

Wall Heating with BEKA Heating Mats

1. Generals

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 profile. 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.

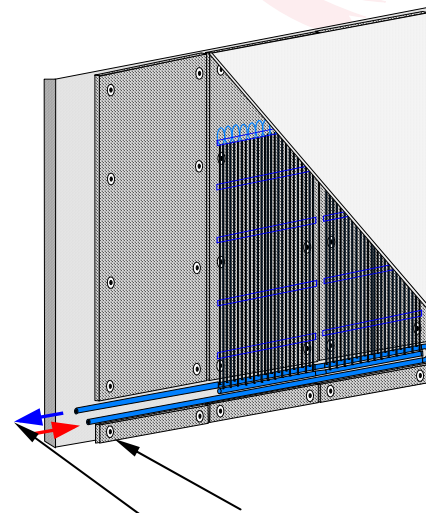
2. System description

In most cases, the BEKA mats are installed into the plastering of outer walls, directly beneath the surface. The outer wall must have a U-value below $0.35 \text{ W}/(\text{m}^2\text{K})$. If this is not given, insulation of the internal wall can be utilised. Wall heating systems prevent the dew point from moving into the wall construction. The connections of the mats to each other 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 technology

The BEKA heating mats are connected in a circuit to the heat source through pipes 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 technology provides for both the desired comfort and necessary system reliability. For the heating ceiling: Room temperature control is required, which regulates the volume of heating water as function of the desired room temperature. Supply temperatures above 45°C must be avoided because of danger that an excessive surface temperature will dry-out the plaster!

6. System dimensioning

The wall heating with BEKA heating mats are dimensioned according to the following lay-out 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 supplier and 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 project 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 orientation before work gets started. All heating mats, their sizes and 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 each other and Polypropylene pipelines are performed 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 drop below 5°C. The pre-heating, welding and setting times for the individual pipe sizes must be stuck to according to the relevant regulations.)

8. Tools, materials

Regarding installation of BEKA heating mats for wall heating, the usual tools and materials for plastering and installation of plastic pipes can be used, such as:

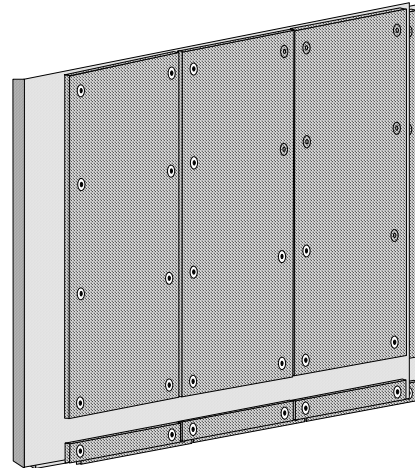
- Plastering material (suitable for wall heating systems)
- Mixer
- Smoothing spatula
- Bonding layer
- Roller or brush
- Border strip
- Possibly spreading dowels and hand drill for additional fixing of the mats to the raw ceiling
- Pair of scissors for cutting plastic piping
- Pencil

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 compression fittings can be used.

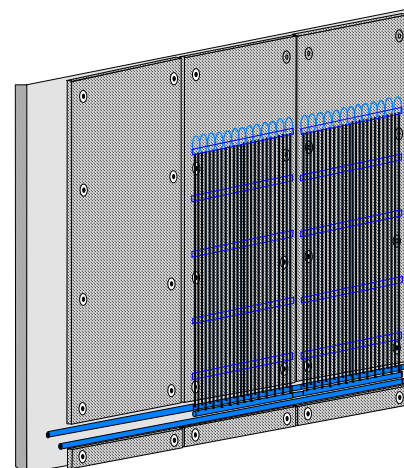
9. Installation steps at the wall (with Inside insulation)

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

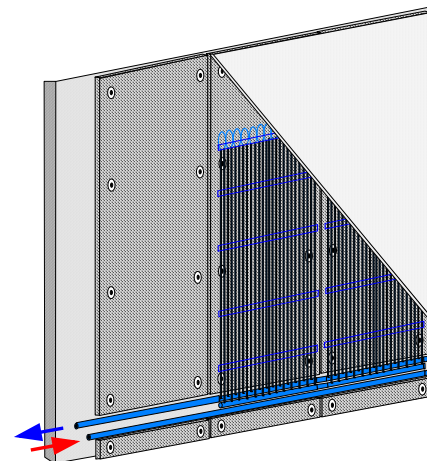
I.



II.



III.



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- Position the BEKA heating mats and fix them with adhesive tape.
- Possibly secure the mats with spreading dowels to the wall.
- Connect the mats to another and pipes for the supply and return lines by thermal welding.
- Take pretest with compressed air of 10 bar for 1 hour.
- Take final test with water pressure of 10 bar for 4 hours. Maintain a resting pressure of 3 bar until taking into operation.
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- Apply a thin layer of plaster (10 mm) in one step according to manufacturer's instructions.
- Smoothen the plaster and align to the pre-drilled holes.

