Wall Heating with BEKA Heating Mats

1. General

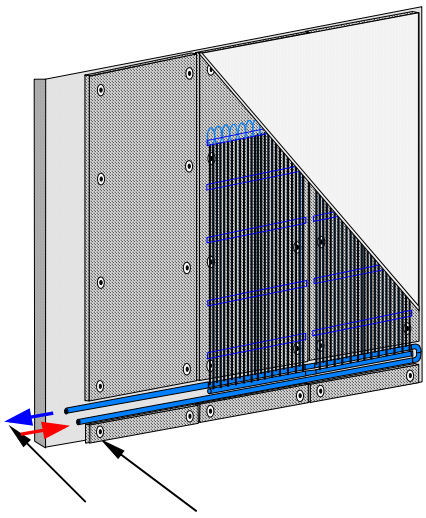
Wall heating with BEKA heating mats releases the heat to the room and directly to the room occupant in a natural way through radiation. The small diameter of the capillary tubes allows the construction of wall heating with a low construction height. For this reason BEKA mats are distinguished for the renovation where wall heating is installed to a later stage. Differing to standard wall heating systems the heat is directly beneath the wall surface. The BEKA wall heating reacts very fast and can be operated with low supply temperatures.

2. System Details

Mostly the BEKA mats are installed into the plastering of outer walls, directly beneath the surface. The outer wall must have a U-value below 0,35 W/(m^{2}K). If this is not given, insulation of the internal wall can be utilised. With a wall heating system the possibility that the dew point is moved into the wall construction is being counteracted. The connections of the mats amongst themselves and the connection of the mats to the piping, all the way to the heating circuit distributor, normally are thermal welded. In most cases the mats are installed to the wall up to a height of 2 meters. This way the possibility is given to fix things (pictures etc.) to the wall above this area.

3. Heating Water Technique

The BEKA heating mats are connected in a circuit to the heat source via pipelines to the supply- and return lines, room for room or zone for zone. It is recommended to connect to BEKA storey distributor stations.
The economical advantages of BEKA wall heating systems are based on the fact, that already at supply temperatures that are barely above room temperatures, the wall releases a high efficiency. This makes it possible to utilise alternative energies (heat pumps, solar collector systems etc). But also with the standard heating a significant energy saving will be achieved, since heating with supply temperatures below 40°C is possible.



Connection through a distributor to the heat source

Figure 1: BEKA mats on the wall with internal insulation and insulation panels. The piping is installed according to Tichelmann

4. Installation

In general the standard Installation guidelines have to be obeyed. All materials used in the BEKA heating- and cooling mat system must be non-corrosive such as plastics, stainless steel, copper, brass and red brass. Other materials in use could cause sludge and could lead to malfunction of the system.

5. Regulating Technique

The regulating technique secures, first the desired comfort, second the necessary system reliance.
For the heating ceiling a room temperature control is required, which regulates the volume of heating water in dependence to the desired room temperature. Supply temperatures above 45°C must be avoided because of the danger that an excessive surface temperature will dry-out the plaster !

6. Dimensioning of the System

The wall heating with BEKA heating 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 wall heating with BEKA heating mats the installation instructions of the plaster supply and the BEKA instructions must be obeyed. The walls to be heated must have a load-bearing surface.
The BEKA heating mats are pre-fabricated to the required dimensions for each object, so that tailoring at the building site is not necessary. It is recommended to have the mats supplied already prepared with adhesive tape for the positioning of the mats to the raw ceiling.
A layout pattern should be prepared as a work basis before work is started. All heating mats, their measurements and the direction they are facing must be marked in the pattern. All surfaces that will not be covered as for the installation of internal walls and fixing points for hanging cabinets must also be marked. The connections of the BEKA heating mats to another and to the Polypropylene pipelines are done by thermal welding. 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 the installation of BEKA heating mats for wall heating, the usual tools and materials for plastering and for installation of plastic pipes can be used, such as:

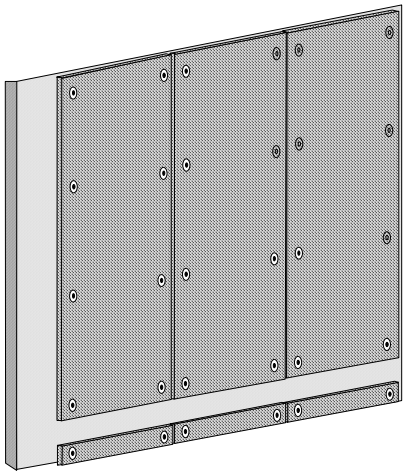
- Plastering material (suitable for wall heating systems)
- Mixer
- Smoothening spatula
- Bonding layer
- Roller or brush
- Border strip
- Possibly spreading dowels and a hand drill for additional securing of the mats to the raw ceiling
- Pair of scissors for cutting plastic piping
- Pencil

For the connection of the piping to the water circuit a hand held thermal welder suitable to weld sleeves of plastic fittings is required. Alternatively sealing ring connections can be used.

