

Wall Heating with the BEKA Pre-fabricated Unit

1 General

Because of the high thermal insulation of modern buildings the offices and residential houses have comparatively low heat requirements. In many cases they must be cooled during long periods of the year to maintain comfortable room temperatures. A low cost solution to save energy is the use of a BEKA wall heating / wall cooling system. With the use of BEKA pre-fabricated units heating and cooling surfaces can be arranged simply and economically in the dry-build version. Through the combined function of the wall surface investments for the necessary building installations can be minimized.

2 Description

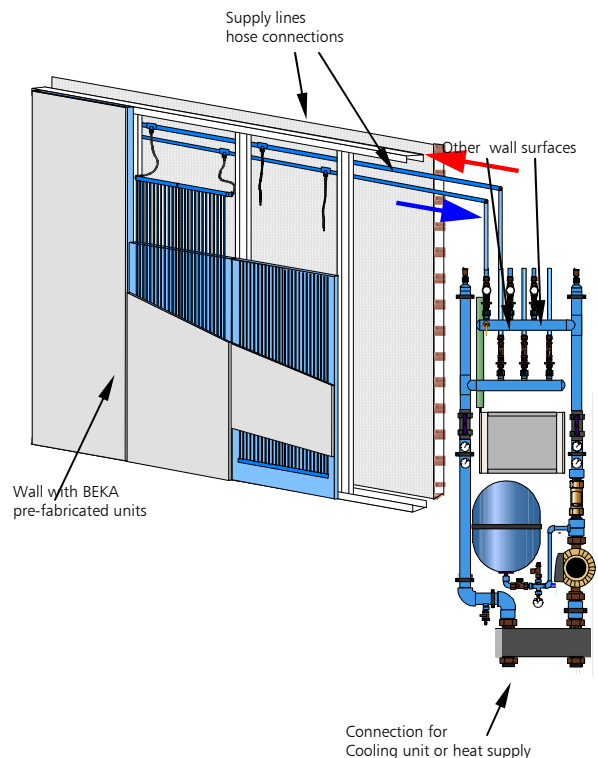
The BEKA pre-fabricated unit is fixed to the support structure, like any other standard dry-build board, according to the dry-build directions. The supply lines, pre-fabricated to the required measurements are laid into the wall cavities. The pre-fabricated units are connected to the supply lines with flexible hoses.

3 Cold Water- / Heating Water Technique

The BEKA pre-fabricated units are connected to the supply and return of the piping of the heat- or cold-water source, room for room or zone for zone. Recommended is the connection via a BEKA storey distributor unit. For the heating water generating different techniques and constructions can be utilised. The economic advantages of a cooling ceiling are influenced mostly by fact that the wall will deliver high heating/cooling capacity already with supply temperatures, which are only slightly above /below the room temperature. This allows the use of alternative energy sources such as heat pumps or solar techniques. Even with the use of standard techniques a decisive energy saving can be achieved, since already little temperature differences in the supply temperatures to the

room temperatures (for heating: supply temp. below 40°C) will achieve respectable heating capacities of 110 W/m².

For cold water cooling similar advantages are achieved. The supply temperatures must be restricted to minimum of 16°C, to surely avoid any condensation. At a room temperature of 27°C cooling capacities of approx. 65 W/m² can be achieved.



4 Installation

Basically the standard installation instructions are valid for all installations. All components used in the piping for the BEKA pre-fabricated units must be made of non-corrosive materials.

Utilised may be plastic materials, copper, brass and red brass. Other materials may cause sludge and could therefore be the cause of malfunction of the system

5 Regulating Technique

The regulating technique secures, first the desired comfort, second the necessary system reliance.

For the wall heating a room temperature control is required, which regulates supply temperature of the desired room temperature. Supply temperatures above 45°C must be avoided because of the danger that excessive surface temperatures could dry-out the plasterboards!

For the wall cooling a room temperature regulation, a dew point guard and a regulation of the supply temperature of the cold water is required.

Supply temperatures below 16°C must be avoided so that the dew point won't be reached!

6 Dimensioning of the System

The wall heating/cooling ceiling with BEKA pre-fabricated units 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 Installation Preparation

For the installation of the BEKA pre-fabricated units the standards for the dry-build construction and the fabricator's recommendations must be obeyed.

It is recommended to use twist-free sheet metal profiles for the supporting construction of the suspended ceiling. The distances of the bracing profiles to another must be 600 mm. The choice of the supporting profiles and the type of fixing must be according to dry-build specifications.

The BEKA pre-fabricated unit is supplied in standard dimensions of 2600 mm x 600 mm. The active surface area is 1,2m². Capillary tubes are not located above 2100 mm of height. This area serves the tailoring for the

length accommodations of the BEKA pre-fabricated units to the room height. At the border area inactive panels are fitted. The BEKA pre-fabricated units are pre-drilled for the fixing to the sub-constructions.

