LOEX
comfort technology

BLife®

TECHNICAL MANUAL

HIGH-PERFORMANCE CEILING AND WALL RADIANT SYSTEM

CERTIFICATION - PARTNER

INDEX

1. INTRODUCTION

1.1 FIELD OF USE

Ceiling and wall radiant system BLife can be used to heat and cool any kind of environment and it can be installed both in new buildings and renovations.
BLife can be installed in the most different types of building:

- houses, apartments, villas;
- tertiary sector such as offices, administrative buildings, banks;
- public sector such as hospitals, clinics, nursing homes, schools, kindergartens;
- trade, for example: hotels, restaurants, bars, large and small shops, shopping centres.

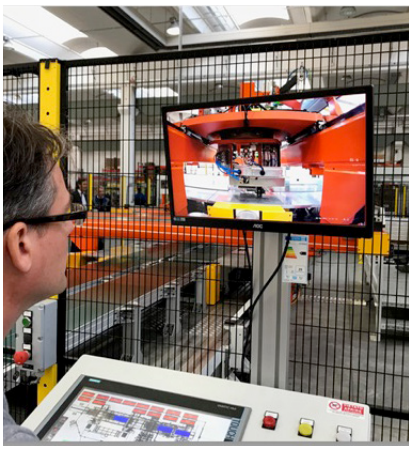
Respect to traditional heating and cooling systems (radiators or fans), BLife can be appreciated for its high comfort level and energy savings.

2. BLife PANELS

2.1 CONSTRUCTIVE METHOD

Active panels constitute the main element of the entire BLife system. They are the result of an in-depth study on the features of the single components, on their layout and on their production method.

BLife panels are characterized by a sandwich structure assembled on an innovative automatic production line. Thanks to this special machinery, the various elements are perfectly assembled to guarantee a high quality level of the panels.



Insulation
The upper part of the active BLife panel is composed by an insulating layer, whose main function is to direct the thermal flow downwards, avoiding losses in not-involved areas.
The panel is made of an expanded pressed polystyrene insulating slab, **having 40 mm thickness and 0,033 W/(mK) thermal conductivity.**
These values guarantee a high insulating power capacity of the system. The lower part of the panel presents special calibrated channels which can accommodate and retain the aluminium thermo-conductive plates.

Polystyrene 40 mm thickness
Thermal conductivity
0,033 W/(mK)

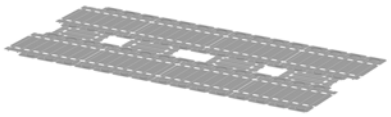
Thermal-conductor foils

Over the insulating panel are inserted the thermal-conductor foils. The heat-conducting strips are placed and interlocked on the insulating layer, which are cut and press-folded on specially made dies.

The foils are obtained by an aluminium sheet having 0,4 mm thickness, a material characterized by a high thermal conductivity 200 W/(mK), perfect to distribute thermal flow "easily".

The foils have the function of wrap the piping so to distribute the thermal flow downwards, increasing the thermal output of the system and the surface temperature uniformity.

More than 82% of the surface of BLife panel is covered by thermal-conductor foils. The shape of these foils is provided with slots in order to prevent that the screws – fixing the BLife panels to the supporting structure – cross the aluminum and may cause deformations and/ or alterations to the panel itself.



Aluminium 0,40 mm thick
Surface filling > 82%

Piping

The circuits are realized by the automated insertion of the piping inside the thermal-conductor foils, according to the path provided for the different types of active panels.

The piping is made of cross-linked polyethylene (PE-Xa) to ensure maximum reliability over time. The characteristic of having an outer diameter of 8 mm and thickness of 1 mm, represents the ideal compromise between the passage section and the length of the circuits.

Thanks to the oxygen barrier it's not necessary to use additives or heat exchangers to protect the system against corrosion.

LOEX PE-Xa 8x1 mm
piping with oxygen barrier

Glue

The union between the insulating panel, completed with foils and piping, and the plasterboard slab is made using a special glue. Hot sprayed (180 ° C) uniformly over the entire panel surface, the glue instantly guarantees the adhesion between the parts. The innovative feature of the use of this type of glue is the ability to remain elastic even at room temperature, avoiding annoying noises due to the expansion because of the temperature variations of the panel.

Plasterboard

The lower surface is composed of **a single plasterboard slab with a constant 12,5 mm thickness.** The screen-printings on its surface indicate the piping position, the fixing points to the hanging structure, the cutting lines and the areas where is possible to install any lights.

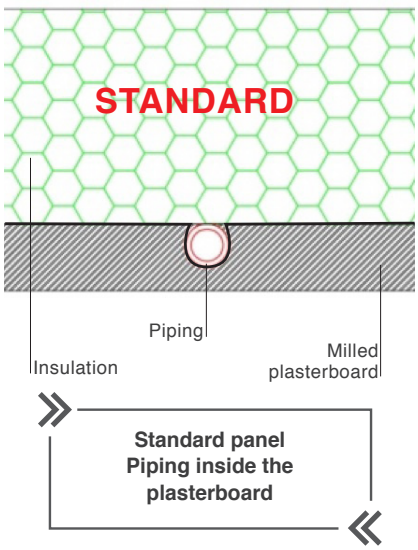
Thanks to the "Active Air" technology, the plasterboard slab can absorbed until 80% of the formaldehyde in the air, contributing to the air healthy.

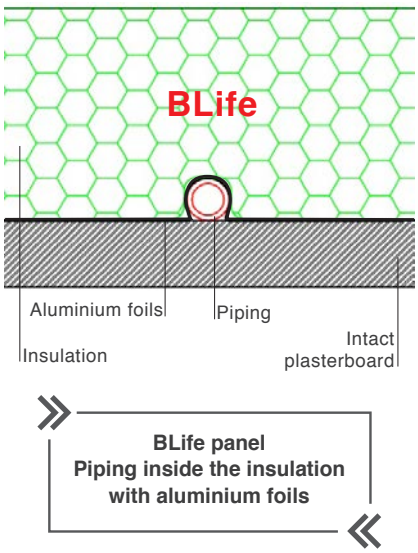
When the system is installed in environments with high humidity levels, for example bathrooms, it is possible to use the **"Hydro"** version, characterized by green color of the plate, that is suitable for this type of use.

12,5 mm thickness
"Active Air" technology
also in HYDRO version

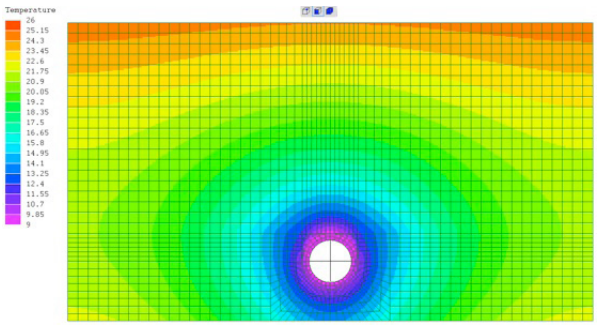
2.2 THE STRUCTURE OF BLIFE RADIANT PANEL

The structure of the radiant panel, intended as the arrangement of the various elements that compose it, determines the operating characteristics both from the mechanical and thermal point of view. In particular, the position of the piping makes more or less efficient the thermal performance in heating and cooling.
The most common solution that is adopted by most of the radiant panels on the market is to mill the plasterboard by obtaining the channels where the piping is then inserted.
The insulating layer is then glued on the plasterboard slab that contains the piping.
The standard configuration simplifies the construction of the panel, but from the mechanical point of view it weakens it (cutting the surface coating and reducing its thickness along the entire pipeline route).
To realize the BLife panels, a different configuration was chosen and the piping is positioned inside the insulation layer, wrapped by thermal-conductor foils that extend to the entire panel surface. In this way, **the plasterboard remains intact and gives greater robustness to the BLife panel structure.**

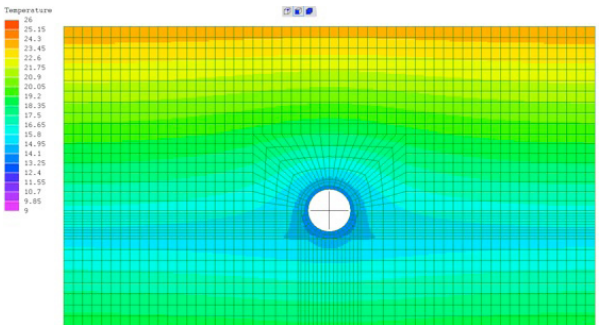




In the simulation below, it is possible to see the comparison between the heat transmission through the panel and therefore a different distribution of surface temperature.
Thanks to the FEM (Finite element method) simulation of panels in cooling mode, it is possible to see how the distribution of temperature inside sections takes place.



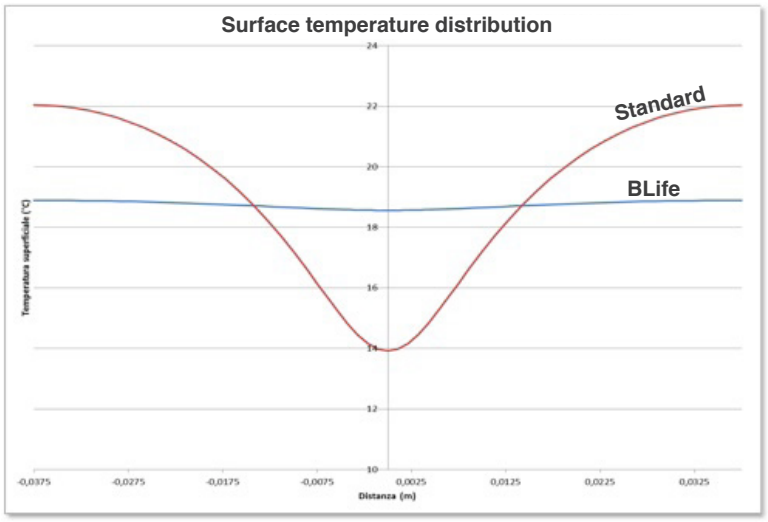
Standard panel: non-homogeneous diffusion



BLife panel: homogeneous diffusion

As shown in the picture, the heat diffusion of “standard” panels is concentric to the piping, otherwise, using BLife panels, the heat is spread evenly and it guarantees homogeneous surface temperatures.

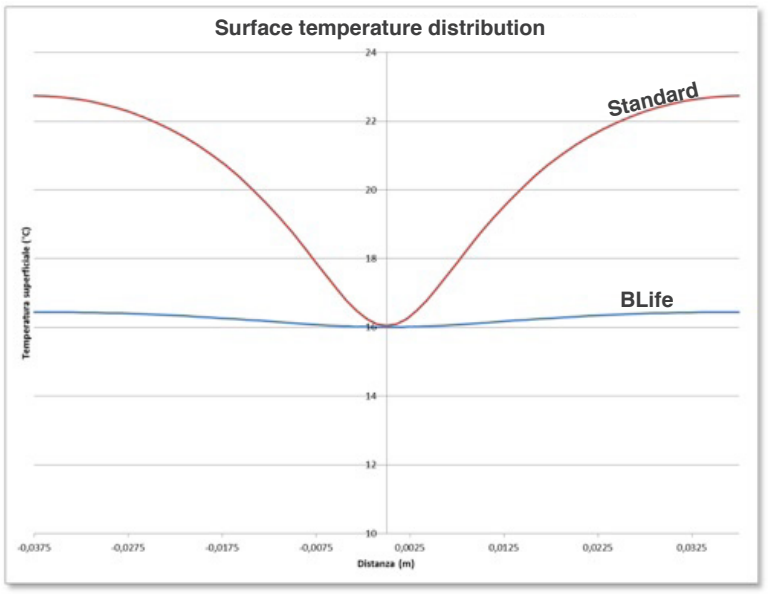
Diagram 1 shows the surface temperature distribution for a standard panel and for BLife panel. The first one highlits a 8°C difference between axial and interaxial point between two pipes; for BLife panel the difference does not exceed 0,5°C.



Same average water temperature Different surface temperature distribution

Diagram 1

If in heating mode temperature homogeneity is not so relevant, in cooling mode difference in homogeneity of the surface temperature has a great importance: in fact maximum thermal output is limited by the need of not reaching dew temperature point.
To prevent condensation on the surface of the radiant system, the surface temperature must be higher than the condensation temperature of the environment, which depends on temperature and humidity. For example, if the room has a temperature of 26 °C and a relative humidity of 50%, the dew-point temperature is 14,8 °C.
To be sufficiently sure that condensation can not form, the temperature of each point of the radiant system must be at least 1 °C higher (16,0 °C). In this condition, as can be seen from diagram 2, the standard panel – in red with a minimum temperature of 16 °C – has an average temperature of about 20,0 °C and consequently a maximum theoretical thermal output in cooling of 65,9 W / m^2; on the other hand, in the BLife panel with a minimum temperature of 16,0 °C, the average temperature is 16,2 °C and the maximum theoretical thermal efficiency in cooling is 107,5 W/ m^2. In conclusion, **the BLife panel structure guarantees a more uniform thermal flow diffusion that allows to obtain a higher thermal output in cooling mode** or, with the same thermal output, greater safety with respect to the risk of superficial condensation formation.



Same minimum surface temperature / greater BLife specific power

Diagram 2

2.3 TYPES AND MODULARITIES OF BLIFE PANELS

2.3.1 Active radiant panels

It is not possible to use all the ceiling as a radiant surface. This because of the fact that the dimensions of the prefabricated modules are fixed and they can not be reduced or shaped at will to adapt to the room dimensions.

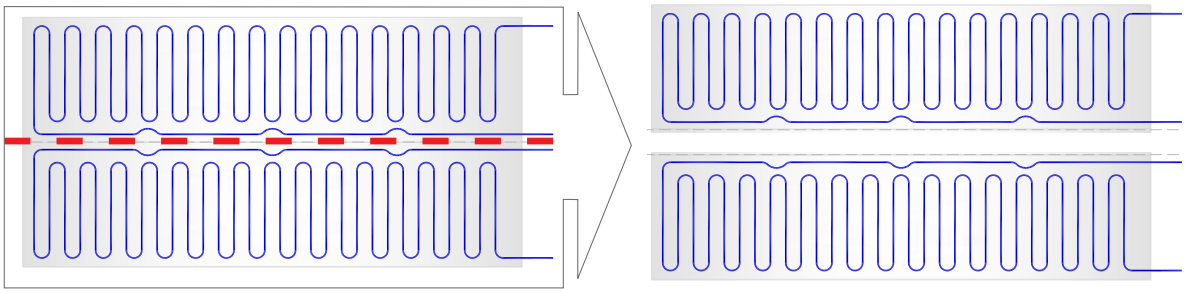
Moreover, adequate spaces have to be foreseen for the lighting and for the distribution. As a consequence, the “active” surface is always less than the entire ceiling surface.

Depending on the size and the geometry of the rooms, the percentage of active surface may vary from 50% to 80%

It is important to be able to cover most of the surface with the active panels because, with the same total power output, it will be necessary a specific thermal output lower with consequent reduction of the water temperature (increase in the case of cooling) and consequent higher efficiency of the heat generator (chiller). Moreover, the greater is the active surface the greater will be the uniformity of the irradiation towards the people inside the space, to the advantage of the sensation of comfort. To be as flexible as possible, the BLife active radiant panels are available in 3 different types from which you can obtain other 3 different dimensions.

All BLife panels are caracterized by same external dimensions, 2400 x 1200 x th 52,5 mm, but circuits layout and connections position define different type of panels. This allows to divide every panel into smaller ones, being able to cover a larger surface of the room.