9. Installation Steps at the Wall (with Inside Insulation)

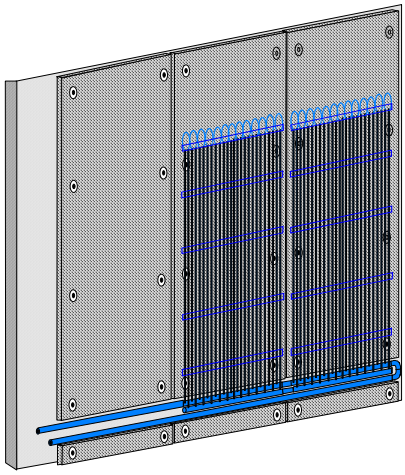
- Fix the insulation panels for a plastering base to the raw walls (with adhesive or dowels) according manufacturers instructions.
- Cut a slot (100 x 30 mm) into insulation approx. 100 mm above the floor
- Prepare insulation panel to be bonding layer for the plastering

I.



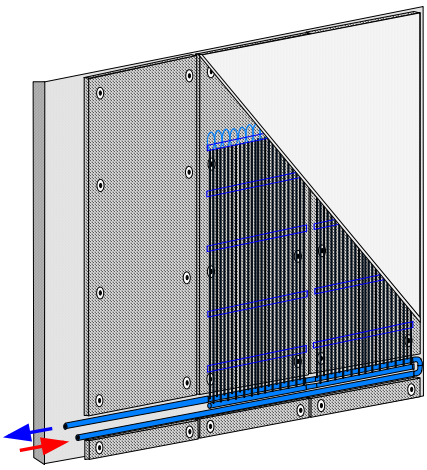
- position BEKA heating mats and fix with adhesive tape
- possibly secure the mats with spreading dowels to the wall
- connect the mats to another and to the pipelines for the supply- and return lines through thermal welding.
- pre-test with compressed air of 10 bar for 1 hour
- main test with water pressure of 10 bar for 4 hours. In resting state maintain 3 bar until taken into operation.

II.



III.

- apply a thin layer of plaster (10 mm) in one step according manufacturers instructions
- smoothen plaster, observe the predrillings



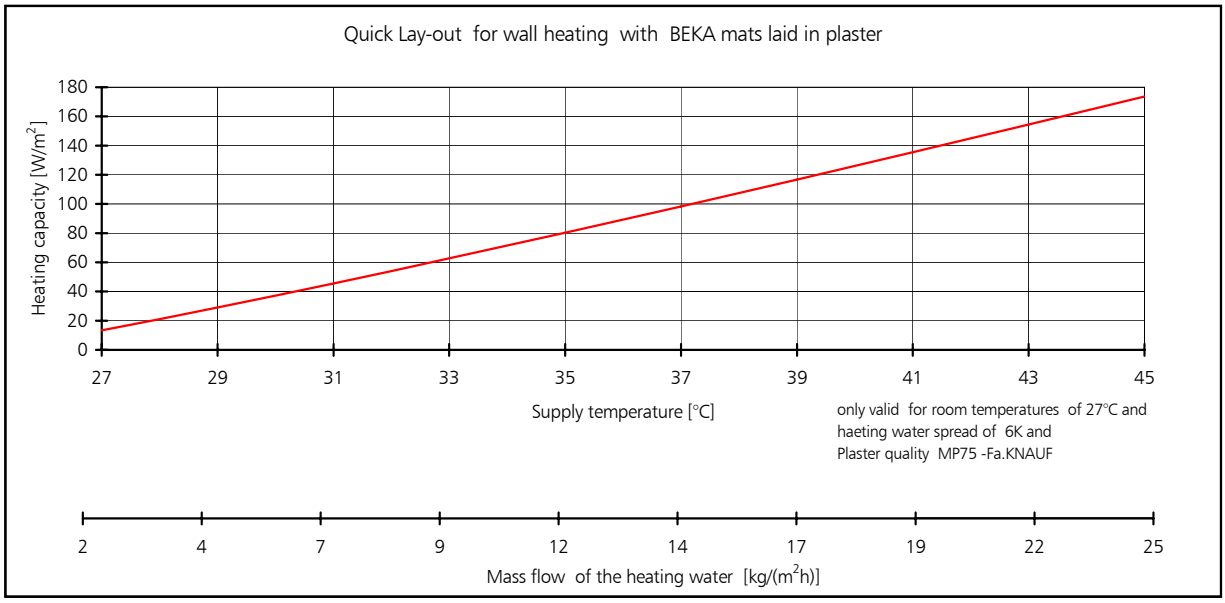
10. Lay-out of Wall Heating with BEKA Heating Mats