The fixing screws may only be located at the pre-given positions, otherwise damages may be caused to the integrated capillary mats.

Before starting work a wall pattern must be arranged as a work- and positioning layout. All panels, their dimensions and the positioning of the supply lines must be recorded. On the wall pattern all areas must be marked which will be left uncovered for installation purposes of inner walls, light fixtures and other wall installations. Furthermore, the installation position for the BEKA pre-fabricated units with integrated dew point sensors must be recorded.

The connection of the Polypropylene-pipelines are done by thermal welding, welding specification DVS 2207-11 of the Deutschen Verband für Schweißtechnik e.V must be obeyed. The surrounding temperature (at the time of welding) must be above 5°C. The pre-heating temperatures, welding- and setting times must be kept according to pre-given values for the responding pipe sizes

8 Tools , Materials

For the processing of the BEKA pre-fabricated units the standard dry-build tools and materials can be used, such as:

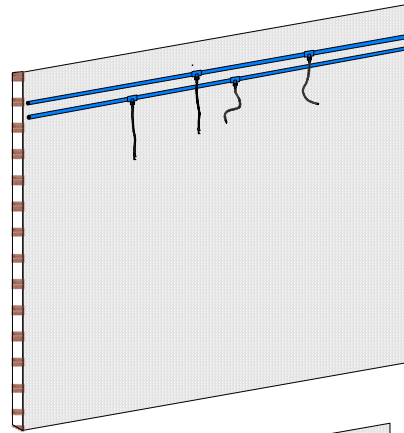
- CW profile
- UW - profile
- Sound insulation tape
- Dowels and screws
- Building screws, 55 mm length
- Plate-knives for tailoring and edge planer
- Screw driver
- Spatula
- Joint spatula mastic
- Hand grinder

A hand-held welding tool with a sleeve welding device is used for welding the supply lines to the cold water circuit. Alternatively sealing ring screw connections may be used instead.

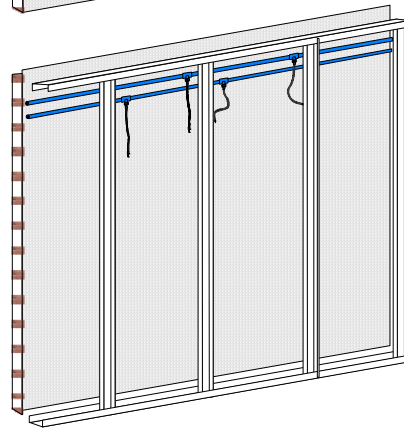
9 Installation Steps at the wall

- The connection lines are installed at the raw wall at a height of approx. 2100 mm and fixed with pipe clamps according to installation instructions. The supply lines are connected by means of thermal welding or sealing ring connections.
- The U- and stud profiles are aligned and fixed to the raw wall in the appropriate manner according to manufacturer's specifications. The distance between the stud profiles is set to 600 mm. Additional stud profiles at the border area and for the inactive (tailored) panels have to be arranged to the wall pattern according to dry-build guidelines.
- The BEKA pre-fabricated unit is fitted to the stud-construction according to the wall pattern
- The flexible connecting hoses are plugged into the quick-action couplings.
- The pre-fabricated unit is aligned to the stud-construction according to the pre-drilled holes
- The building screws inserted into the pre-drilled holes and fastened until a secure fixing to the sub-construction is achieved.
- Pre-test with compressed air at 10 bar for 1 hour.
- The main test with water follows at 10 bar for 4 hours. Idle pressure at 3 bar must be kept until start of operation.
- Fill gaps, smoothen and grind.

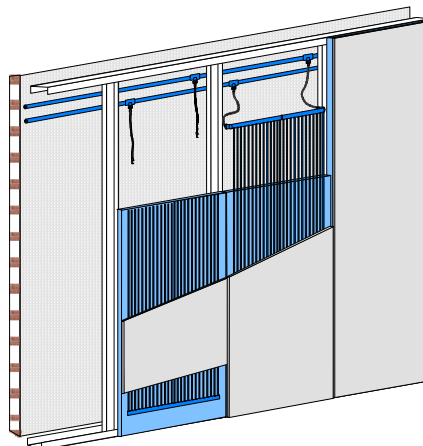
I.



II.



III.