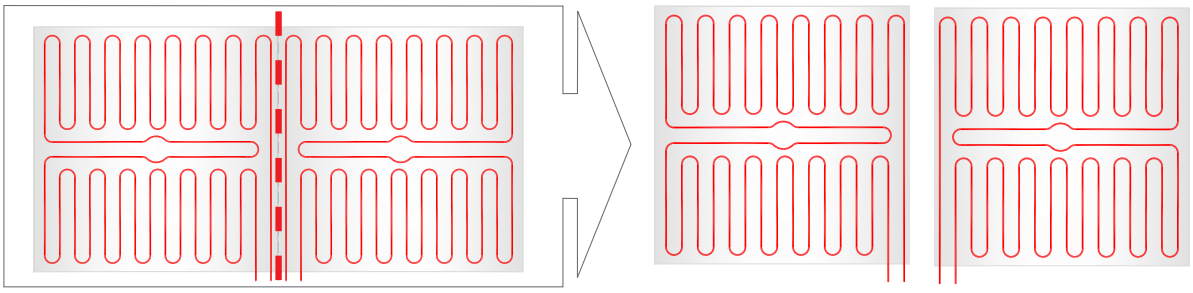
BLife active panel type 1



Dimensions: 2400x1200x52,5 mm
No. 2 circuits 19,0 m - Shorter side output

Divisible in 2 panels 2400x600x52,5 mm

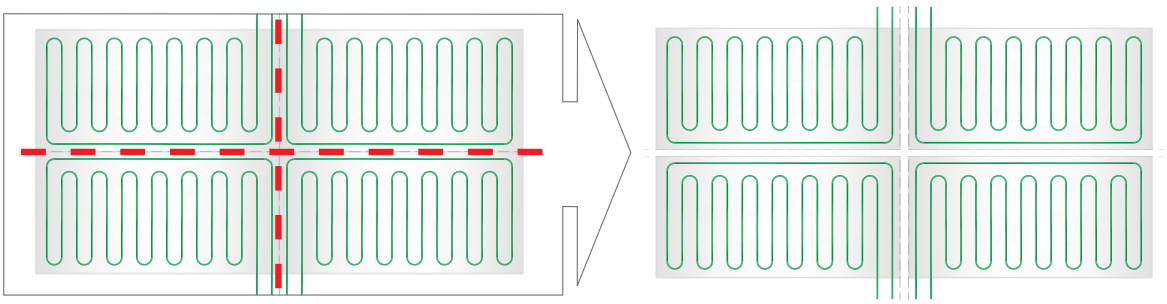
BLife active panel type 2



Dimensions: 2400x1200x52,5 mm
No. 2 circuits 19,0 m - Longer side output

Divisible in 2 panels 1200x1200x52,5 mm

BLife active panel type 3

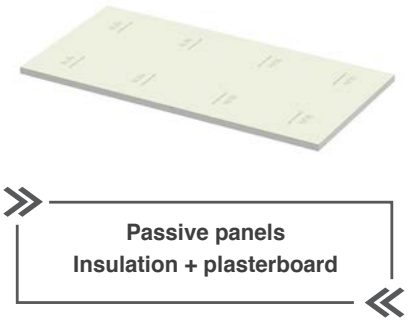


Dimensions: 2400x1200x52,5 mm
No.4 circuits 10,0 m
Outputs on both longer sides

Divisible in 4 panels 1200x600x52,5 mm

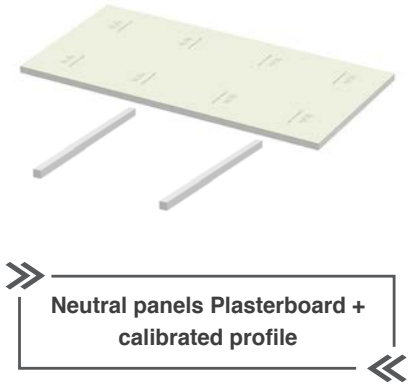
2.3.2 Passive radiant panels

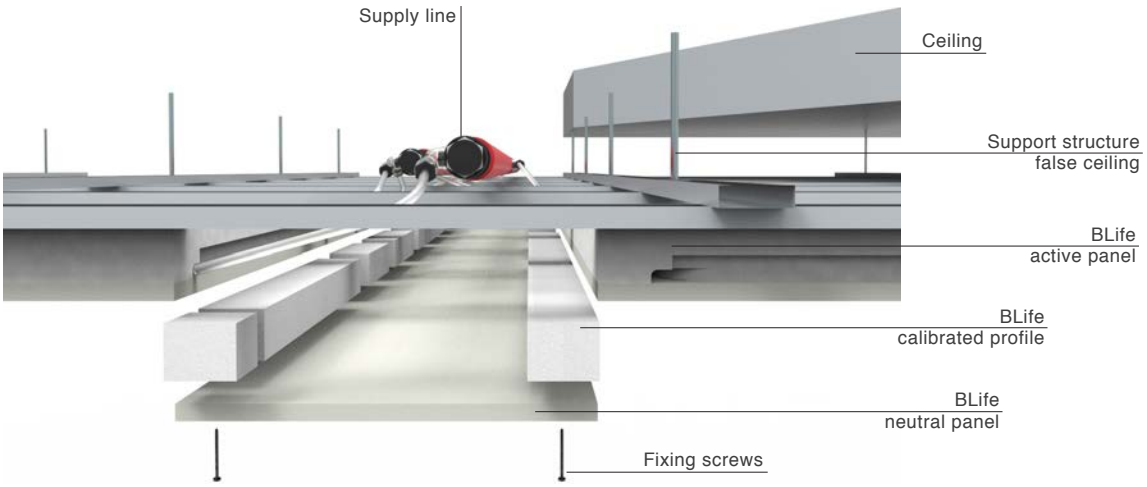
The areas that are not covered by the BLife radiant active panels, as far as possible, have to be closed using BLife passive panels that are made in the same way of the active panels but without the piping and the thermal-conductor foils. In this way, also the not-active areas will be adequately isolated both to the air chamber of the false ceiling and both to the outside in the case of a last floor.



2.3.3 Neutral radiant panels

In the exit area of the piping from the active panel, a passive panel can not be installed because the piping would collide with the insulating layer. In this case, near the connections with main supply line, must be used BLife radiant neutral panel (only gypsum panel).
In order to be fixed to the support structure at the same height as active and passive panels, the “BLife profile” must be interposed. Made of expanded polystyrene and characterized by a thickness equivalent to the insulation of the panels, the profile is provided with an adhesive strip to be easily applied to the structure itself.

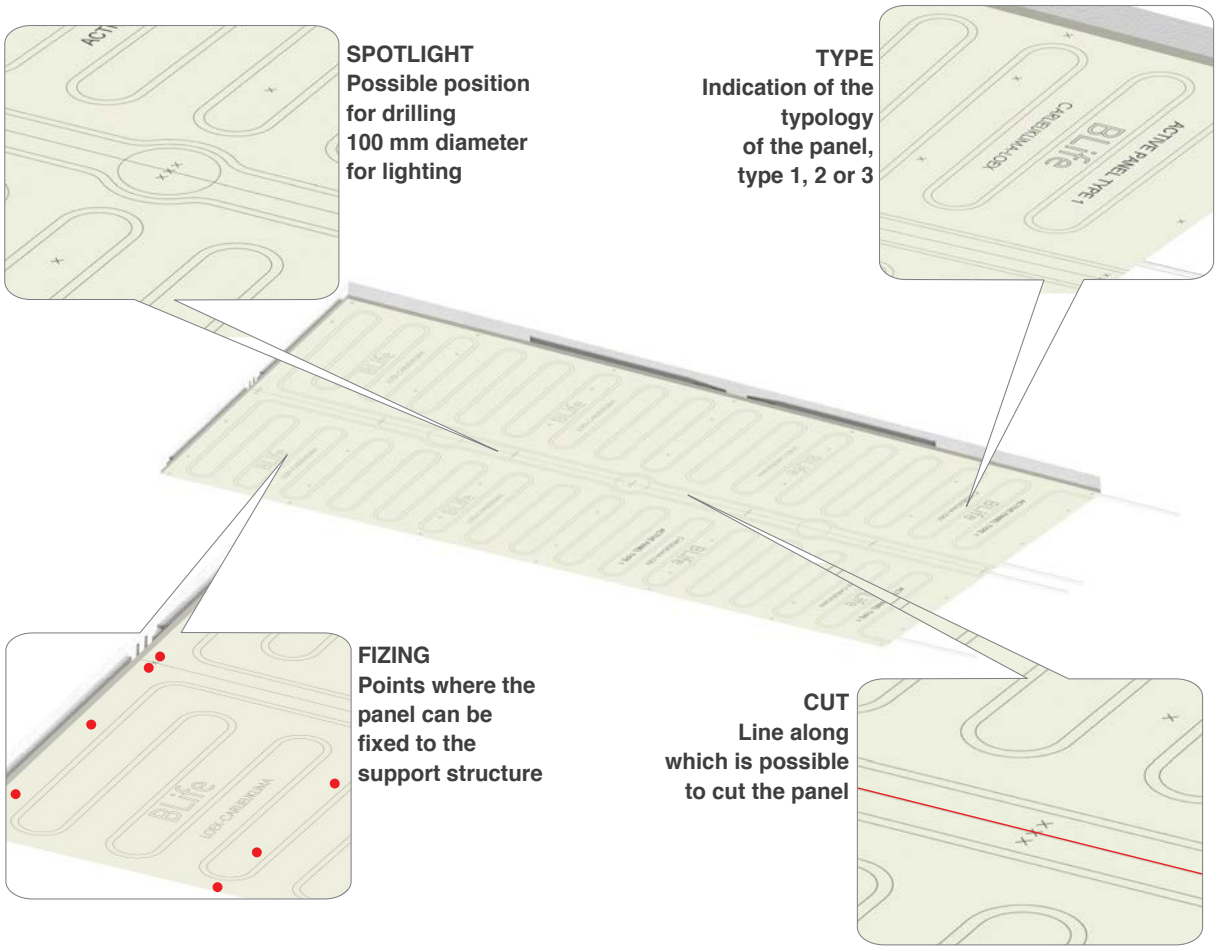




2.4 CONSTRUCTION CHARACTERISTICS

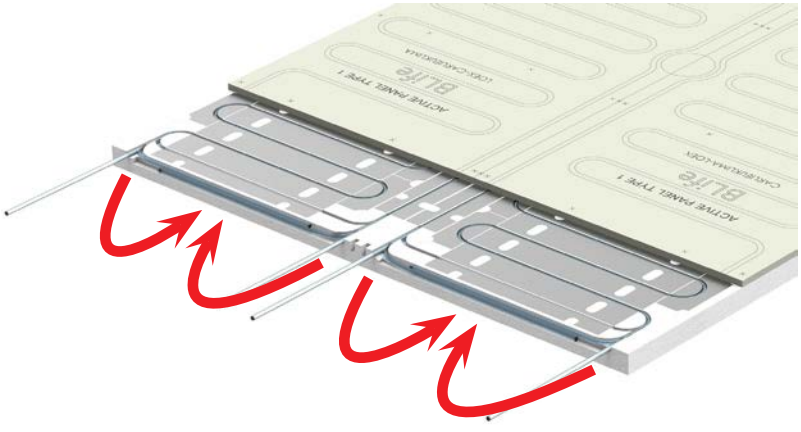
2.4.1 Printed surface

The panels have a “sandwich structure” and, once assembled, it is no longer possible to identify the arrangement of the individual components located inside (piping and aluminum foils). For this reason, it is very important to have certain references for the installation of the panels. In production department, useful references for cutting, fixing and connecting the panels are printed on the plasterboard slab.



2.4.2 Extensions and circuits

In order to facilitate the connection of the circuits inserted into the panels to the power supply line, the piping protrudes for a length of 500 mm. These excess piping sections are folded and recessed into a suitable area formed in the insulating panel so as not to protrude beyond the dimensions of the finished panel. This special solution of the BLife system facilitates the transport, storage and assembly operations of the panels, avoiding that these pieces of piping interfere with the handling of the slabs. Furthermore, if the protruding piping sections are not adequately protected, they would run the risk of being damaged.



Insertion of the protruding pipes in the appropriate slot

2.4.3 2.4.3 Plasterboard type

The plasterboard slab **(perfectly intact)** of the radiant ceiling panels BLife® constitutes the element that borders the inhabited environment, directly influencing the aesthetic appearance and the comfort conditions. For this reason it is important to choose a high quality solution with increased core density, whose gypsum is added with glass fibers; these characteristics give the product a high degree of surface hardness and mechanical resistance.

The “Active Air” technology of the plasterboard slab allows to absorb and neutralize up to 80% of the formaldehyde contained in the air in closed environments.
Released from glues or paints, wooden furniture, detergents, perfumes and cigarette smoke, formaldehyde is one of the most dangerous compounds we breathe.
To use the BLife radiant system, as well as making the environment more comfortable from a thermal point of view, improves the air quality and the healthiness of the environments.

For rooms with a high degree of humidity, for example bathrooms, the **“Hydro”** panel is available with a slab characterized by a low water absorption (class H1) with an excellent seal.

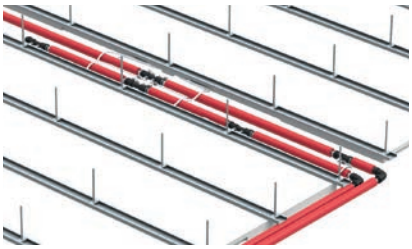
2.4.4 Technical data BLife panels

TECHNICAL DATA - BLife ceiling radiant panels	
Thermal insulation	
Material	Sintered expanded polystyrene foam EPS (compliance with EN 13136 standard)
Thermal conductivity declared	0,033 W/mK
Thickness	40 mm
Thermal resistant	1,20 m^2K/W
Reaction to fire	E Euroclass
Compressive strength at 10% of deformation	200 KPa
Flexural strength	350 KPa
Thermal-conductor foils	
Material	Aluminium
Construction	Sheet cut and cold pressed
Thickness	0,40 mm
Thermal conductivity	200 W/mK
Active panel cover surface	> 82%
Piping	
Material	Pe-Xa cross-linked polyethylene complying with ISO EN 15875 standard
Percentage of cross-linking	> 70%
Oxygen permeability	< 0,32 $m^2/(m^2xd)$ According to DIN 4726 and EN 1264-4 standard)
Dimensions	External diameter 8.0 mm – thickness 1,0 mm
Circuits length (including the projections of 0.5 mm)	BLife active panel type 1: no. 2 circuits, 19 m BLife active panel type 2: no. 2 circuits, 19 m BLife active panel type 3: no. 4 circuits, 10 m
Distance between piping centers	74 mm
Plasterboard	
EN 520-3.2 type	Standard plate: D I Type HYDRO plate: D H1 I E Type
Dimensions	2400x1200 mm Width tolerance 0 / -4 mm Length tolerance 0 / -5 mm - angular tolerance < 2,5 mm/m
Thickness	12,5 mm
Reaction to fire class (EN 13501-1)	A2-s1,d0 (B)
Surface hardness	< 16 mm
Water absorption	HYDRO plate: superficial 180 g/m^2 – total < 5%

3. DISTRIBUTION

3.1 CHARACTERISTICS

The distribution is that set of components that direct the water to the BLife active panels installed in different rooms in a correct way.
The hot or chilled water (at a temperature controlled by the thermal power plant) is distributed by the BLife manifold to the different supply lines that reach the different rooms to be air-conditioned. The active panels installed inside a room are connected to each power line.
Every single room must be powered by at least one power line so as to be able to independently control the flow of water and consequently the heat output emitted, guaranteeing thermal comfort.



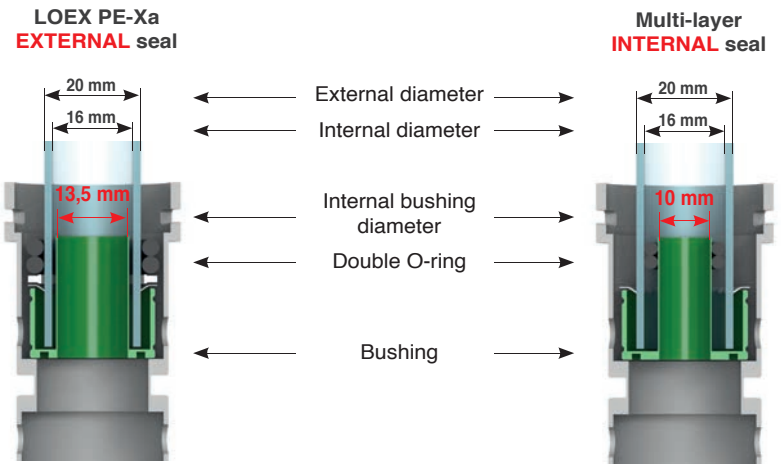
To have an autonomus regulation, each room must have at least one supply line

3.1.1 Balancing

For the correct operation of a ceiling radiant system, the single active panels have to be powered with the correct flow. In this way, they can supply a thermal output proportional to the needs of each room. The flow valves of the BLife manifold, thanks to the flow meters, allow you to precisely regulate the water flow for each supply line that depends on the number of active panels connected and the heat output required by the environment in which they are installed.
In their turn, the active panels are connected in parallel to the supply line. This inevitably involves that the first panel connected to the line will be supplied with a higher flow than those connected subsequently due to the loss of load of the power line. The greater are the loss, the greater will be the difference in flow between the different panels.

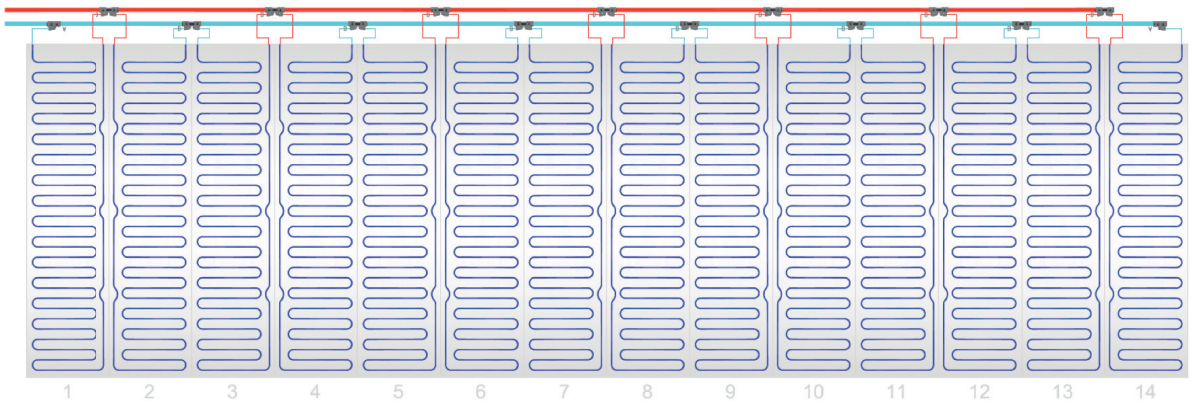
A difference in flow rate, with the same water delivery temperature, means a different specific thermal output inside the same room and, consequently, also a different surface temperature of the radiant ceiling which results in less thermal comfort.
To overcome this problem, there are several solutions, such as compensated return power (Tichelmann) or installation at the inlet of each panel of a calibration valve that creates localized pressure losses and balances the flow rate to the different active panels.
In both cases, however, the installation of the system itself became complicated and expensive. The supply lines are commonly created with multi-layer piping (PEX-AL-PEX) with a diameter of 20x2 mm, but in the BLife system it is used the LOEX 202 PE-Xa piping always with a diameter of 20x2 mm.
The diameter and the internal roughness of the 2 pipes are equal and, consequently, also the linear load losses are the same.
The difference is found in the connection fittings which, with the multi-layer piping, have the seal on the internal diameter of the piping, while with the PEX piping the seal is on the external diameter (see the image below).
As a result, the cross-section in the fittings is more close for the multi-layer piping (10,0 mm versus 13,5 mm) with a consequent increase in pressure losses located to the LOEX PE-Xa piping.