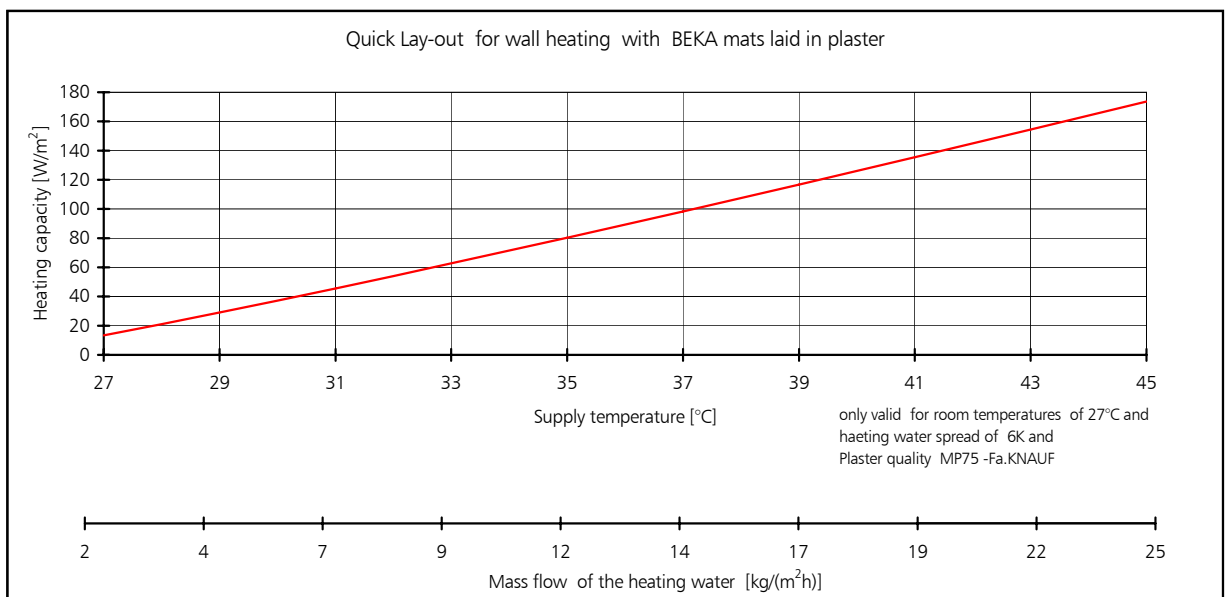
10. Layout of wall heating with BEKA heating mats

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

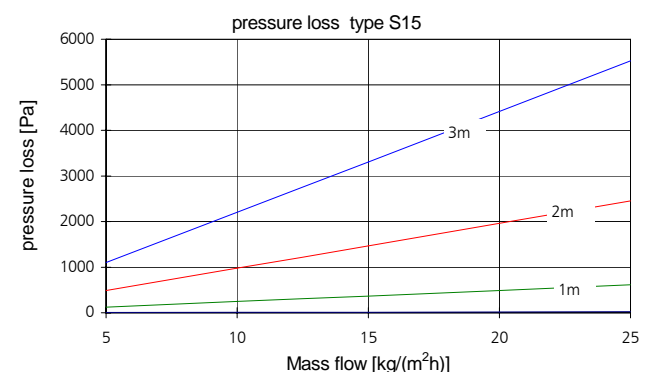
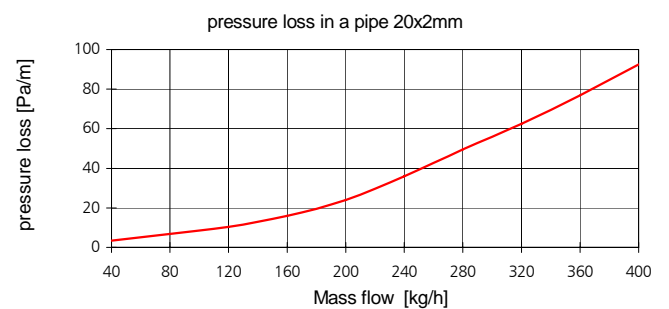


4	Supply temperature -> from diagram 1	°C	
5	Return temperature	°C	
6	Water volume per mat area	kg/(m ² h)	
7	Water volume per zone	l/h	

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 specification

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

Size:

Length: standard	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 content	0.27 l/m ²

Heating capacity:
Depending upon the type
up to 150 W/m²

Operating conditions:

Temperature-stable with permanent operation	up to 45°C
Operating pressure	3 to 4 bar
Test pressure	10 bar over 10 hours maximum

Application /mode of installation:
Wall heating for plaster walls
Connections through thermal welding

Delivery
Mats are delivered rolled-up and packed in cartons.