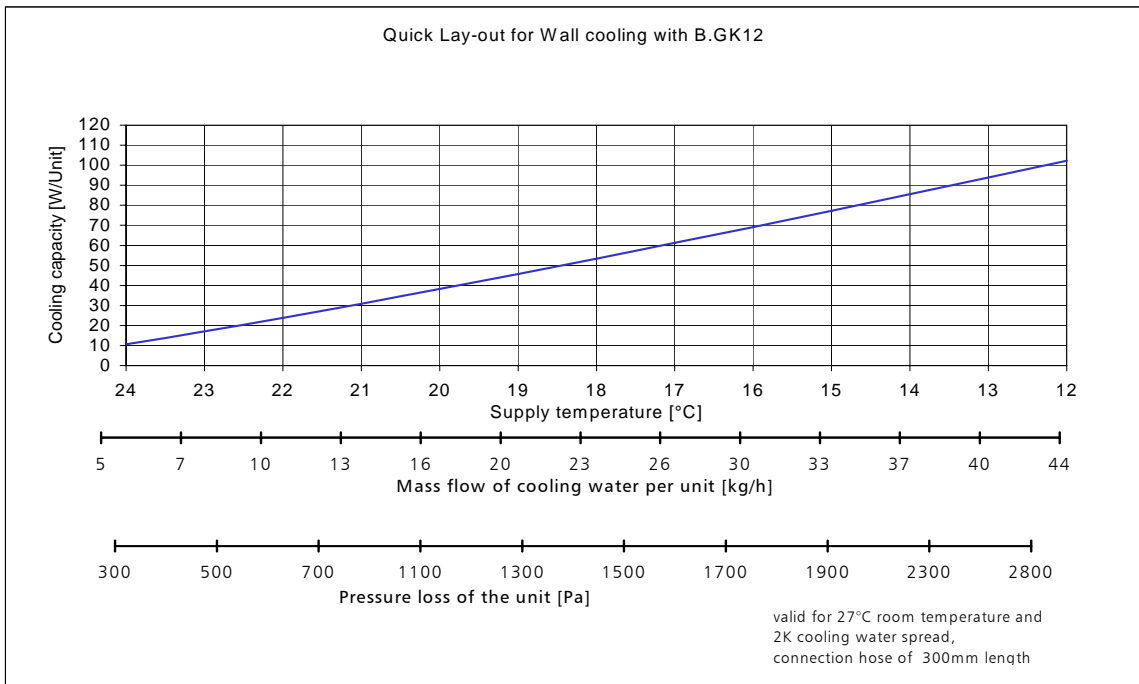
10. Lay-out for a Wall cooling with the BEKA Pre-fabricated Unit B.GK12

Project:	Date :
Project consultant :	Lay-out valid for room temp. of 27°C and 2K cooling water spread!

Required cooling capacity

1 Cooling load	W		Calculation from planning office
2 Planned qty of panels	Qty.		max.possible arrangement derived from room dimensions
3 Required cooling capacity per unit	W		= cooling load / qty of panels

Determination of capacity



4 Supply temp. -> from diagram	°C		Water volume per unit	kg/h		-> from diagram
5 Return temperature	°C		Water volume per zone or wall	ltr/h		

Determination of pressure loss

6 Pressure loss in the piping = pipe length * resistance	Pa		Length of connecting pipe	m		only 1 pipeline
7 Pressure loss of the unit -> values of line 3 from diagram	Pa		Resistance in pipe -> from diagram	Pa/m		value -> diagram
8 Add for pressure loss through fittings (recomm: 30% addition to pipe)	Pa		<div style="text-align: center;"> <p>pressure loss in pipe 20x2mm</p> </div>			
9 Add for heat exchange unit recomm: for zone valves 500-1000 Pa for mains regulator valves 700 - 1500 Pa for heat exchanger approx. 4000 Pa	Pa					
10 Total pressure loss	Pa					

If BEKA heat exchanger units are used, pressure loss determination can be omitted. Only the number of cooling circuits and the total cooling capacity is required for the selection.

