Floor Heating with BEKA Heating Mats

1. Generals

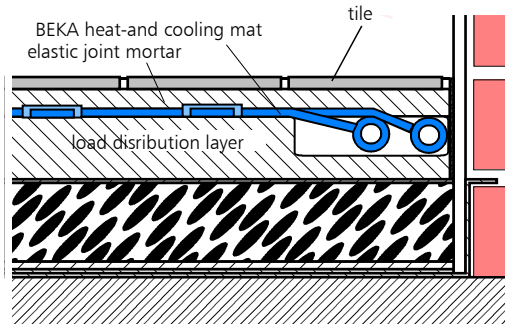
The small diameter of the capillary tubes of the BEKA mats allows a-low profile construction of the floor heating. For this reason, BEKA mats are especially useful for modernising, when floor heating is installed at a later stage. Different to the standard floor heating systems, the heat is available closely beneath the floor surface. For this reason, the BEKA floor heating reacts very rapidly and can be operated already with low supply temperatures.

2. System description

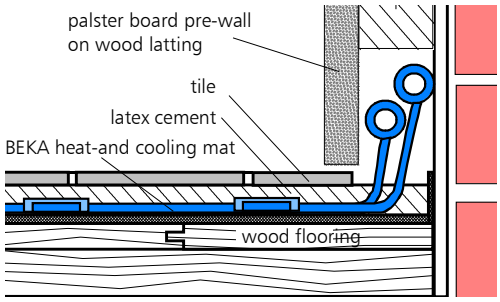
The BEKA mats are laid on top of a load supporting structure, directly below the surface of the floating screed. The capillaries tubes do not weaken the load-carrying capacity of this thin layer of screed. The mats are connected between each onother, to the pipelines and up to the heating circuit distributor normally by means of thermal plastic welding.

3. Heating water technology

BEKA heating mats are connected room-/zone-wise with the supply and return pipes in one circuit to the heat source. The connection via a BEKA storey distributor unit is recommended. The economic advantages of the BEKA floor heating are based mostly on the fact that already low supply temperatures, which are only slightly above the room temperature, will transmit high performances. This makes the utilisation of alternative energy (heat pumps and solar collectors) possible.
But even with conventional technologies a defined energy saving will be achieved, since it can be operated with temperatures below 40°C .



Variation A: Layout for new floor construction



Variation B: Layout for modernizing

4. Installation

Basically, the relevant installation specifications are valid. All materials used in the BEKA heating mats must be non-corrosive.
The following materials may be used: Plastic, stainless steel, copper, brass and red brass. Other materials may cause sludge in the system, which may lead to breakdown.

5. Regulating technology

The regulating technology provides for both the desired comfort and necessary system reliance.
The floor heating requires room temperature regulation to control the supply temperature in relation to the desired room temperature. It must be observed that the surface temperature must not exceed 29°C in the room.
Depending on floor covering material and floor construction, the supply temperatures will normally not raise above 36°C. In non-occupied areas surface temperatures up to 35 °C are permissible.

6. System dimensioning

Floor heating installations with BEKA floor mats are dimensioned according to the following layout table. The supply temperature determined in the water circuit, taken at the side of the cooling unit or heat generator, is regulated with the water temperature upstream to the heat exchanger.

7. Preparation for installation

For the installation of the floor heating with BEKA heating mats, working and installation instructions of the floor concrete manufacturers must be observed. The floor to be heated has to be completed with a load carrying, possibly thermal insulated layer.
BEKA mats are pre-manufactured to object size that tailoring at the building site will not be required.
It is recommended having the mats supplied already prepared with adhesive tapes for better positioning at the floor.
The laidout BEKA Heating mats can be walked-on, when the floor screed has been attached. They should be protected area-wise with styrofoam plates to avoid damage of the capillary tubes.

Before starting work, a layout pattern should be prepared as working base. In this layout pattern, all heating mats with their sizes and positions as well as the supply lines should be outlined. In this pattern, also all areas must be marked which must remain uncovered as for the positioning of internal walls. BEKA heating mats are connected to each onother and to the Polypropylene piping through thermal welding. For execution, the welding directions DVS 2207-11 of the Deutschen Verband für Schweißtechnik e. V. are relevant. (The surrounding temperature during working must not drop below 5°C. The preheating, welding and setting times for the single pipe sizes must be observed according to regulations.)