Fittings section for LOEX PE-Xa piping and comparison with multi-layer piping.



PEX LOEX fitting, bigger section, lower head losses.

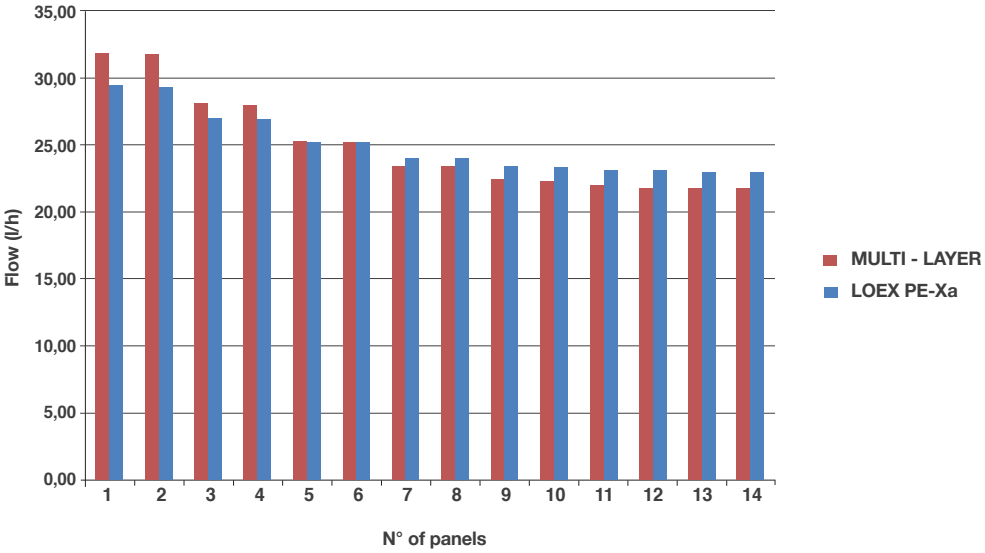
To evaluate the difference between the two solutions, the LOEX PE-Xa fitting and the PEX multi-layer (piping), we analyse how the flow is distributed inside the BLife active panels in a hypothetical supply line. It is hypothesized a very simple line consisting of 7 BLife active panels with 14 circuits arranged as in the image below. The line is supplied with the same flow (350 l/h) in the 2 cases and, consequently, theoretically each circuit should have a flow of 25 l/h.



No. of circuit	Weater flow (l/h)		Difference
	Multi-layer fittings	PEX fittings	
1	31,94	29,45	2,49
2	31,82	29,32	2,50
3	28,08	27,02	1,06
4	27,99	26,92	1,07
5	25,32	25,26	0,06
6	25,25	25,19	0,06
7	23,48	24,08	-0,60
8	23,43	24,03	-0,60
9	22,40	23,38	-0,98
10	22,37	23,35	-0,98
11	21,94	23,10	-1,16
12	21,93	23,09	-1,16
13	21,80	23,00	-1,20
14	21,80	23,00	-1,20
Total flow	350	350	
Maximum flow	31,94	29,45	
Minimum flow	21,80	23,00	
Difference	**10,14**	**6,45**	

The table shows the flow rates of the single panels along the line according to the type of fittings used.

Thanks to the use of the LOEX PE-Xa piping, the circuits are balanced.



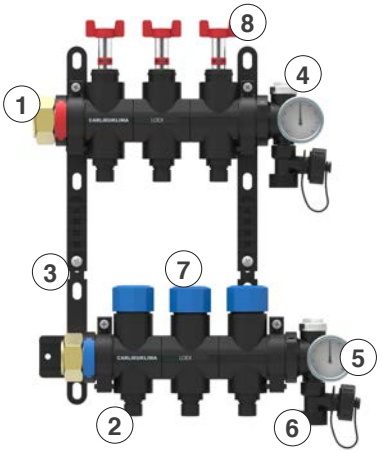
From the values shown in the table and in the diagram, it is clear that using a LOEX PE-Xa piping instead of a multi-layer piping, for the supply lines, allows a better balance of the system. The flow rates of the different circuits are more uniform and, consequently, also their specific thermal output and the surface temperature for advantages in the perceived thermal comfort.

3.2 BLife MANIFOLD (header)

The BLife manifold consists of 2 bodies made of a techno polymer resistant to temperature, pressure and deformations. Moreover, it is characterized by a lower thermal expansion to guarantee the system operation in heating and cooling.
The delivery body is equipped with:

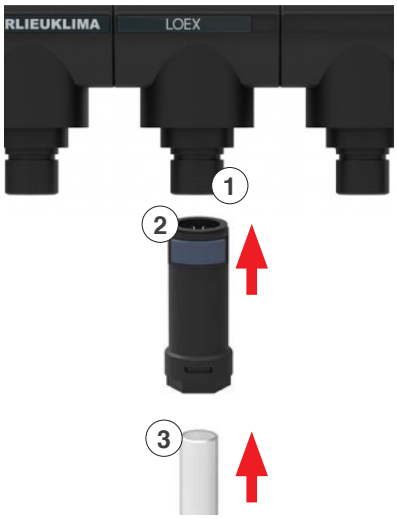
1. valves for balancing the supply lines complete with flow meter and ring nut for calibration;
2. manual vent;
3. thermometer to measure the water temperature;
4. hose connection for loading and drain with safety valve.

The return body has the same equipment as the delivery body but, instead of the valves, it is equipped with return holders for the installation of the BLife thermal servomotors for single room regulation systems. The BLife manifold is fixed to the wall or ceiling with the special plastic brackets with adjustable distance between centers. The connection of the LOEX 202 PE-Xa distribution piping is made through the special push-button joints without the use of tools, while the connection to the system power supply is possible thanks to two fittings.



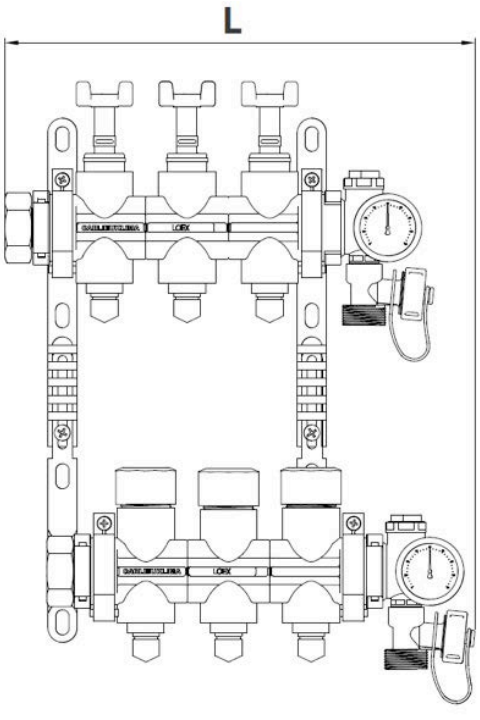
1	1''F Fittings for connection to the distribution network
2	Connection of supply lines with profile for BLife push-button joint
3	Fixing brackets
4	Manual operated vent valve
5	Thermometer
6	Loading and drain system with safety valve
7	Return holders
8	Delivery valves with flow meter

The connection between the LOEX 202 PE-Xa 20x2 mm piping and the BLife manifold is made through the convenient push-button joints that don't require the use of tools, guarantee the perfect tightness and allow the easy disconnection of the piping for possible maintenance operations.
For the connection is sufficient to insert the push-button joint on the piping, to slide it and to hook it to the special connection on the manifold. To disconnect the piping is sufficient to press the button and the joint disengages from the manifold.



1	Special connection for the push-button joint on the BLife manifold
2	Push-button joint for the connection to the BLife manifold
3	LOEX 202 PE-Xa 20x2 mm piping

3.2.1 Dimensions



BLife manifold – Width	
No. of circuits	**L (mm)**
2	216
3	266
4	316
5	366
6	416
7	466
8	516
9	566
10	616
11	703
12	753

3.3 LOEX 202 PE-XA 20X2 mm PIPING

The water distribution from the BLife manifold to the active panels takes place through the LOEX 202 PE-Xa piping with a 20x2 mm diameter built according to the ISO 15875 and equipped with oxygen barrier.
The cross-linked polyethylene (PE-Xa) is a material known for its resistance, reliability over the time and elasticity.
The oxygen barrier avoids the use of additives or heat exchangers to protect the system from the oxygen permeability.
The supply line runs inside the false ceiling chamber, so it should be isolated to avoid energy dispersion and to prevent the formation of condensation in cooling operation.
The use of the pre-insulated piping, available in convenient 90 m rolls, makes the preparation of the line practical and fast.

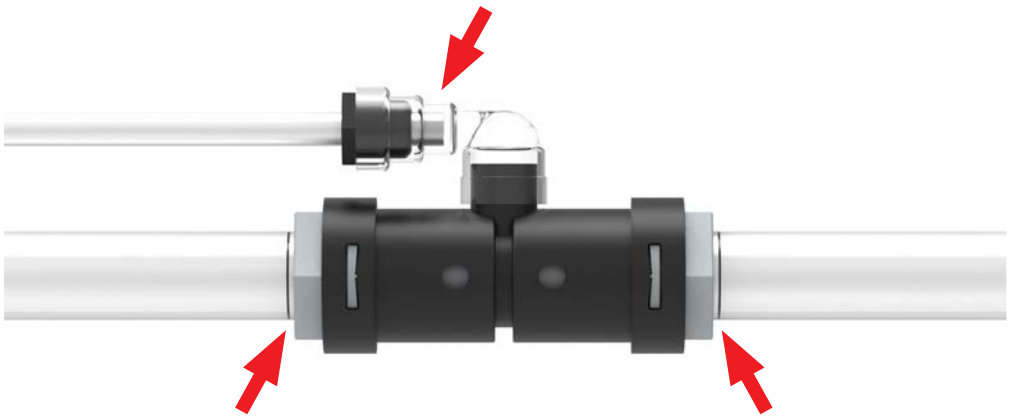
PE-Xa piping – 20x2 mm
90 m pre-insulated roll

3.4 BLIFE FITTINGS

The connection of the circuits (located in the BLife active panels) to the supply line is made through the special BLife fittings available in different configurations.
The installation of the BLife ceiling system often takes place using stairs or scaffolds. Therefore, the use of heavy or big tools (such as pressing tools or wrenches) should be inconvenient. For this reason, the BLife fittings are “Push-fitting” type: the piping is connected simply by pushing it inside the fitting.
As it can be seen from the exploded fitting, the piping, when inserted, runs through the o-ring gasket which guarantees the seal and then through a metal tweezers that, deforming it, no longer allows the output guaranteeing a perfect seal over the time.

“Push-fitting” fittings
- **tools are not necessary**
- **visual test**
- **perfect seal**

Given the type of fitting, to guarantee a perfect seal of the connection, it is essential to insert in the fitting the correct piping length in order to be sure that it will “caught” by the metal tweezers.
For the 8x1 mm piping of the BLife active panels, the transparency of the fitting allows to visually check the correct insertion.
For the 20x2 mm piping of the supply lines, instead, it is necessary to use a suitable template to mark the correct length (39 mm) to verify if it was correctly pushed into the fitting.



3.4.1 Type of fittings

To better identify the different types of fitting, to each one an identification letter has been assigned.

Fitting type A

20 – 20 connector with no. 1 90° 8 mm reducer

Fitting type B

20 – 20 connector with no. 2 90° 8 mm reducers

Fitting type C

20 – 20 connector with no. 4 90° 8 mm opposite reducers

Fitting type D

20 – 20 connector with no. 2 90° 8 mm opposite reducers

Fitting type E

8 - 8 straight piping

Fitting type F

20 – 20 straight piping

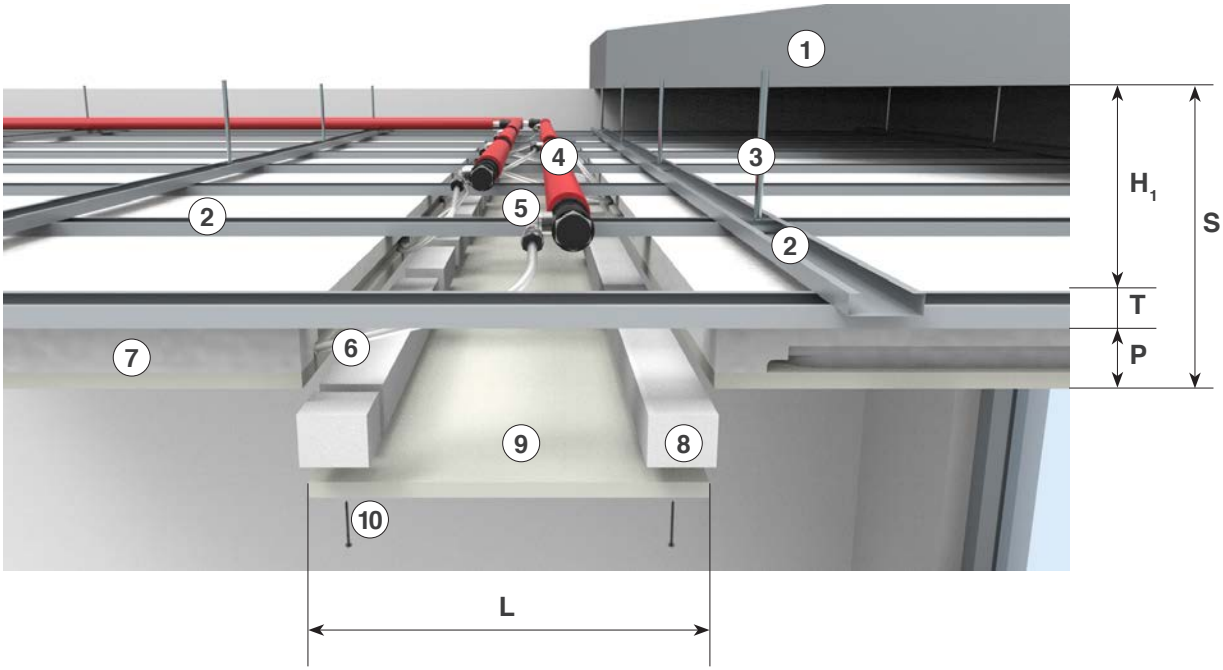
Fitting type G

20 - 20 90° piping

3.5 SUPPLY LINES LAYOUT

Depending on the arrangement of the system, of the support structure and of the available thickness, the supply lines can be positioned over the support structure or below in the thickness of the BLife active panels.
The area below the distribution line, which must remain accessible after having installed the active panels to connect them, is closed depending on the cases using the BLife passive and neutral panels.

