Floor Heating with BEKA Heating Mats

1. General

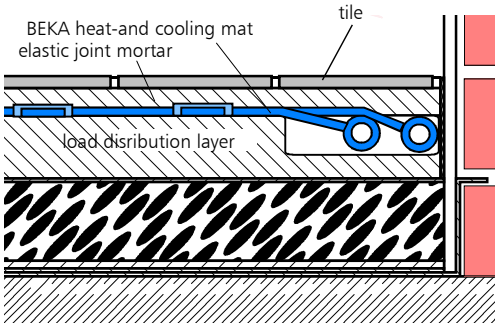
The small diameter of the capillary tubes of the BEKA mats allow a low construction height of the floor heating. For this reason the BEKA mats are especially useful for modernising when floor heating is installed at a later stage. Different to the standard floor heating systems the heat is brought closely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

2. Description of the System

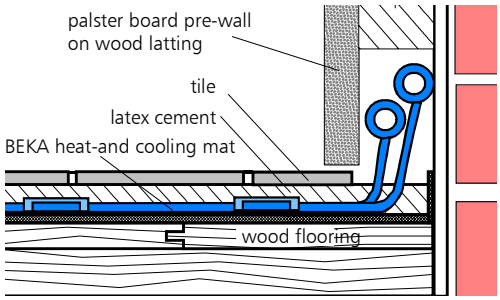
The BEKA mats are laid on top of a load carrying base, directly below the surface of a floating screed . The capillaries tubes do not weaken the load carrying ability of this thin layer of screed. The mats between another, to the pipelines and up to the heating circuit distributor normally are connected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

3. Heating Water Technique

Die BEKA heating mats are connected room-/zone-wise with the pipelines for the supply- and return 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 techniques a definite energy saving will be achieved, since it can be operated with temperatures below 40°C .



Variation A: Arrangement for new floor construction



Variation B: Arrangement for modernizing

4. Installation

Basically the known 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 breakdowns

5. Regulating Technique

The regulating technique secures, first the desired comfort, second the necessary system reliance.
The floor heating requires a room temperature regulation to control the supply temperature in connection to the desired room temperature. It must be observed that surface temperature above 29°C is surpassed.
Depending on floor covering material and floor construction the supply temperatures will normally not be above 36°C. In non-occupied areas surface temperatures up to 35 °C are permissible.

6. Dimensioning of the System

The floor heating 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 before 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 obeyed. The floor to be heated must have load carrying, possibly thermal insulated layer.
BEKA mats are pre-manufactured to object measurements, so that there must be no tailoring at the building site.
It is recommended to have the mats supplied already prepared with adhesive tapes for better positioning at the floor.
The laid-out BEKA Heating mats can be walked-on when the floor screed is brought in, they should be protected area wise with Styrofoam sheets to avoid damages of the capillary tubes.

Before starting to work a layout pattern should be prepared as work 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 stay uncovered, as for the positioning of internal walls. Thermal welding does the connection of the BEKA heating mats to another and with the Polypropylene piping. For the execution the welding directions DVS 2207-11 of the Deutschen Verband für Schweißtechnik e. V. are valid. (The surrounding temperature during working must not be below 5°C. The preheating, welding and setting time must be according to regulations.)

8. Tools and Materials

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

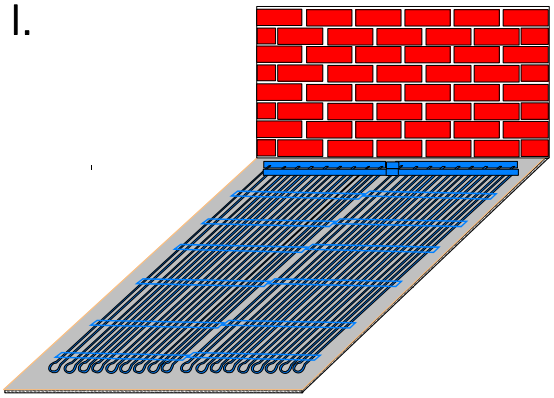
- Levelling compound (suitable for floor heating)
- Mixer
- Smoothening trowel
- Adhesive layer
- Roller or paint brush
- Border strips
- Eventually butterfly dowels and hand drill und for additional fixing of the mats to the raw floor.
- Styrofoam sheets for protection of the capillary tubing when walking 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 sealing ring connectors can also be used.

9. Installation Steps for the Floor Variation A

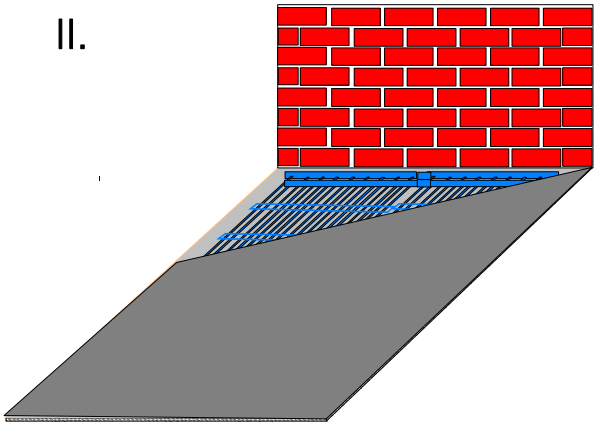
- Take BEKA heating mats out of the packaging. Mark the lay-out pattern at the primed raw floor
- connect the mats to the pipe mains to another and to the pipe lines by means of thermal welding, up to the distributor unit.
- Pre-test with compressed air 10 bar for 1 hour
- Main test with water with 10 bar for
- 4 hours. Sustain an idle pressure of 3 bar until start of operation.

