suitable for ceramic surface layers as well as for plastics or linoleum carpet.

As an alternative solution for dry rooms, a casting with LK Kiilto Floor Heat DF can be used.

Lay 2 layers of age-resistant plastic foil (0.2 mm) and turn up the plastic foil along the walls (approx. 100 mm). Lay the LK Steel mesh 70 x 70 x 2.5 mm, and allow the mesh mats to overlap one another by at least 70 mm.

Cover the installation with LK Kiilto Floor Heat DF. The compound should be at least 25 mm thick. When the compound has dried after 3-5 days, the surface ceramics are applied.



HeatFloor 22 installed on floor joists (max joist distance 300 mm). Ceramic surface layer with levelling compound in dry or wet rooms.

### Handling instructions

#### General

When buying and before assembly; Always check the boards for visible defects. Before the boards have been installed, it is important that they have been conditioned for 2-3 days in the climate in which they will be used.

Read the installation instructions before you begin installing HeatFloor 22. If anything is unclear or ambiguous, contact your supplier prior to installation!



### P6 (standard quality)

Slotted and turning boards marked with quality class P6 are designed for use in dry indoor environments. They should not be used outdoors or in such a way that they are exposed to moisture or air with a very high humidity.

### P7 (moisture resistant quality)

Moisture resistant slotted and turning boards marked with quality class P7 are designed for use in climate class 1. The boards may be exposed to climate class 2 for a short time in the installation stage. The boards should not be exposed to water of any kind without being protected.

If the floor is used as a platform floor, it must be protected against moisture with a tarpaulin or similar covering.

CLIMATE CLASS 1 is characterized by a moisture content in the materials which corresponds to a temperature of 20°C and a relative humidity which only a few weeks per year is higher than 65%. (EN 1995-1-1:2004)

CLIMATE CLASS 2 is characterized by a moisture content in the materials which corresponds to a temperature of 20°C and a relative humidity which only a few weeks per year is higher than 85%. (EN 1995-1-1:2004)

### Protection during transport

During transport and storage, the boards must be protected against dirt and moisture. The boards should be transported and stored on a flat surface.

If exposed to prolonged high humidity, boards with profiled edges can be damaged causing difficulties to arise when installing. For the same reason the boards should be generally handled with care.

### Protection when stored



#### NOTE!

The chipboard should never be stacked directly on the ground. The best storage conditions are 15-25 °C and 50-60% relative humidity. The relative humidity must not exceed 80% for prolonged periods.

Chipboard should be stored indoors. If this is not possible, storage outdoors should be brief and the chipboard must then be thoroughly covered, e.g. with tarpaulin, ensuring the boards are protected from precipitation. Remember to arrange ventilation under a sealed cover.

The chipboard must be stored on a flat and horizontal surface.

### Load category

The design principles in these instructions meet the requirements of load category A in EN 1991-1-1 and EKS. Category A includes spaces for housing, etc., rooms in apartment buildings and houses, bedrooms and wards in hospitals; bedrooms in hotels and hostels, kitchens and toilets.

For load categories other than those above, the floor structures must be strengthened. Design must be performed by a structural engineer.

### Formaldehyde

HeatFloor 22 boards are certified according to the current E1 standard regarding formaldehyde emissions. LK HeatFloor is capable of withstanding E0.5, which means max. 0.07 mg formaldehyde/m<sup>3</sup> air. This test is carried out using the EN 717-1 method.

## Product overview, LK HeatFloor 22

LK art. nr.	Product Name	Description
241 89 02	LK HeatFloor 22, Slotted Boards c.t.c 200	Used for pipe laying c.t.c 200
241 78 18	LK HeatFloor 22, Turning Boards c.t.c 200	Used for pipe laying c.t.c 200
241 80 09	LK Heat Distribution Plate 16/190	Used for pipe laying c.t.c 200
298 88 69	LK HeatFloor 22, Slotted Boards c.t.c 300	Used for pipe laying c.t.c 300
298 88 71	LK HeatFloor 22, Turning Boards c.t.c 300	Used for pipe laying c.t.c 300
298 88 70	LK Heat Distribution Plate 16/280	Used for pipe laying c.t.c 300
241 98 74	LK Router template HF22 c.t.c 200	Used when milling turnstiles c.t.c 200
211 31 91	LK Router template HF22 c.t.c 300	Used when milling turnstiles c.t.c 300
241 98 73	LK Router Bit HF22	Used when milling turnstiles

## Product overview, Adhesive & primer

The following products have been tested to be used for gluing and priming of our boards.

LK Art no.	Product name	Usage	Comment	Consumption	Drying time
33527	Kiilto Fix Primer, 5 litre	Priming of underfloor heating plates with mounted Heat Distribution Plate and priming in connection with the slope structure	Only combine with Kiilto products. Bonding or filling should be carried out within 24 h after the primer has dried.	1lit/5 m <sup>2</sup>	1-2 hours
33521	Kiilto Start Primer, 3 litre	Priming of underfloor heating plates with mounted Heat Distribution Plate and priming in connection with the slope structure.	Only combine with Kiilto products. Bonding or filling should be carried out within 24 h after the primer has dried.	1 l /10 m <sup>2</sup>	1-2 hours
33525	Kiilto FloorFix DF, 20 kg	Bonding of dimensionally stable boards to underfloor heating plates	Mix 5 litres of Fixbinder and 2 litres of water with 20 kg FloorFix DF	3.5 kg/m <sup>2</sup>	32-48 hours
33522	Kiilto Fixbinder, 5 litres	Bonding of dimensionally stable boards to underfloor heating plates	Mix 5 litres of Fixbinder and 2 litres of water with 20 kg FloorFix DF	5 l/20 kg FloorFix DF (+2 l water)	n/a
33524	Kiilto Floor Heat DF	Floor Slope structure	Only use with Kiilto Start Primer	1.7 kg/m <sup>2</sup> /mm	3-5 days
8912	Steel mesh 70x70x2.5, 1,800*600 mm	Reinforcement		1.3 pc/m <sup>2</sup>	n/a
Not an LK article	PVAc glue class D2 or D1	Bonding of P6 boards on floor joist, tongue & groove.		about 1.3 l / 10m <sup>2</sup> floor area	see packaging
Not an LK article	PVAc glue class D3	Bonding of P7 boards on floor joist, tongue & groove		about 1.3 l / 10m <sup>2</sup> floor area	see packaging