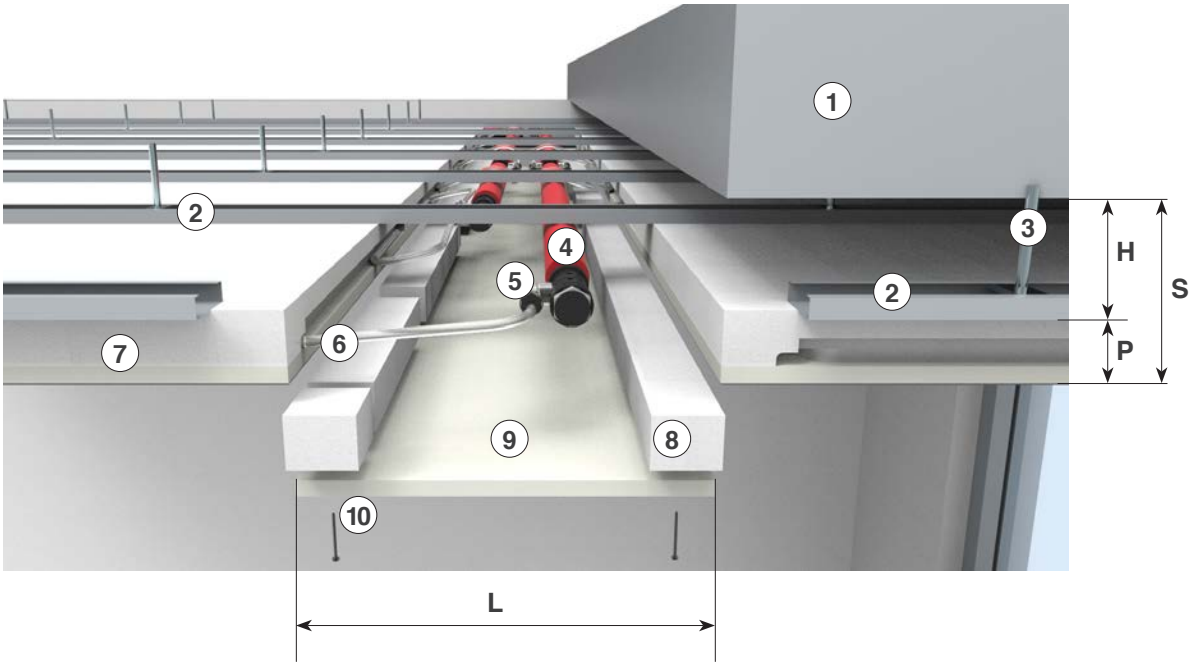
3.5.1 Supply line over the support structure (standard solution)



P: thickness of BLife active or passive panel: 52,5 mm
H_1: minimum distance of the ceiling gap: 60 mm
T: thickness of support structure with single or double warping: variable (minimum 15 mm)
L: width of distribution zone: 400 mm (minimum 300 mm)
S: **minimum thickness BLife system: 127,5 mm**

Pos.	Description
1	Ceiling
2	Profile for supporting metal warping (not supplied by LOEX)
3	Adjustable hanging system (not supplied by LOEX)
4	LOEX PE-Xa 20x2 mm pre insulated piping
5	Fittings with 20-8 ramifications
6	LOEX PE-Xa 8x1 mm piping
7	BLife active panel
8	Polystyrene calibrated adhesive spacer, 40 mm thick
9	BLife neutral panel
10	Fixing screws (not supplied by LOEX)

3.5.2 Supply line in the thickness of the active panels ("low thickness" solution)



P: thickness of BLife active or passive panel: 52,5 mm
H: minimum distance of the ceiling gap: 47,5 mm
S: **minimum thickness of BLife system: 100 mm**
L: width of distribution zone: 400 mm (minimum 300 mm)

Pos.	Description
1	Ceiling
2	Profile for supporting metal frame (not supplied by LOEX)
3	Adjustable hanging system (not supplied by LOEX)
4	LOEX PE-Xa 20x2 mm insulated piping
5	Fittings with 20 – 8 ramifications
6	LOEX PE-Xa 8x1 mm piping
7	BLife active panel
8	Polystyrene calibrated adhesive spacer, 40 mm thick
9	BLife neutral panel
10	Fixing screws (not supplied by LOEX)

3.6 TECHNICAL DISTRIBUTION DATA

BLife manifolds	
Material	Temperature- and pressure-proof Technopolymer
Supply connection	1”F
Supply lines connection	BLife button joint plug
Max. flow	3500 l/h
Flow meter scale	From 0 to 5 l/minute
Max. pressure and temperature operating	6 bar with water at 55°C
Max. pressure	10 bar
Kvs delivery valve (fully open)	0.98 m^3/h
Kvs return valve	2.69 m^3/h
Center distance of delivery / return body	from 200 to 250 mm
Thickness	98 mm without thermometers – 105 mm with thermometers
LOEX 202 PE-Xa 20x2 mm pre-insulated piping	
Certificate of conformity	DIN CERTCO– Reg. no. 3V339 PE-Xa
Piping material	PE-Xa according to ISO 15875
Piping diameter	20x2.0 mm
Minimum radius of curvature	115 mm
Application class	Class 4: 8 bar - Class 5: 6 bar
Oxygen permeability	6 bar con acqua a 55°C
Reticulation degree	< 0,32 mgO/(m^2 x d) (According to DIN 4726 and EN 1264-4 standard)
Density	>70% (EN 579)
Thermal expansion coefficient	0,935 g/cm^3 (ISO 1183 D method)
Softening temperature	1,8*$^{10-4}$ K-1 (DIN 52328)
Elongation at break	> 130°C (DIN 53460)
Tensile strength	> 400% (ISO 6259)
Color	25 MPa (ISO 6259)
Water content	natural – latex
Marking	0,19 l/m
Marcatura	Indicated in each meter, according to ISO 15875
Insulation for pre-insulated piping	
Material	Expanded polyethylene (PE-LD), closed cell foam
Thickness	10 mm
Protection	PE-LD scratch resistant film (0,2 – 0,3 mm thick)
Thermal conductivity	0,040 W/(m·K)
Resistance to the diffusion of water vapor	mu 5480
Reaction to fire	Class 1
Application temperature	From -30°C to +95°C

BLife insulating sheath for 20-8 mm piping	
Material	Extruded polyethylene
Density	35 kg/m^3
Diameter	For 20 mm pipe: Ext. 40 mm – Int. 20 mm (10 mm thick)
For 8 (mm) piping: External 20 mm – Internal 8 mm (Thickness of 6 mm)	> 400% (ISO 6259)
Thermal conductivity	0,035 W/mK
Resistance to the diffusion of water vapor	mu 10000
Reaction to fire	Self-extinguishing Class 1
Application temperature	From -45°C to +100°C
Format	2 m bar
BLife insulation for 10 m fittings tape	
Material	Closed cell polyethylene wth adhesive band and reinforced fabric
Tape dimensions	50 mm wide – 3 mm thick
Thermal conductivity	0,038 W/mK
Resistance to the diffusion of water vapor	mu 5000
Reaction to fire	Self-extinguishing Class 1
Application temperature	from -50°C to +105°C
Format	50 m roll

4. DESIGN CRITERIA

The BLife ceiling radiant system is a false ceiling in plasterboard that is activated thermally thanks to the presence of piping, thermal-conductor foils and insulation. Therefore, in general terms, all the indications, precautions and prescriptions normally foreseen for this type of construction must be observed even if not explicitly reported in this manual.

4.1 HEIGHT

To install the BLife ceiling radiant system, the space between the lower edge of the ceiling and the lower edge of the system must be at least 10 cm.
The available thickness conditions the positioning of the supply lines: with small available area, they should be located in the active panel thickness; while, when the area is bigger, they can be positioned over the ceiling support structure.

Min. thickness of BLife system: 100 mm

4.2 CEILING

The ceiling under which the BLife system can be installed can be of different types: in brick, concrete, wood, steel, newly built or part of a building under renovation. It can be an inter-floor ceiling like a ceiling cover and, in this case, it can also be slightly inclined. From a structural point of view, it must be able to support, with an adequate degree of safety, the weight of the system equal to about 18,50 kg / m^2 and be sufficiently solid to allow fixing of the metal support structure of the plasterboard.

Weight of BLife system:

18,50 kg/m^2

4.3 SUPPORT STRUCTURE

The support structure of the BLife system is the same as that used for common plasterboard false ceilings and, given the weight pf the system, the structure must have a load class between 15 and 30 kg/m^2. In the presence of other elements that must be anchored to the false ceiling (for example lamps, sensors, grills etc), the weight must be evaluated and, if it is necessary, the load class of the structure must be adapted.

4.3.1 Support structure warping

The support structure is composed of a series of metal profiles that constitute warping suitable for fixing the BLife panels. Depending on the height of the ceiling compared to the false ceiling and on the construction type, the warping can be of different types:

- single warping
- double warping

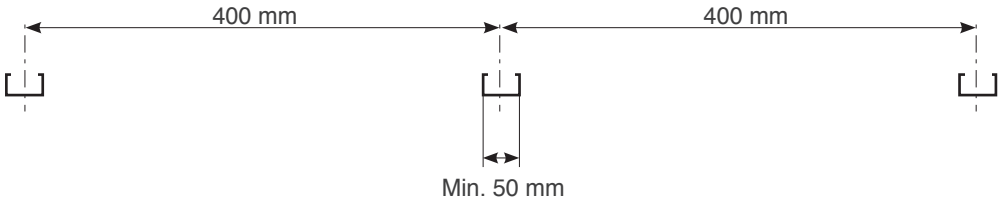
Support structure:
load class 15 kg/m^2 < P < 30 kg/m^2
Distance between centers: 400 mm
minimum width profiles: 50 mm

Example of single warping

Example of double warping

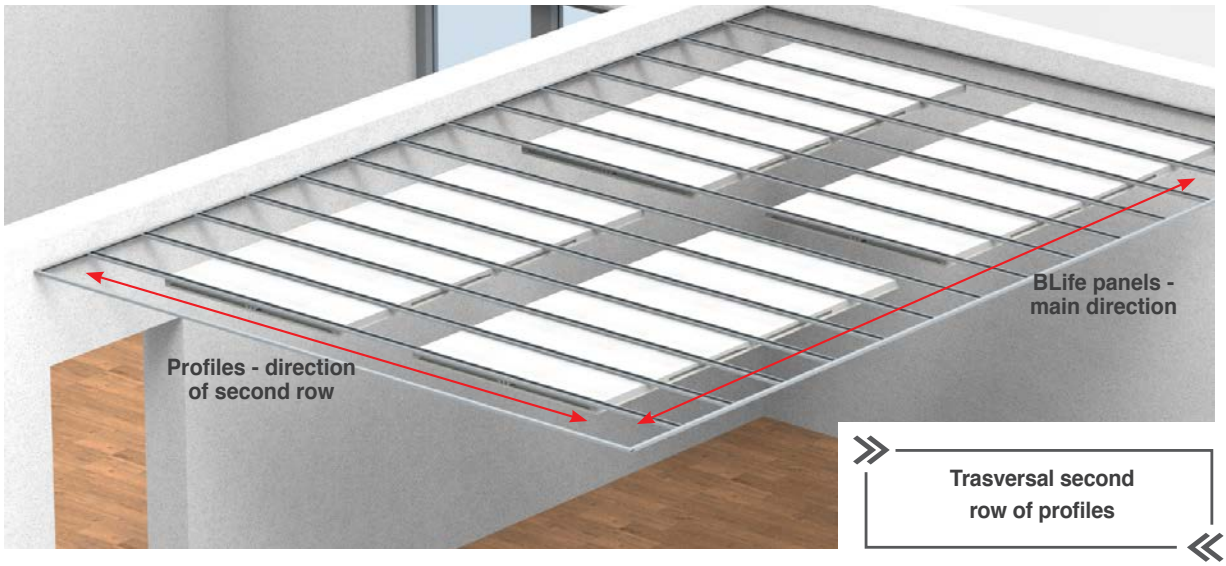
Anyhow, for mounting the BLife system, the profiles to which the panels are fixed must have:

- a maximum distance between centers or sub multiples of 400 mm;
- a minimum width of 50 mm.



4.3.2 Support structure warping arrangement

The profiles of the secondary warping, to which the BLife active panels are fixed, must be arranged transversely respect to the panels themselves.



If there are active panels with a different orientation inside a room, the profiles must be arranged according to the main orientation. Moreover, near the head of the panels with a different orientation, a transverse profile must be added to allow the correct coupling with the passive or neutral panels.

1	Additional cross profiles

4.4 BLIFE ACTIVE PANELS

In general terms, in the arrangement of BLife active panels, by combining the different types, we try to cover most of the available surface, in this way the irradiation will be more uniform to the advantage of thermal comfort.
With the same thermal power required, the greater the active surface, the lower the specific thermal output required. Consequently, a lower water temperature will be used.
Reducing the specific heat output also means having a ceiling surface temperature closer to the room temperature, increasing the self-regulation effect of the system and thermal comfort.
Indicatively, the surface covered by the active panels must be between 50% and 80% of the total area of the environment.

Increase of active surface percentage

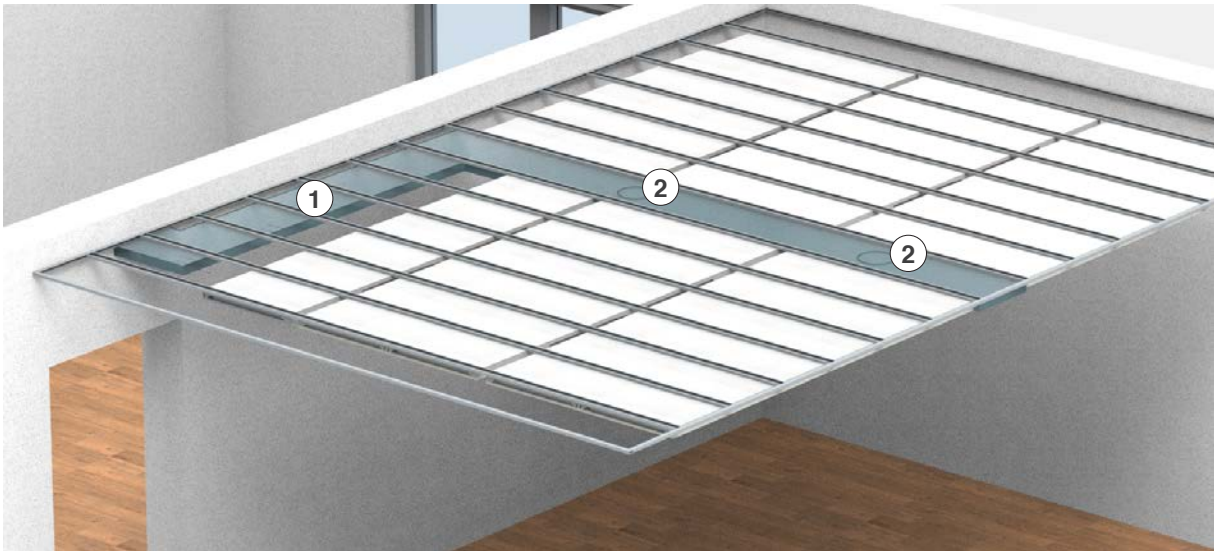
more uniform radiance => greater thermal comfort

ceiling temperature closer to room temperature => greater system auto-regulation

lower water temperature => greater efficiency and saving

4.4.1 Technical areas

Placing the BLife active panels, it is necessary to take into account the presence of the lighting (lamps, lights and spotlights etc) that must be anchored to the false ceiling and whose position must be previously defined. Another element that must be considered is the space necessary for the supply lines, which must remain accessible to allow the connection of the panels.
Lighting: evaluate the space required for the passage of the supply cables and the hypothetical fixings of the lighting bodies.
Supply lines: maintain free a “band” of minimum width 300 mm. For an optimal installation, it must be considered a 400 mm width.

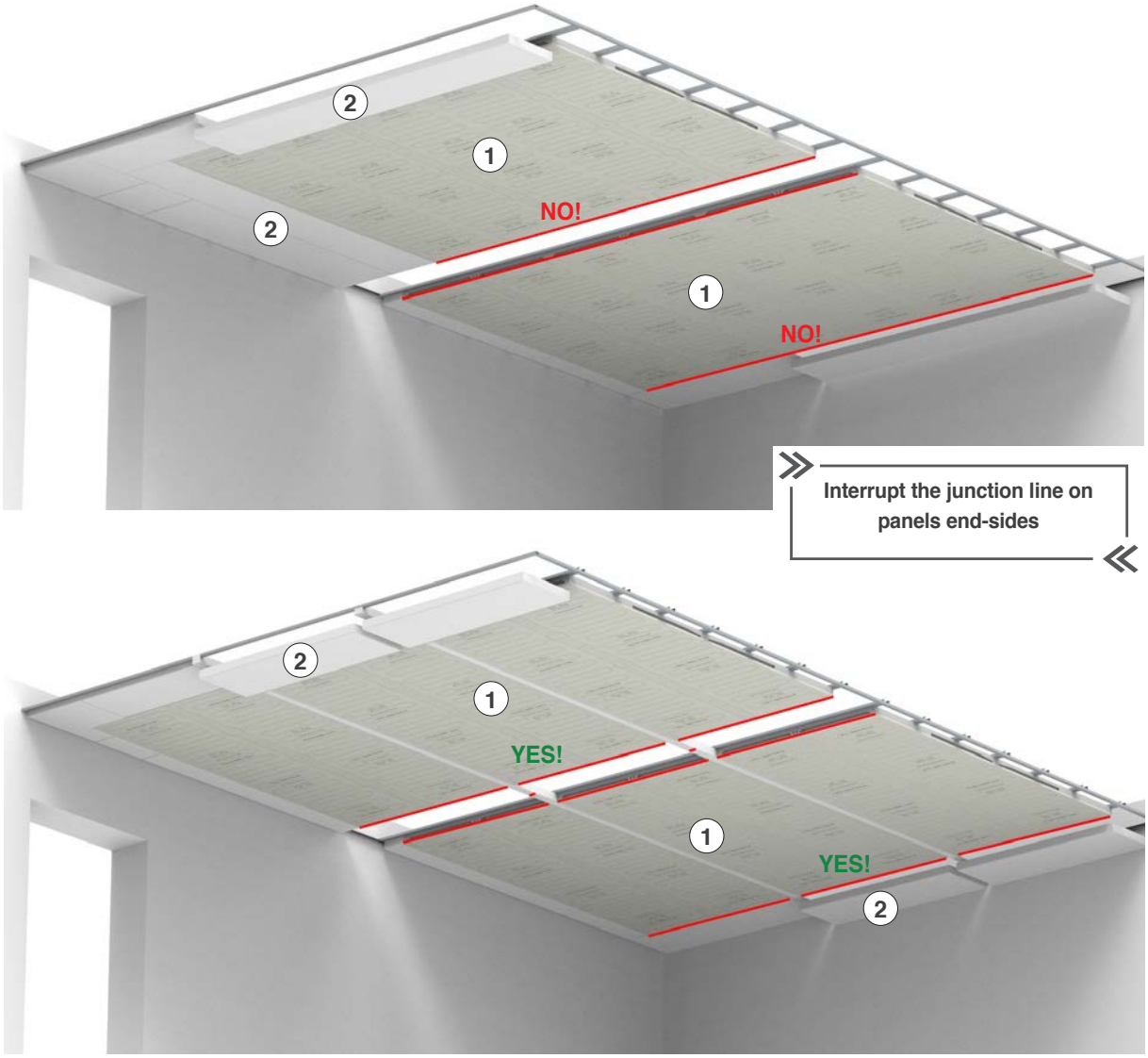


1	Band for supply line
2	Lighting position

Pay attention to the spaces required for the lighting and for the supply lines.