8. Tools, materials

Regarding installation of BEKA heating mats for floor heating, all tools and materials normally used for floor concreting, such as screed and installation of plastic tubing, can be utilised:

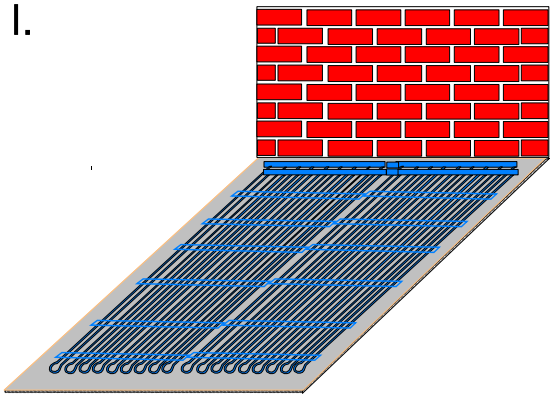
- Levelling compound (suitable for floor heating)
- Mixer
- Smoothening trowel
- Adhesive layer
- Roller or paint brush
- Border strips
- Possibly butterfly dowels and hand drill for additional fixing of the mats to the raw floor.
- Styrofoam sheets for protection of the capillary tubing when walking on them
- Scissors to cut plastic piping.
- Marker

For the connection of the supply lines to the heating circuit, a hand-held welding unit with a sleeve welding device is needed for the welding of the plastic fittings. Alternatively cutting ring connectors can also be used.

9. Installation steps for the floor, variation A

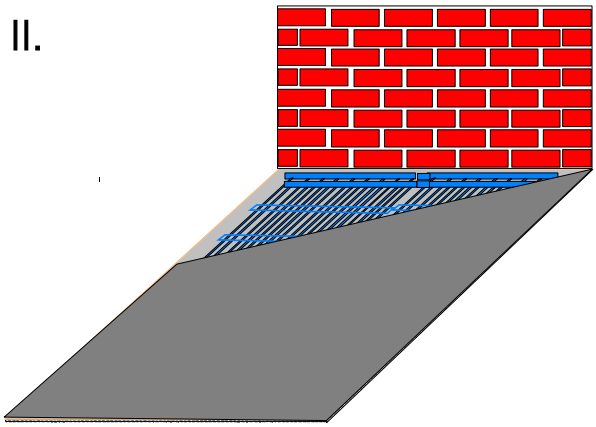
- Take BEKA heating mats out of the packaging. Mark the lay-out pattern at the primed raw floor.
- Connect the mats to the mains pipes and to the ones up to the distributor unit through thermal welding.
- Take pretest with compressed air 10 bar for 1 hour
- Take final test with water at 10 bar for 4 hours.
- Maintain a pressure at rest of 3 bar until start of operation

I.



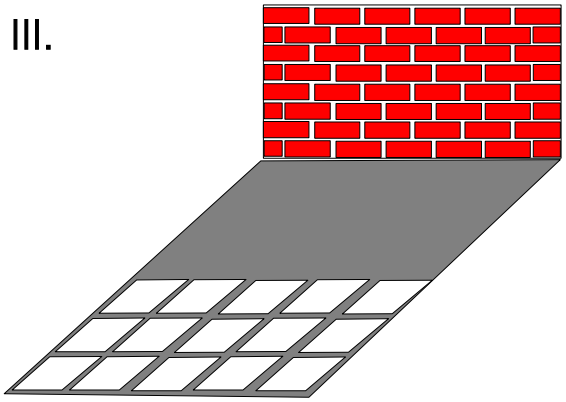
- Area-wise cover the capillary piping with Styrofoam sheets for safe walking (during application of the screed, the sheets are removed again).
- Attach levelling or flexible filling compound according to manufacturer's specification.

II.



- Finishing of the floor covering,
- (tiles etc.)

III.



The installation steps for version B are similar to the shown version A. For version B, however, the mains and mains pipe are arranged behind a dummy wall.