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 calculations of the planning office
2	Planned coverage with mats	m^2		derive the maximum possible arrangement from the room measurements
3	Required specific heating capacity	W/m^2		= heat requirement/ Coverage

Determination of capacity

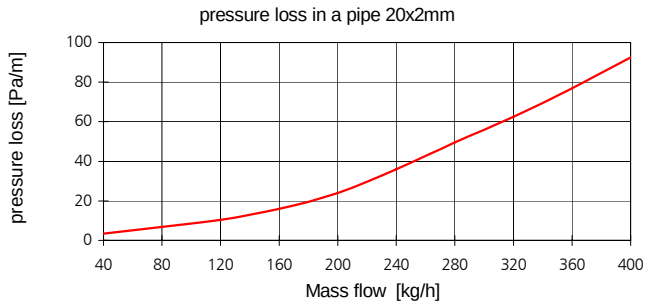


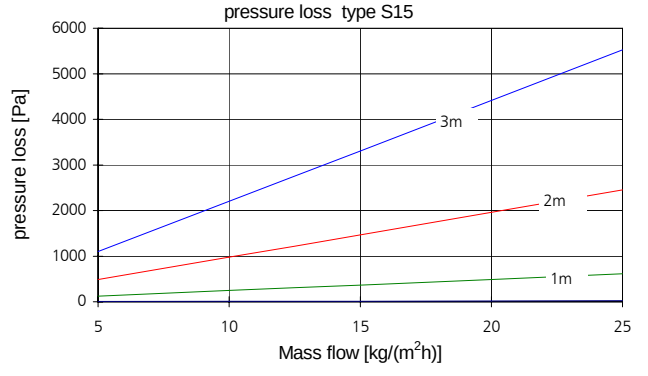
4	Supply temperature -> from diagram 1	°C	
5	Return temperature	°C	
6	Water volume per mat area	kg/(m^2h)	
7	Water volume per zone	l/h	

Determination of pressure loss

8	Length of connecting pipe	m	
9	Resistance in the pipe -> from diagram 2	Pa/m	
10	Pressure loss in the pipe = Pipe length * Resistance	Pa	
11	Pressure loss of the mat -> with value from diagram 1 (line 2)	Pa	
12	Add for pressure loss through fittings (recomm: 30% add to the pipe)	Pa	
13	Add for heat transfer station Recomm: for zone valves 500-1000 Pa for mains regulating valves 700 - 1500 Pa for heat exchanger approx. 4000 Pa	Pa	
14	Total pressure loss	Pa	

If BEKA transfer stations are utilised the determination of pressure loss can be omitted, only the quantity of the heating circuits and the total heating capacity is required for the selection.





11. Technical Data

BEKA Capillary tube mats
Type K.S15

Material
Polypropylene Random Co-polymer type 3 DIN 8078

Geometry

Collector pipe	20 x 2 mm
Capillary tube	3,35 x 0,5 mm
Capillary tube distance	15 mm
Exchanging surface	0,71 m^2

Measurement
Length: normally 600-2000 mm (in increments of 10 mm)
Width: 150-1200 mm (in increments 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 the type
up to 150 W/m^2

Conditions of operation
temperature persistent at continues use up to 45°C
Operation pressure 3 to 4 bar
Test pressure 10 bar max. 10 hours

Place of application /Type of installation:
Wall heating for plaster walls
Connections through thermal welding

Type of delivery
Mats are delivered rolled-up, packed in cartons.