4.4.2 Active panels alignment

The plasterboard slab of the BLife panels has on the long sides has a beveled profile to support the grouting; while, on the short sides, the slab profile has a clean cut.
To prevent possible flaws of the grouting, when there are several active panels side by side (more than two panels), it is good to distance them by at least 60 mm. In this way, the junction line is offset through the interposition of a passive panel “slice”.



1	BLife active panels
2	BLife passive panels

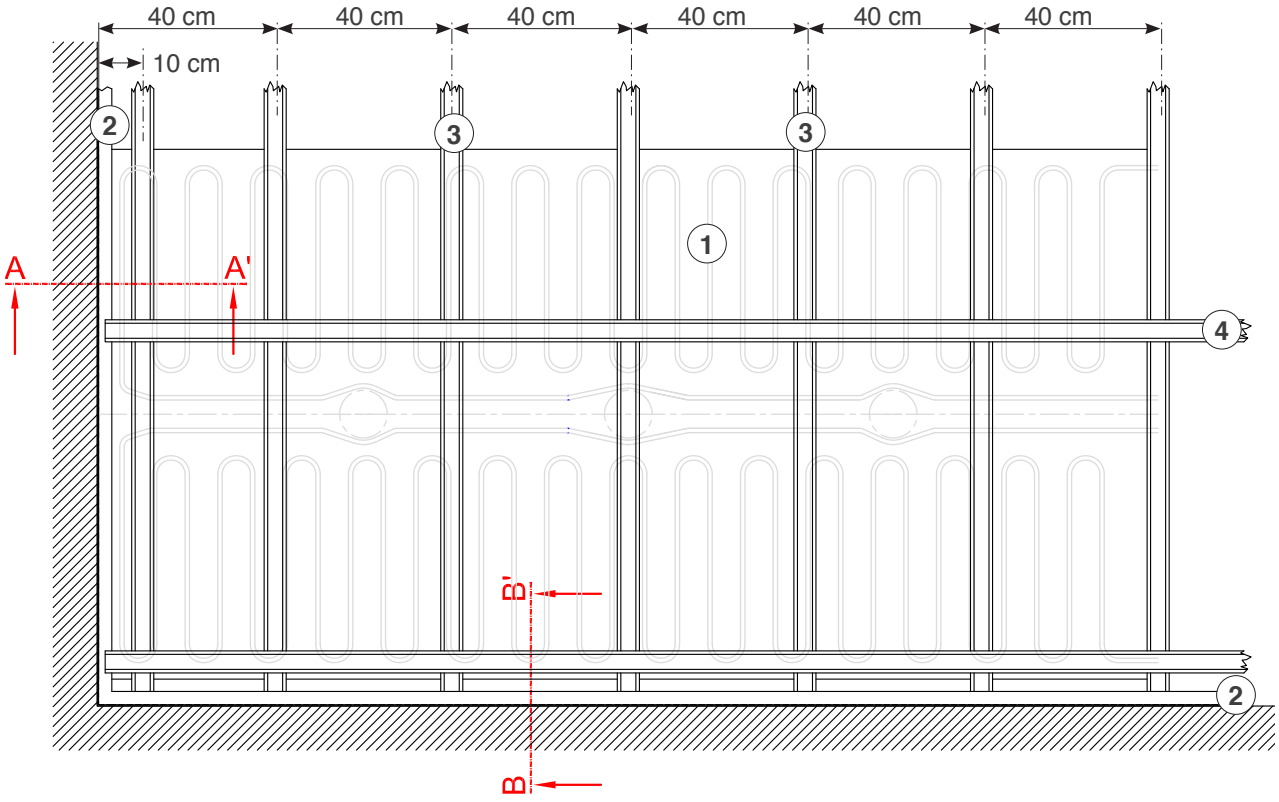
4.4.3 The perimeter finish

The perimeter finish of the plasterboard false ceiling can generally be of two different types:

- **with sealant:** the point of contact between the plasterboard slab and the wall is closed and insulated through an acrylic sealant product that, being elastic, allows the dilatation of the plasterboard compared to the wall;
- **with edging profile:** the plasterboard slab remains slightly detached (the distance is variable) from the wall thanks to the use of a small shaped profile that can have different dimensions.

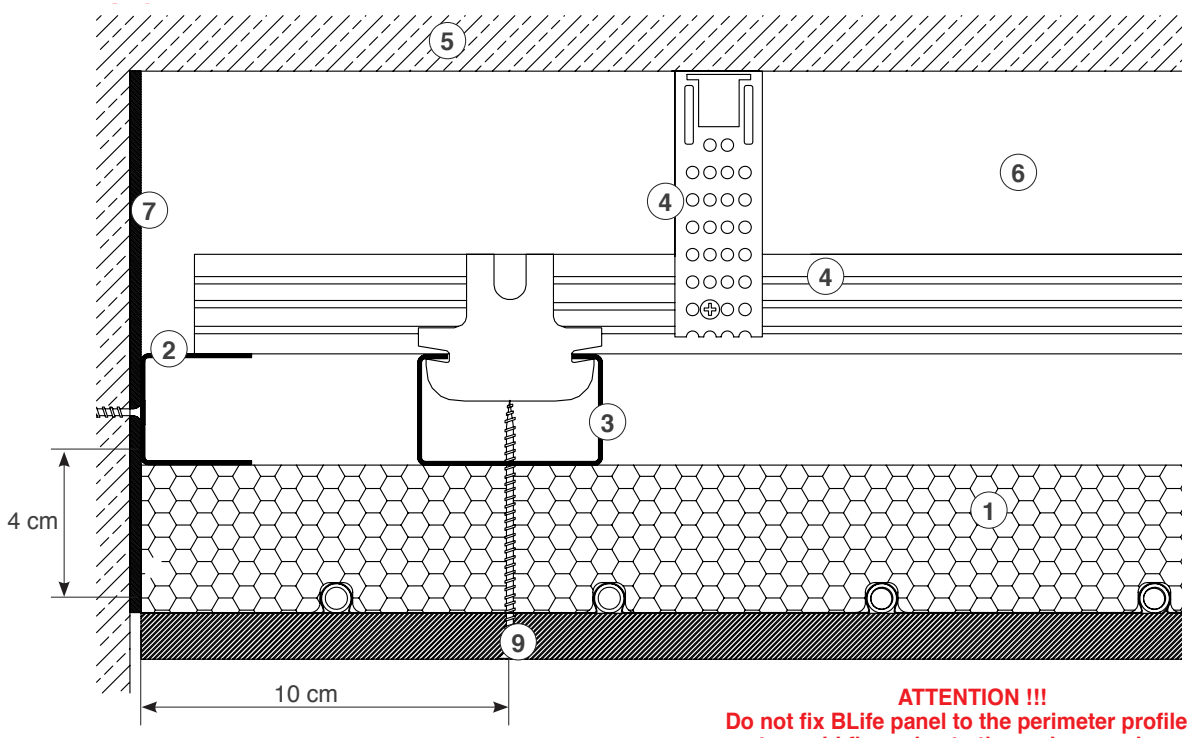
If the BLife active panel is placed directly in contact with the perimeter wall to perform correctly these two types of finishing, given the presence of the piping and of the fixing points defined, it is essential to slightly vary the arrangement of the support structure and to respect some warnings that allow the correct dilatation of the false ceiling and the possibility to fill the lower surface more easily.

4.4.3.1 Detail of the perimeter finish with sealant



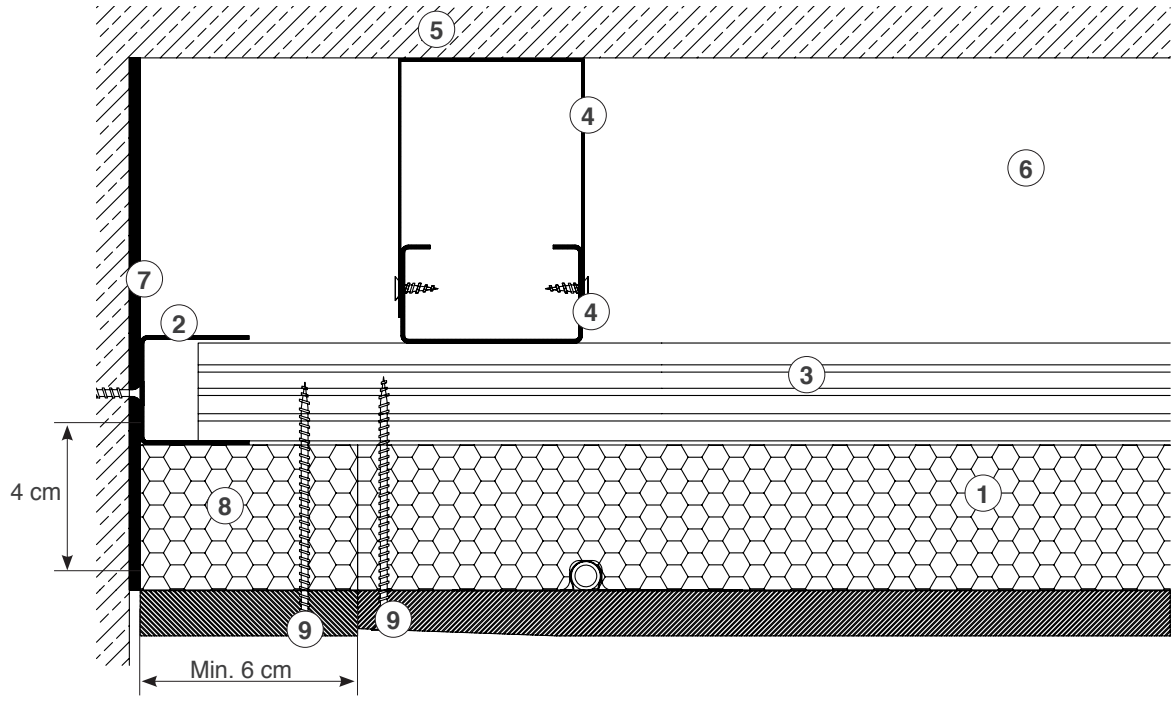
1	BLife active panel	3	Secondary warping profile
2	Perimeter profile with “C” shape	4	Load-bearing structure

A-A' Section



ATTENTION !!!
Do not fix BLife panel to the perimeter profile (2) to avoid flaws due to thermal expansions.

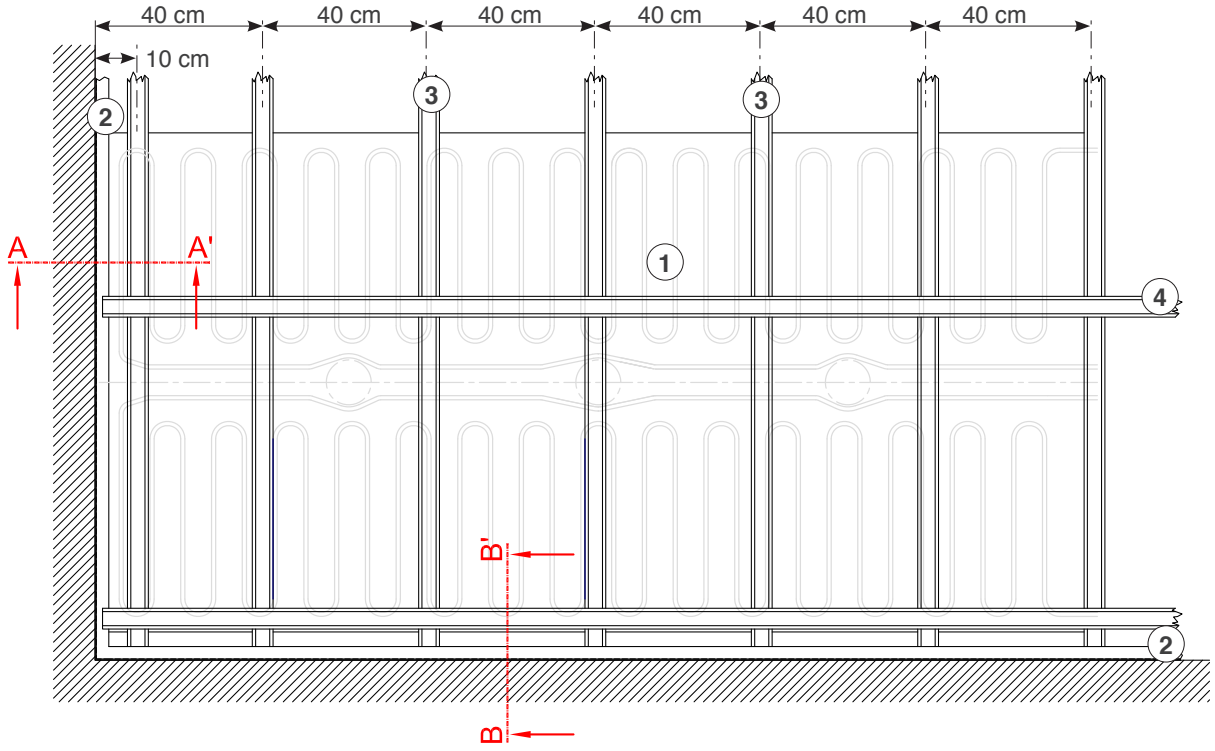
B-B' Section



1	BLife active panel 52,5 mm thick
2	Perimeter profile with "C" shape
3	Secondary warping profile (not supplied)
4	Load-bearing structure (not supplied)
5	Load-bearing ceiling

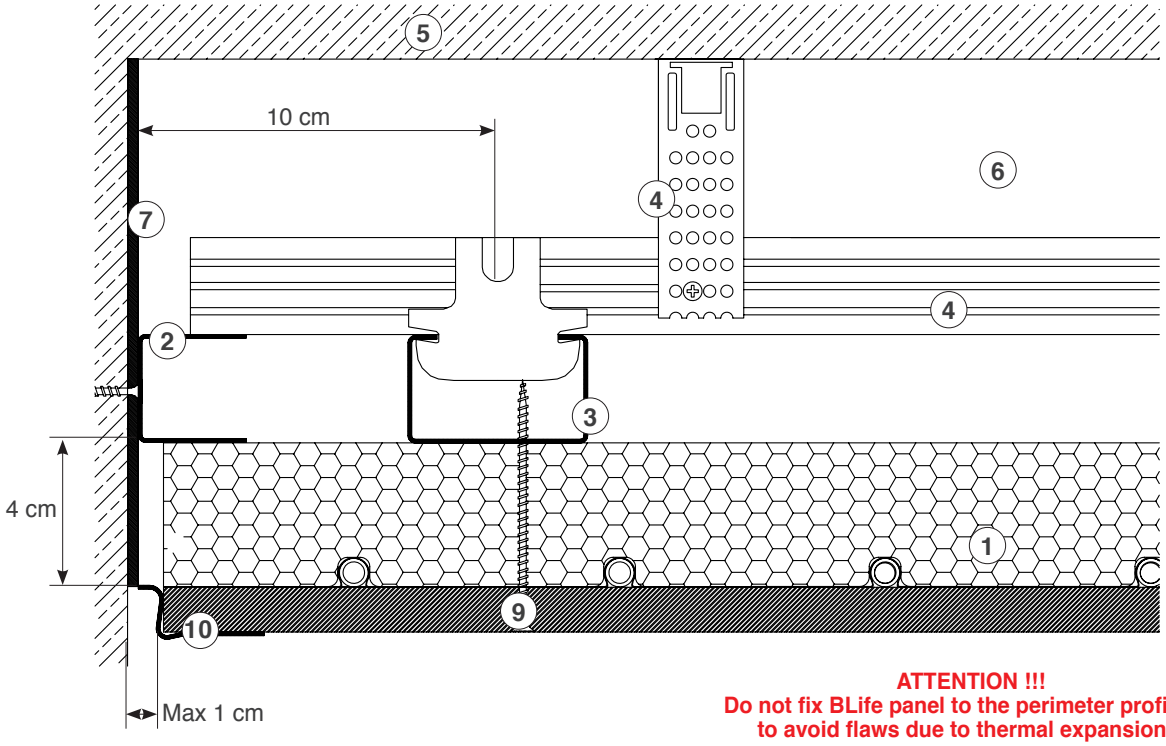
6	Interspace
7	Perimeter board strip
8	BLife passive panel 52,5 mm thick
9	Fixing screws with maximum length 70 mm

4.4.3.2 Detail of the perimeter finish with edging profile



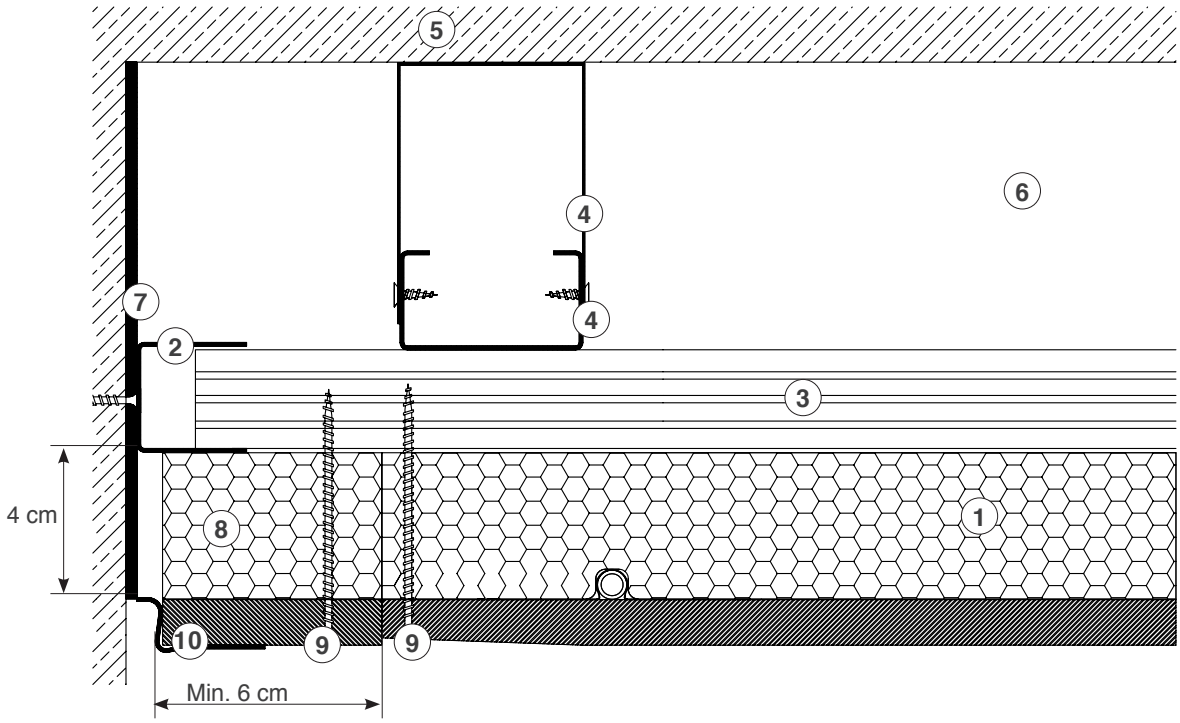
1	BLife active panel	3	Secondary warping profile
2	Perimeter profile with “C” shape	4	Load-bearing structure

A-A’ Section



ATTENTION !!!
Do not fix BLife panel to the perimeter profile (2) to avoid flaws due to thermal expansions.