I.



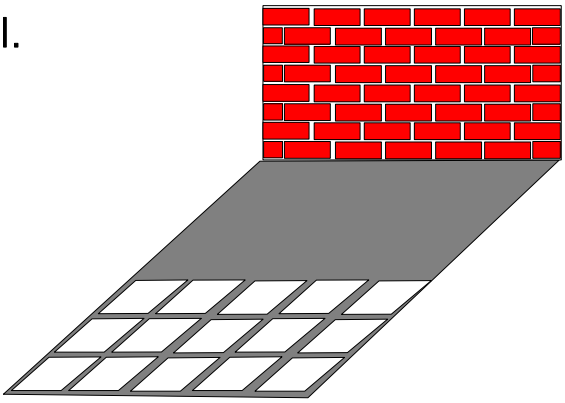
- Area wise cover the capillary tubing with Styrofoam sheets for safe walking (during application of the screed the sheets are removed again)
- levelling- or flexible filling compound is brought out according to manufacturers specification.

II.



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

III.



The installation steps for variation B are similar to the shown version A. For variation B though the mains and pipeline are arranged behind a dummy wall (which has to be erected)

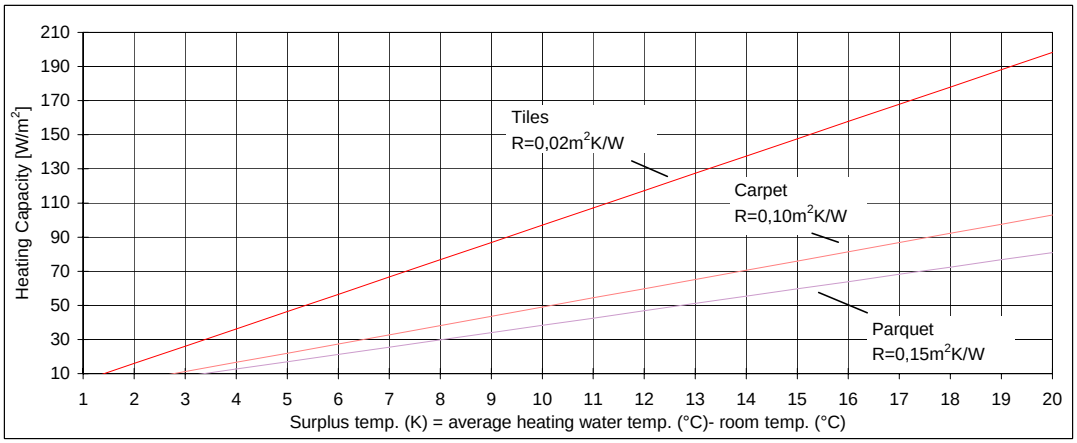
10. Lay-out of the Floor Heating with BEKA Heating Mats

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

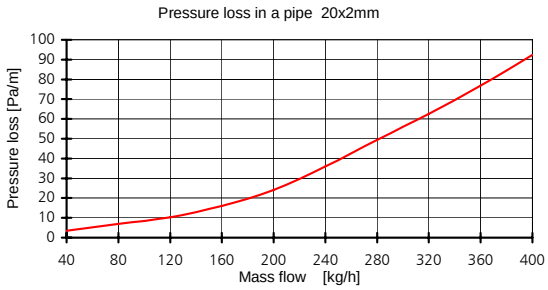
Determination of Performance

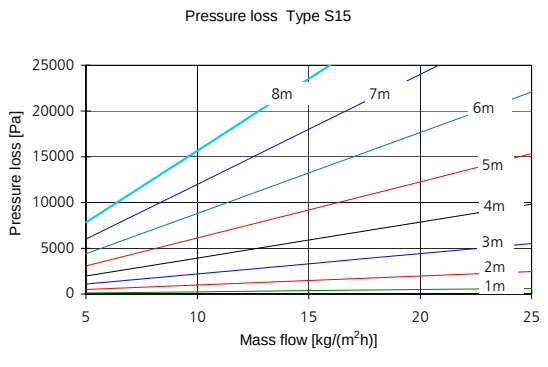


4	Room temperature	°C		average heating water temp.	°C		-> from diagram
5	Supply temp. -> from diagram	°C		return temperature	°C		
6	Spread	K					
7	Water volume per mat	kg/h		= (Heating capacity x 3600) / (Spread x 4180)			
8	Water volume per zone	ltr/h					

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	





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 Data

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

Operation Conditions:
Temperature stable at duration up to 60°C
Operation pressure 3 to 4 bar
Test pressure 10 bar max. 10 hours

Place of application / type of installation:
Floor heating with low construction height
Connection by thermal welding

Type of delivery:
The mats are delivered: rolled-up and packed in cartons