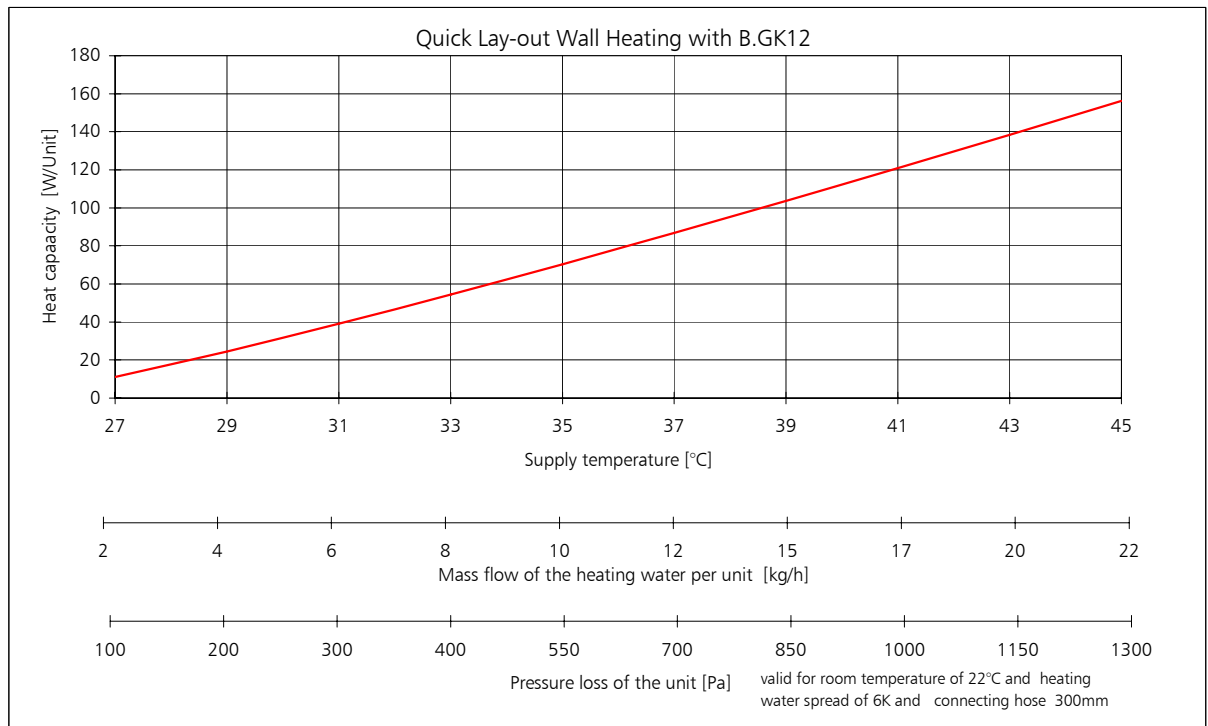
11. Lay-out for Wall Heating with BEKA Pre-fabricated Unit B.GK12

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 calculation of planning office
2 Planned qty. of panels	Qty	Derive max.possible arrangement from the room measurements
3 Required heating capacity / unit	W	= Heat requirement / Qty of panels

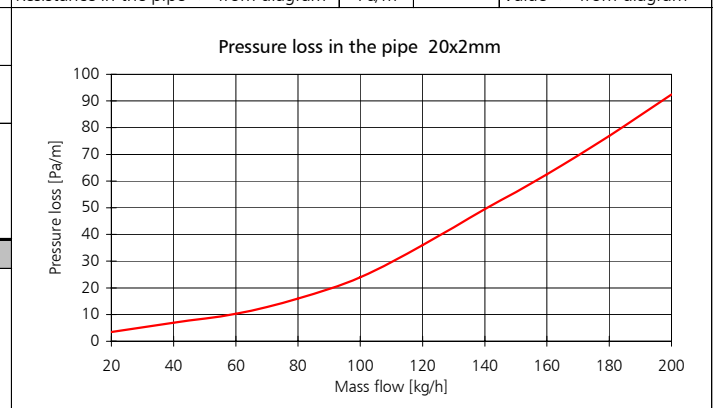
Determination of capacity



4 Supply temperature -> from diagram	°C	Water volume per unit	kg/h	-> from Diagram
5 Return temperature	°C	Water volume per zone or wall	l/h	

Determination of pressure loss

6 Pressure loss in the pipe = Pipe lenght * Resistance	Pa	Length of connecting pipe	m	only one lead
7 Pressure loss of the unit -> with value from line 3 from the diagram	Pa	Resistance in the pipe -> from diagram	Pa/m	Value -> from diagram
8 Addition for pressure loss by the fittings (Recommendation : 30% add.to the pipe)	Pa			
9 Addition for heat transfer station (Recomm. For zone valves 500-1000 Pa for mains regulator valves 700 - 1500 Pa for heat exchanger approx. 4000 Pa)	Pa			
10 Total pressure loss	Pa			



When utilizing BEKA transfer stations the determination of pressure loss is not necessary. Only the quantity heating circuits and the total heating capacity is required for the selection !

12. Details

Construction

12,5 mm plasterboard
Capillary tube mat with capillary diameter 3,35x0,5 mm (Polypropylene)
30 mm extruded foam (heat conductivity 0,035 W*K; Fire behaviour class B1)

Weight

15,5 kg/m² (empty)
16,2 kg/m² (filled)

Size

Width: 600 mm
Length: 2600 mm
active area 1,2 m²
upper tailoring area 500 mm
pre-drilled for fixing at a stud distance of 600 mm

Cooling Capacity

64 W/m² (DIN 4715)
=76 W/unit

Heating Capacity

130 W/m²
= 155 W/unit

Conditions of Operation:

Temperature stability at duration use up to 45°C
Operation pressure 3 to 4 bar
Test pressure 10 bar max. 10 hours

Place of Operation / Type of Installation

Cooling- and heating walls, dry-build version
Connection via BEKA quick-action coupling system
Installation according the dry-build guidelines

Terms of delivery:

Finished dry-build units are delivered, lying on pallets.