B-B’ Section



1	BLife active panel 52.5 mm thick
2	Perimeter profile with “C” shape
3	Secondary warping profile (not supplied)
4	Load-bearing structure (not supplied)
5	Load-bearing ceiling

6	Interspace
7	Perimeter board strip
8	BLife passive panel 52,5 mm thick
9	Fixing screws with maximum length 70 mm
10	Edging profile

4.5 SUPPLY LINES

After the layout of the BLife active panels inside the building, the route and the characteristics of the water distribution system must be evaluated. The water distribution system consists of 1) the BLife manifolds and 2) the LOEX 202 PE-Xa pre insulated pipes with their related fittings.

4.5.1 BLife manifold

The BLife manifold is installed on the ceiling and, thanks to its reduced dimensions (105 mm thick including the encumbrance of the thermometer), it can remain within the thickness of the false ceiling constituted by the BLife system. The optimal position is barycentric compared to the system. This allows to reduce the length of the supply lines to the advantage of simplicity and cost-effectiveness of installation and of load losses reduction.
For any adjustment and maintenance operations, the access to the BLife manifold must always be guaranteed and therefore the false ceiling must be provided with an opening hatch. For this reason, for the installation of the manifold, accessory rooms such as corridors or hallways are preferable where, if necessary, the ceiling can also be lowered if space is not sufficient.
The BLife manifold can also be installed on the wall and, if it is the wall of the room below, it must be evaluate the necessity to install some breathers in the high points of the distribution to facilitate the filling and the breather of the system itself: on the contrary, if the manifold is installed on the wall of the upper floor, the supply lines must cross the ceiling with all the necessary precautions that this crossing entails.

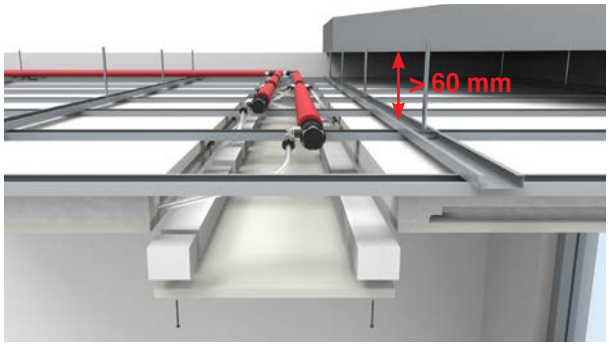
BLife manifold
- 105 mm thick
- barycentric position

4.5.2 Supply lines

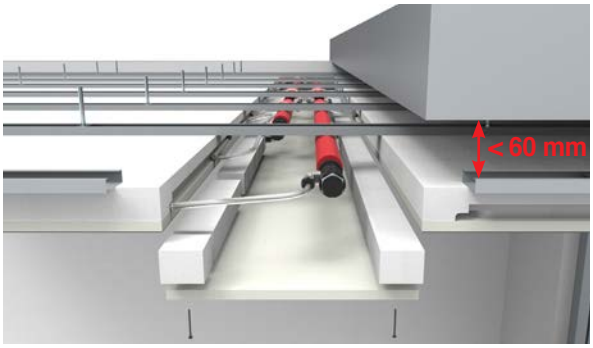
4.5.2.1 Position of the supply lines

The supply lines start from the BLife manifold and feed several BLife active panels connected in parallel to the line itself. Firstly, it is necessary to determine the position of the supply lines compared to the radiant system:
1) if the cavity height over the false ceiling is bigger than 60 mm, the lines will be located over the radiant system, fixed for example with electrician clamps on primary or secondary profiles of the support structure;
2) if in the cavity height there is not enough space, the supply lines will be installed in the thickness of the radiant system always fixed to the support structure, but in the lower part instead of the upper one.

Cavity height of the false ceiling, from the upper wire of the support structure to the lower wire of the ceiling:

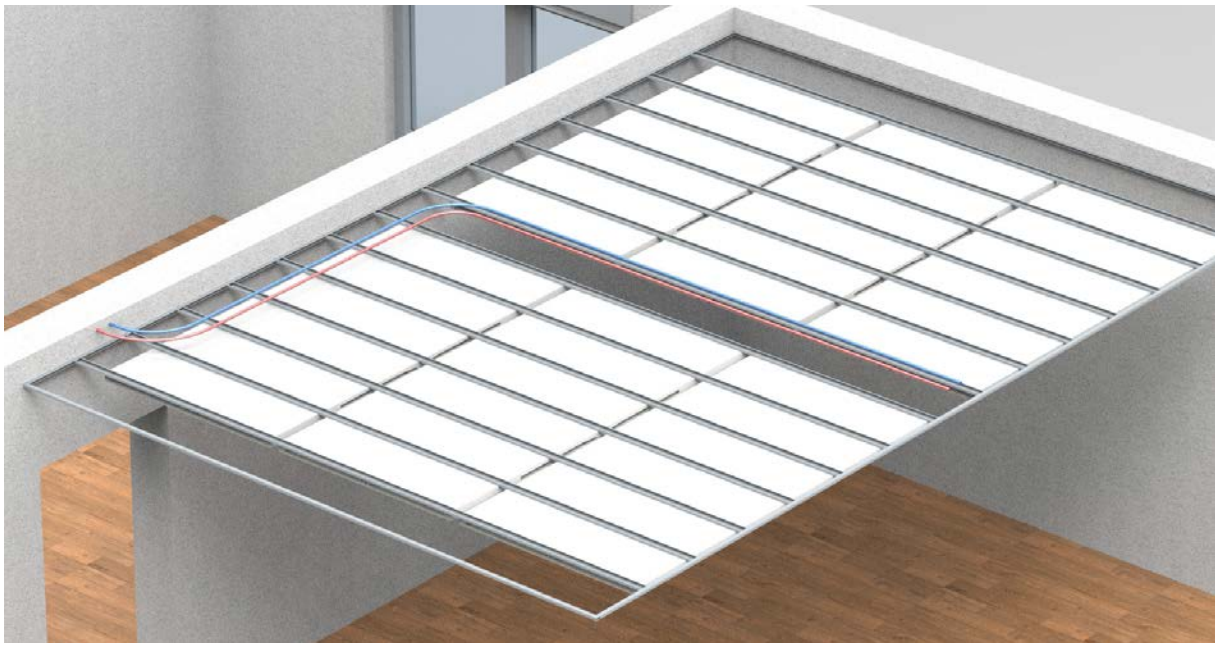


1) Supply **ABOVE** the radiant system

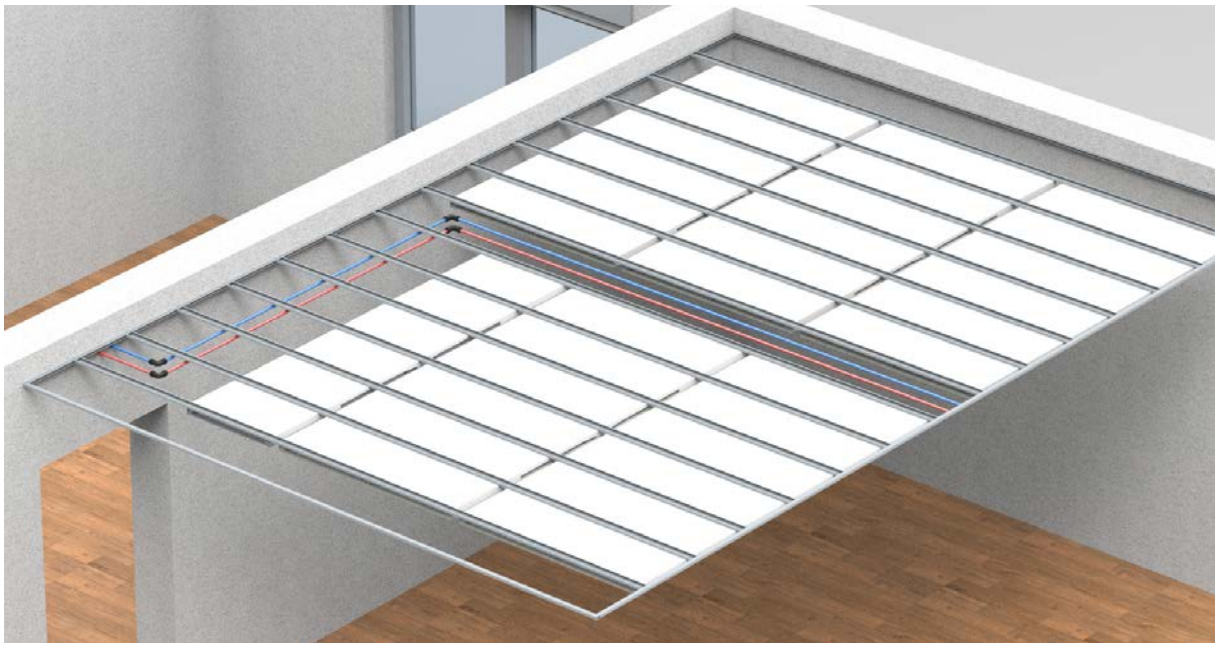


2) Supply **IN** the thickness of the radiant system

The position of the supply line determines its trajectory. In fact, when it is positioned above the radiant system, it can pass over the active panels and must be accessible during the assembly only on the zone where it is necessary to put the fittings; on the contrary, when the supply line is in the thickness of the system, all its trajectory must take place without overlapping with the active panels.



Example of arrangement of the supply line ABOVE the radiant system.
The trajectory can overlap with the active panels allowing a greater coverage of the surface.



Example of arrangement of the supply line IN the thickness of the radiant system.
The trajectory can NOT overlap with the active panels and the elbows must be done using the 90° fittings to facilitate the infill with the BLife neutral panels

4.5.2.2 Sizing of the supply lines

Each supply line can feed several BLife active panels, their number depends on the required water flow which is determined according to the maximum thermal output that the system must provide and according to the difference in water temperature between supply and return.
Under standard conditions (thermal output 80 W/m^2 – Difference of water supply temperature – 4 °C return) for each supply line it is possible to connect up to 12 circuits (6 BLife active panels) for an active surface of 17,0 m^2 that can be composed also of panels of different types (Type 1, Type 2, Type 3 combined together).
For the correct operation of the radiant system, according to the ISO EN UNI 11855 norm, regardless of the dimension, each environment or room must have at least one supply line to regulate in an independent way the operation and allow the correct hydraulic balance of the system.

Criteria for sizing the supply lines of the BLife system	
At least 1 supply line for each environment (Do NOT feed several rooms with the same supply line)	
Max. flow for each supply line	300 l/h
Max. No. of circuits for each supply line*	No. 12 circuits – Type 1 or 2 active panels (6 panels) No. 20 circuits – Type 3 active panels (5 panels) Combination of different types
Max. active surface for each supply line*	17,0 m^2
*Standard conditions	

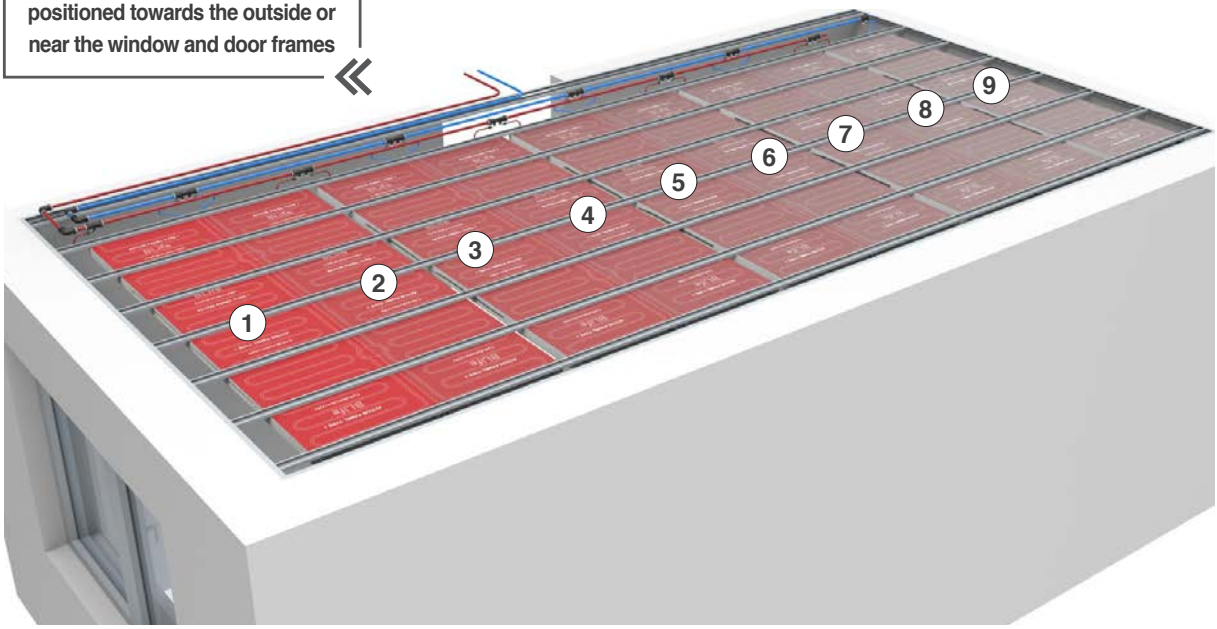
4.5.3 Connection between the active panels

The active panels are connected to the supply line in parallel. Therefore, the thermal output between the several active panels is slightly different, in the same way the thermal output of the circuits of the type 3 active panel will be different compared to the circuits of the type 1 and 2 panels.
In general terms, these differences are negligible between circuits of the same length (about 4%); instead, between smaller circuits, depending on their position among the line, they will have a higher output than the others (about 10-12%).
However, it is possible to take into account these differences, in the connection sequence, in order to exploit them to the advantage of the thermal comfort of the room.