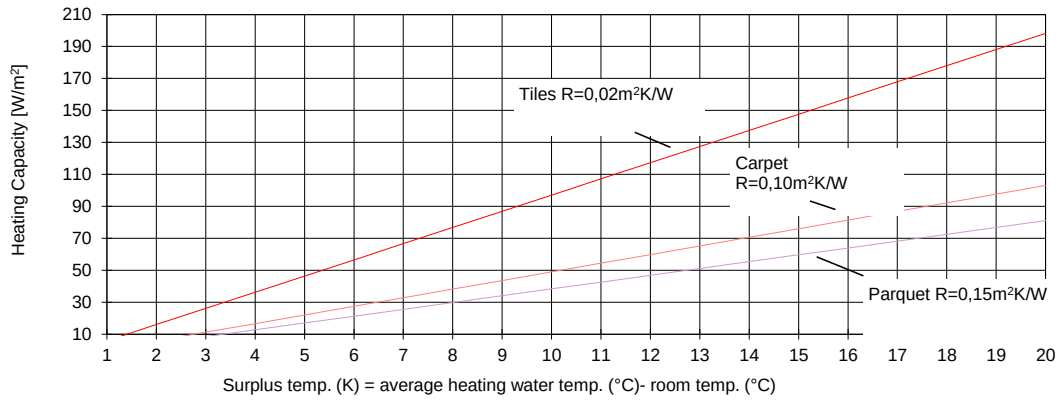
10. Layout of the floor heating with BEKA heating mats

Project :	Date
Project consultant :	Lay-out valid for 22°C room temperature and 6K heating water spread

Required Heating Capacity

1	Heat requirement for the room	W		from the calculation of the planning office
2	Planned coverage with mats	m^2		max.possible arrangement derived from room measurements
3	Required heating capacity	W/m^2		= Heat requirement / coverage

Determination of Performance

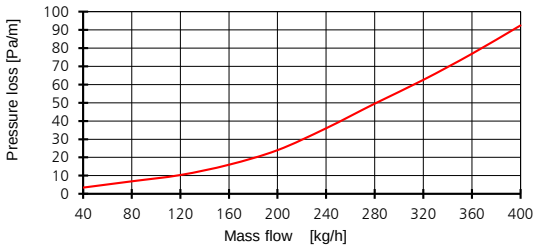


4	Room temperature	°C		average heating water temp.	°C		-> from diagram
5	Supply temp. -> from diagram	°C		return temperature	°C		
6	Spread	K					
7	Water volume per mat	kg/h		= (Heating capacity x 3600) / (Spread x 4180)			
8	Water volume per zone	ltr/h					

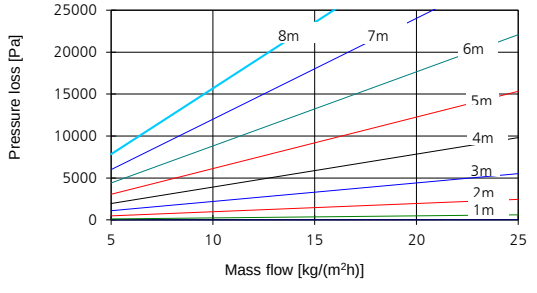
Determination of pressure loss

9	Length of connection pipe	m	
10	Resistance in the pipe -> diagram 2	Pa/m	
11	Pressure loss in the pipe = pipe length * Resistance	Pa	
12	Pressure loss in the mat -> value from line 2 -> diagram 1	Pa	
13	Addition for pressure loss by fittings (recomm: 30% addition to pipe)	Pa	
14	Addition for heat transmission unit (recomm.:for zone valves 500-1000 Pa for mains regulating valves 700 - 1500 Pa for heat exchanger approx. 4000 Pa	Pa	
15	Total Pressure Loss	Pa	

Pressure loss in a pipe 20x2mm



Pressure loss Type S15



When using BEKA Transfer units the determination for pressure losses are obsolete. Only the qty. of heating ciruits and the total heating capacity is required for the selection.

11. Technical specification

BEKA Capillary tubes mats
Type K.S15

Material:
Polypropylene Random-Copolymer Type 3 DIN 8078

Geometry:

Collector pipe	20 x 2 mm
Capillary tube	3.35 x 0.5 mm
Capillary pipe distance	15 mm
Exchanging area	0.71 m^2

Size:
Length: 600-6000 mm (in steps of 10 mm)
Width: 150-1200 mm (in steps of 30 mm)

Masses:
0.44 kg/m^2 (empty, without collector)
0.71 kg/m^2 (filled, without collector)
Water contents 0,27 l/m^2

Heating capacity:
Depending upon type
180 W/m^2

Operating conditions:
Temperature-stable with permanent operation up to 60°C
Operatiing pressure 3 to 4 bar
Test pressure 10 bar over 10 hours maximum

Application / mode of installation:
Floor heating with low profile
Connection by thermal welding

Delivery:
The mats are delivered rolled-up and packed in cartons