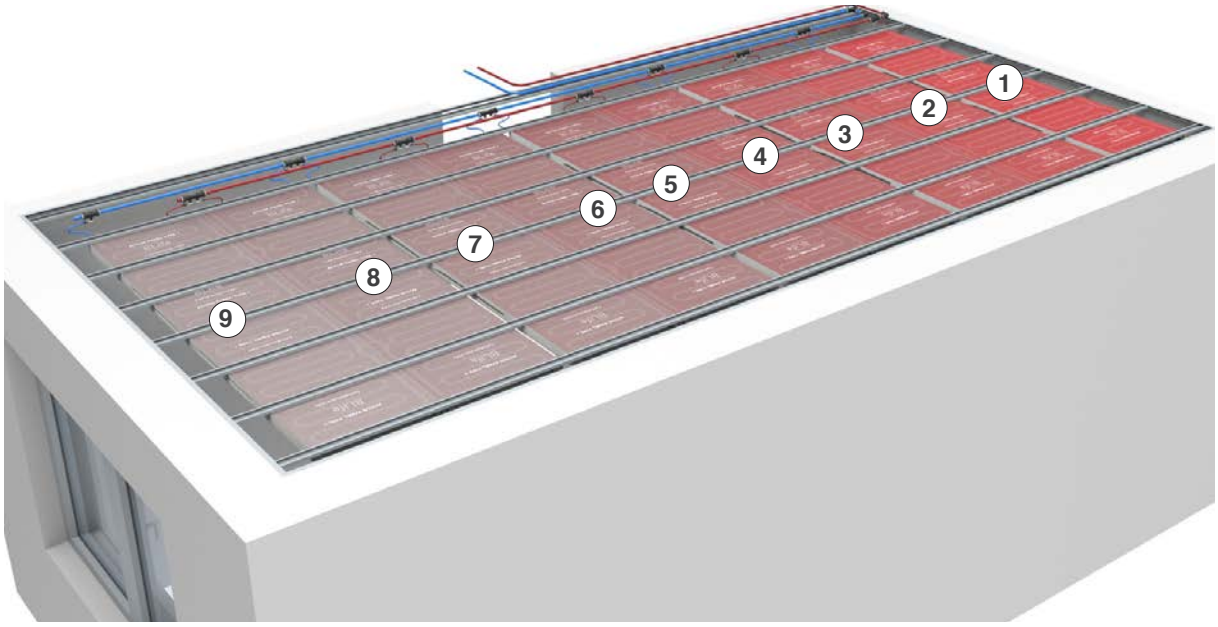
4.5.3.1 Connection sequence

When it is possible, in the connection sequence of the circuits, it is advisable to first feed the circuits positioned towards the outside of the rooms and then those placed inside. In this way, the circuits provide a greater thermal output where the heating dispersion in winter and the returns of summer heat, balancing the hot/cold radiance of the walls and of the external window and door frames.

Firstly connect the active panels positioned towards the outside or near the window and door frames



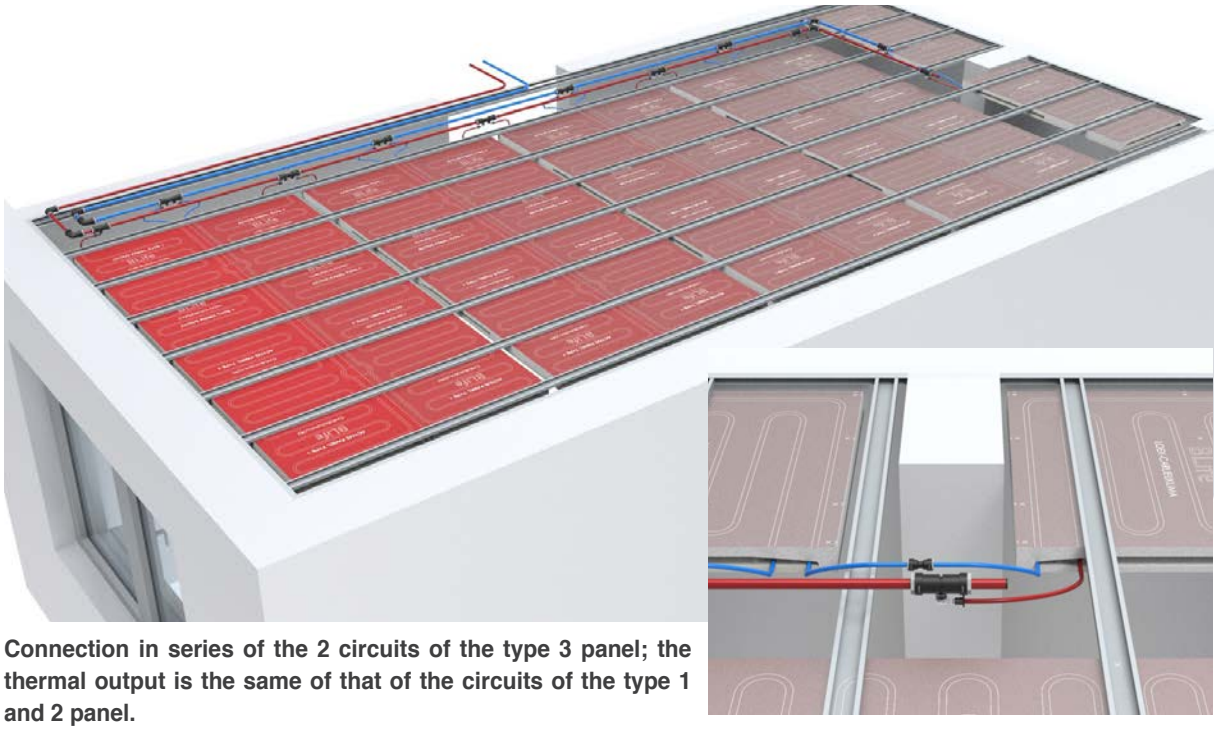
Example of an OPTIMAL connection: the circuits that are fed first are those positioned towards the walls and the external window and door frames, while the more internal circuits inside the room are fed last.



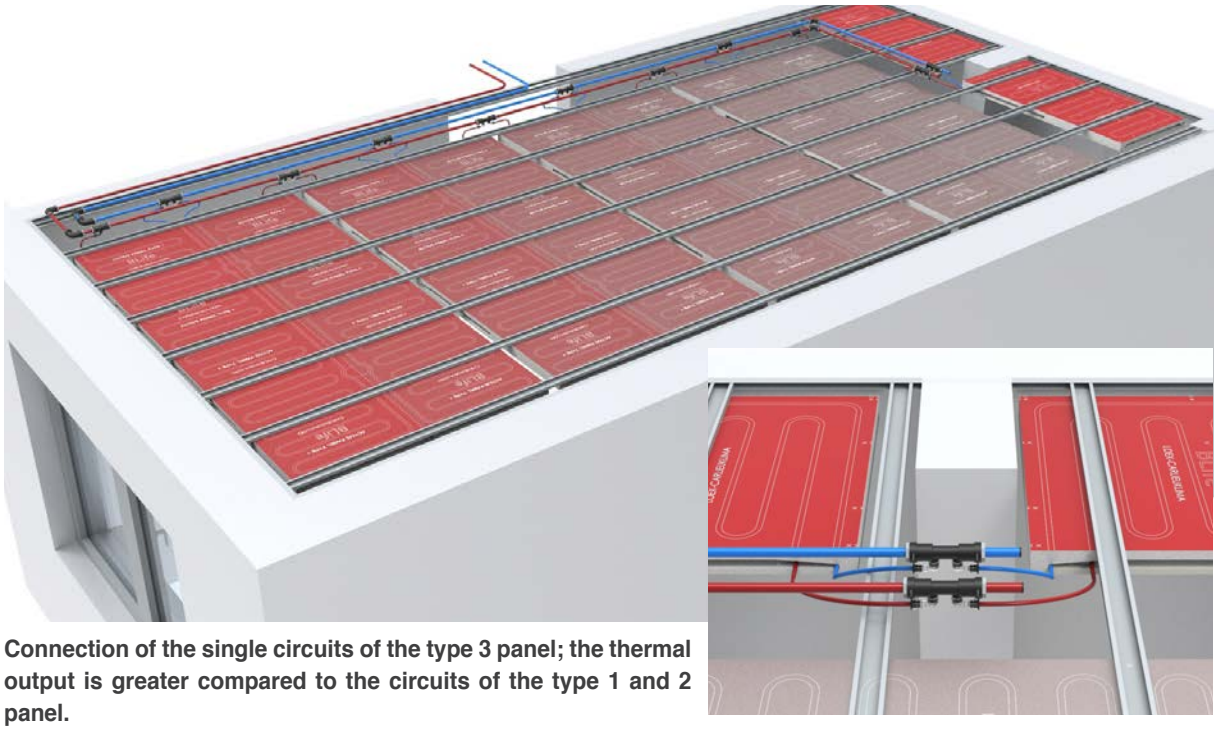
Example of an NOT OPTIMAL connection: the circuits that are fed first are those positioned more inside the room, while the circuits near the outside walls and to the window and door frames are fed last.

4.5.3.2 Connection between the circuits of type 3 active panel

The circuits of the type 3 panel are shorter than the type 1 and 2 panels. As a consequence, the load losses will be lower and the flow greater, as well as the thermal output emitted.
When these panels are used, it is possible to connect 2 in series and to obtain the equivalent length to that of the other circuits. In this way, the thermal output will be equivalent.

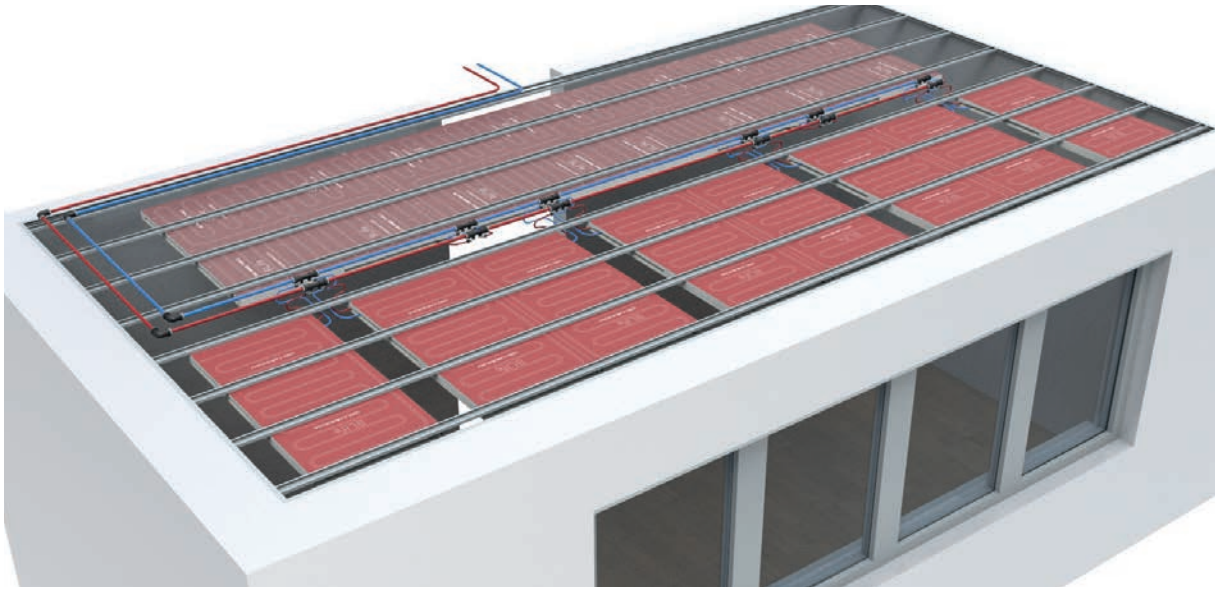


Connection in series of the 2 circuits of the type 3 panel; the thermal output is the same of that of the circuits of the type 1 and 2 panel.



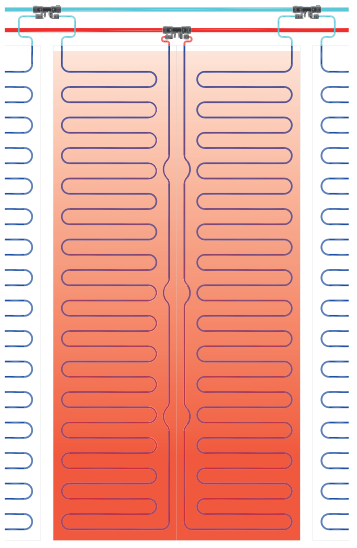
Connection of the single circuits of the type 3 panel; the thermal output is greater compared to the circuits of the type 1 and 2 panel.

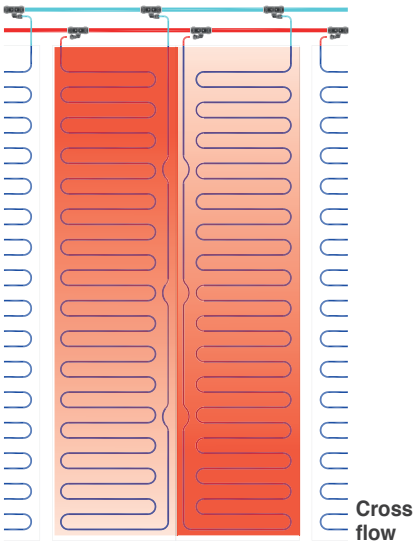
In the presence of large windows, type 3 circuits can be used to create a zone with a higher thermal output near the window and door frames as it is used with the perimeter circuits of floor radiant systems.



4.5.3.3 Type of connection

Given the serpentine arrangement of the piping inside the BLife active panels, the system operation is influenced not only by the connection sequence of the circuits to the supply line, but also by the piping connection of the circuit to the supply line itself. Depending on the piping type of the circuit that is connected to the delivery and return, even if in a limited way, the trend of the thermal flux inside the panel will change.



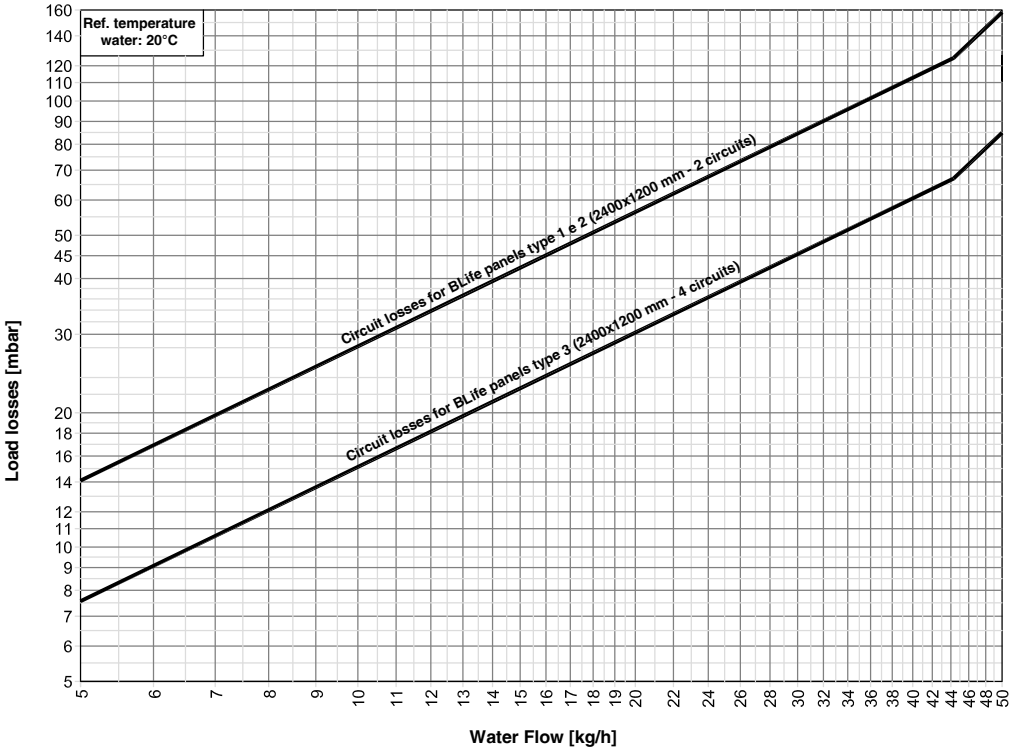


With the **parallel flow** connection, the adjacent circuits have the same temperature gradient and can be used near the outer walls to have a slightly higher radiance where there is more dispersion.
The **cross-flow** connection is recommended for the central areas of the rooms where it guarantees greater uniformity of thermal output and radiance.
In general, the active panels are connected with the parallel flow because this modality is simpler and less expensive, since less fittings are used. In big areas, with many active panels, the difference of radiance is not perceptible.
The cross-flow connection is advisable in small areas with few active panels (2-3 elements) where the radiant surface is limited and there is the desire to make it as homogeneous as possible.

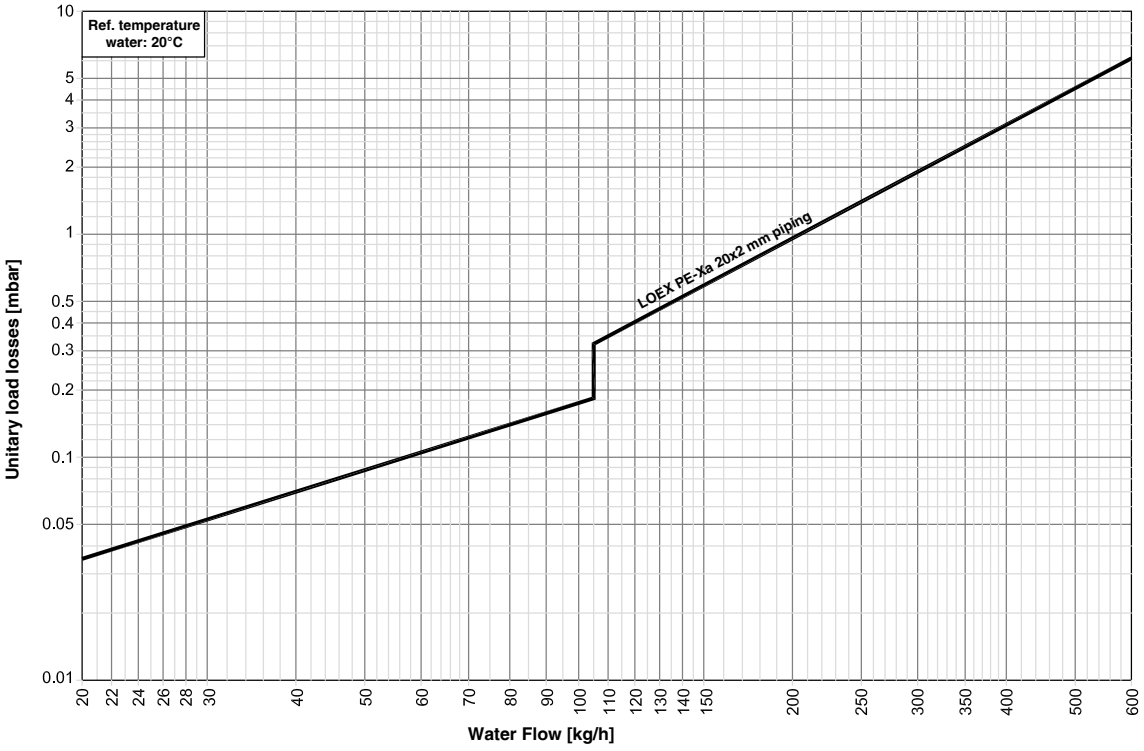
4.6 LOAD LOSSES

Diagrams of unitary load losses of: piping of active panels, piping of supply lines and fittings

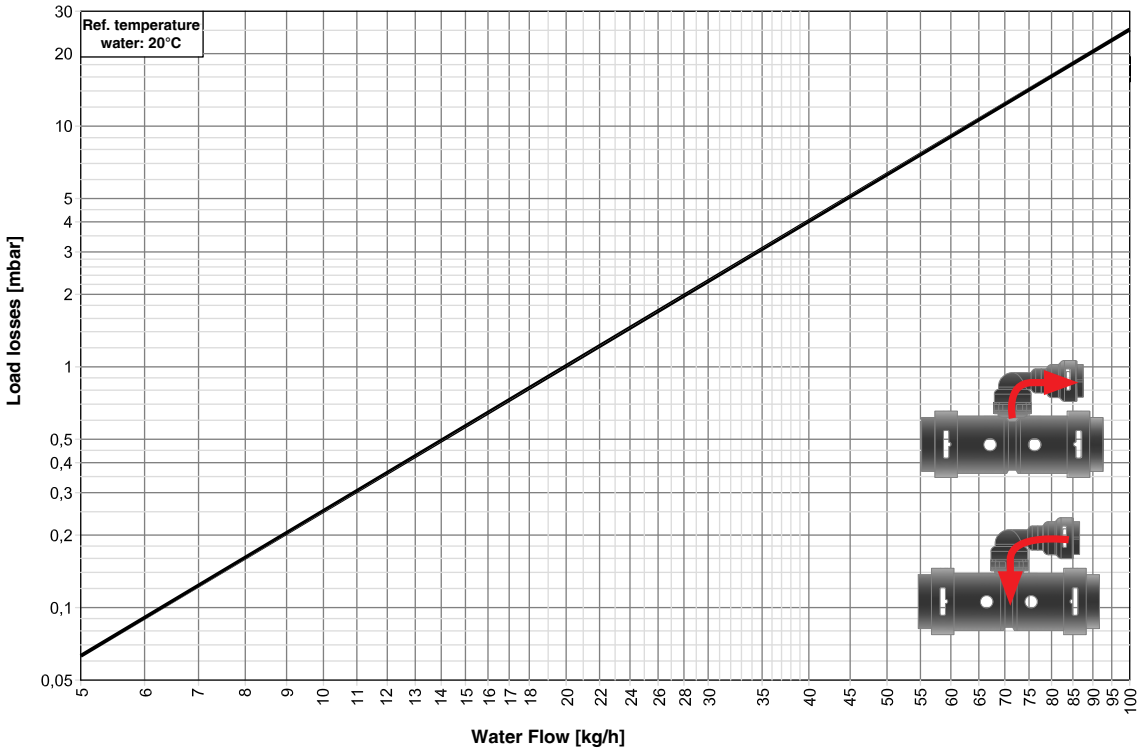
4.6.1 Circuits of BLife active panels – LOEX PE-Xa 8x1 mm piping



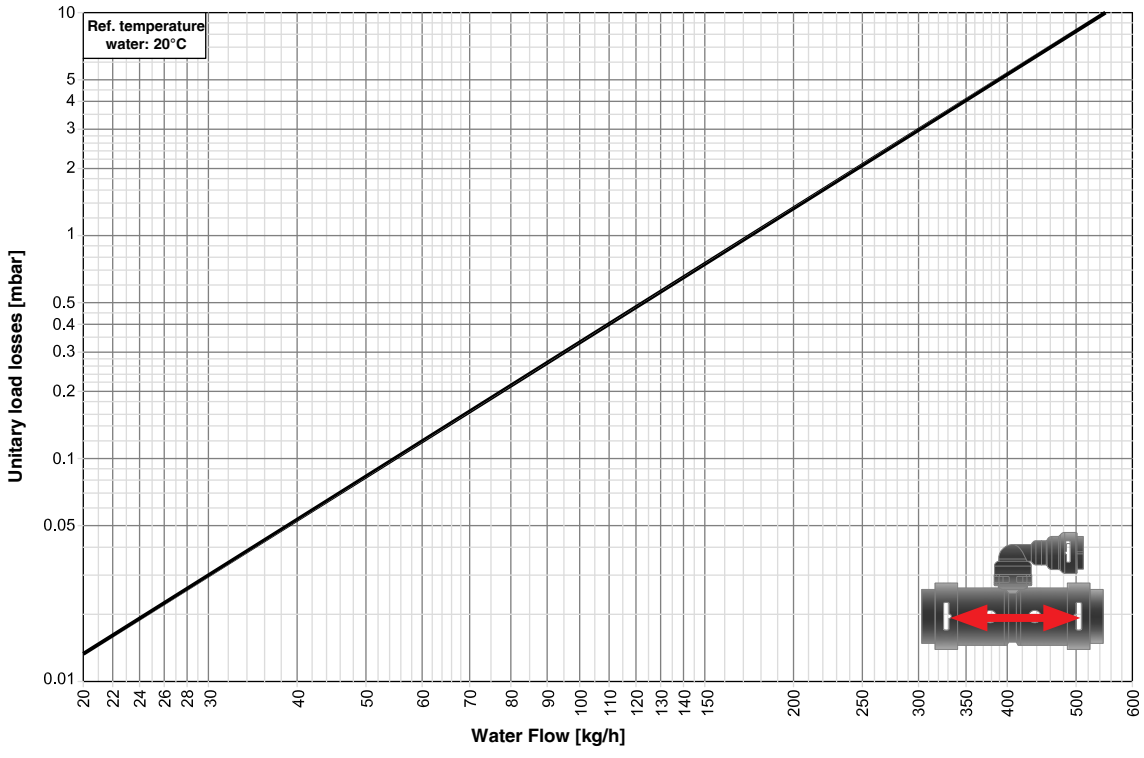
4.6.2 Supply lines – LOEX 202 PE-Xa 20x2 mm piping



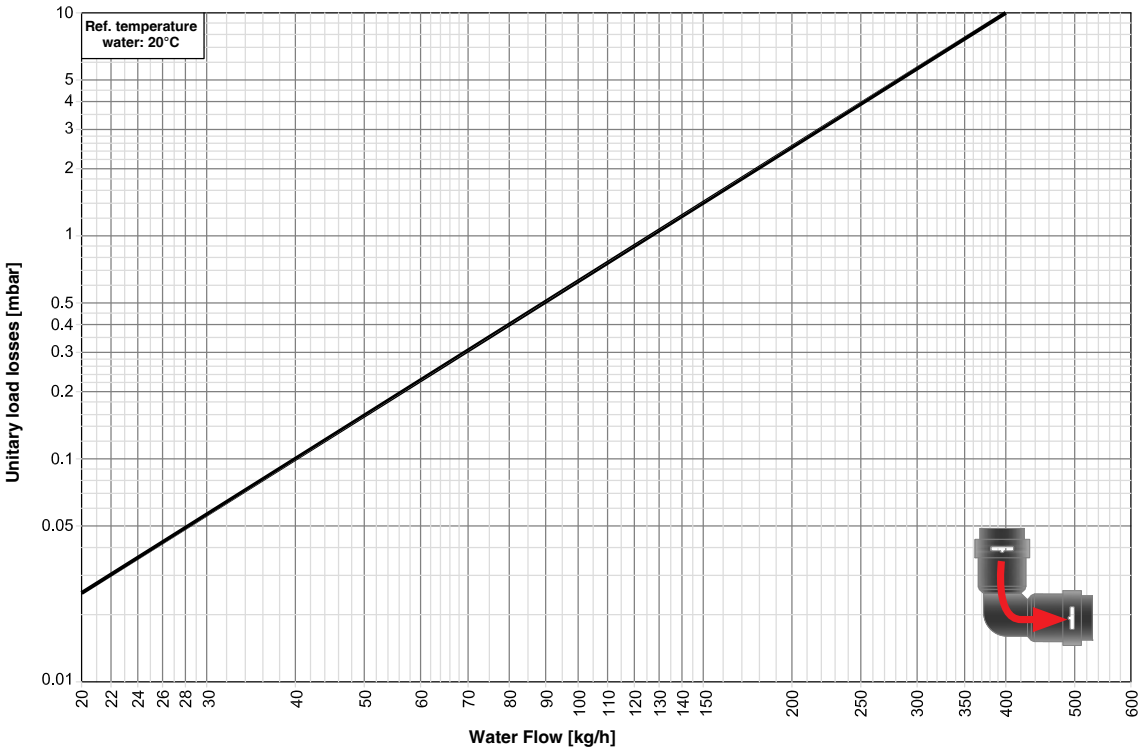
4.6.3 Fitting – reduction 20-8 or 8-20



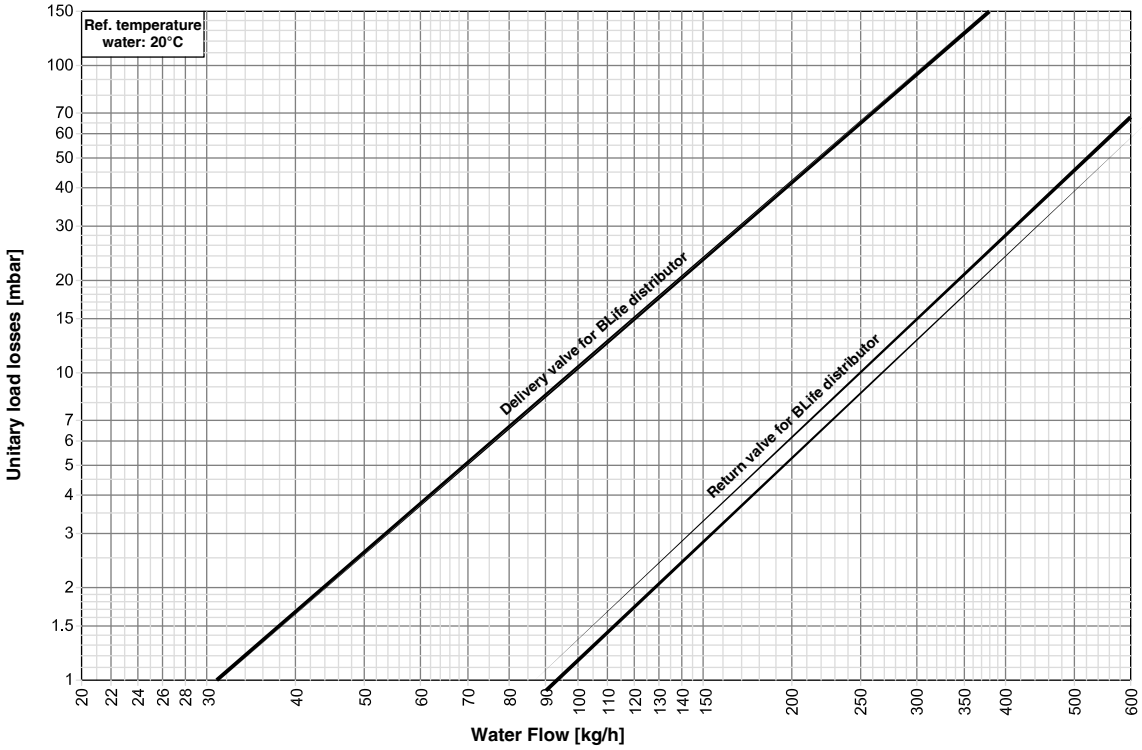
4.6.4 20-20 straight fitting



4.6.5 Fitting – 90° elbow 20-20



4.6.6 BLife manifold – pressure valve and return holder



5. THERMAL OUTPUT

The BLife ceiling radiant system heats and cools rooms exchanging heat. Its thermal output is variable depending on several factors:

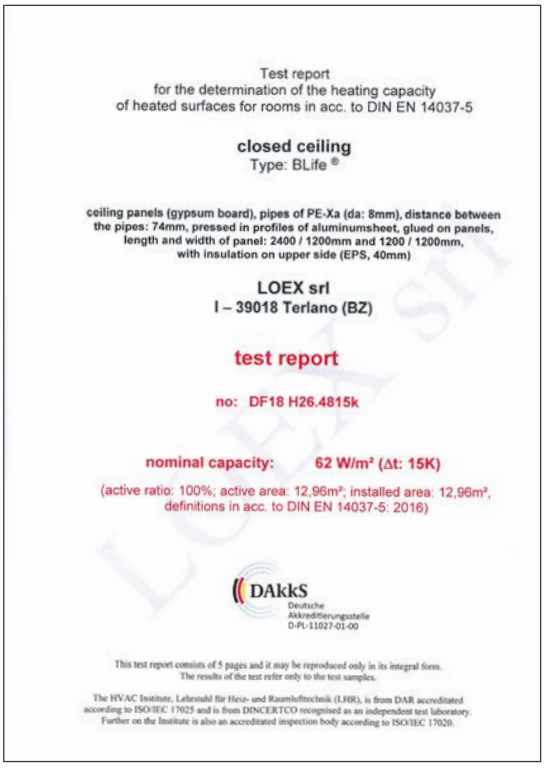
- percentage of active surface;
- water temperature;
- room temperature.

5.1 CERTIFICATION OF THERMAL OUTPUTS

The thermal output of a radiant system, which is indicated in the documentation, must be that which the radiant system is effectively able to supply under pre-established conditions. Furthermore, for greater protection of the designer, installer and end/final costumer, it is important that these values are determined and verified by a third party that can certify them independently.

To determine the thermal output of the BLife ceiling radiant system, the tests are made in HLK (Heizung, Luftung Klimatechnik) laboratories from the University of Stuttgart, concretely measuring the thermal exchange between the radiant system and the environment according to the modalities foreseen by the EN 14037 e EN 14240 norms. This modality guarantees that the declared values correspond to the effective performance of the system.

BLIFE SYSTEM		
Operation mode	**Heating**	**Cooling**
Reference legislation	EN 14037-5	EN 14240
No. test report (HLK Stuttgart)	DF18 H26.4815	VF18 K26.4814
Water/nominal-environment temperature difference	ΔT: 15°C	ΔT: 8°C
Nominal thermal output	**62 W/m²**	**45 W/m²**



Test report
for the determination of the heating capacity
of heated surfaces for rooms in acc. to DIN EN 14037-5

closed ceiling
Type: BLife ®

ceiling panels (gypsum board), pipes of PE-Xa (da: 8mm), distance between the pipes: 74mm, pressed in profiles of aluminumsheet, glued on panels, length and width of panel: 2400 / 1200mm and 1200 / 1200mm, with insulation on upper side (EPS, 40mm)

LOEX srl
I – 39018 Terlano (BZ)

test report

no: DF18 H26.4815k

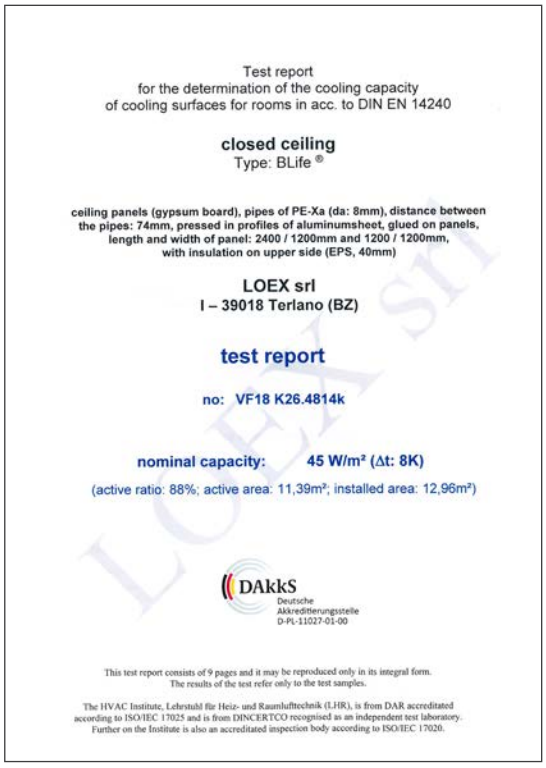
nominal capacity: 62 W/m² (Δt: 15K)

(active ratio: 100%; active area: 12,96m²; installed area: 12,96m², definitions in acc. to DIN EN 14037-5: 2016)

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11027-01-00

This test report consists of 5 pages and it may be reproduced only in its integral form.
The results of the test refer only to the test samples.

The HVAC Institute, Lehrstuhl für Heiz- und Raumlufttechnik (LHR), is from DAR accreditated according to ISO/IEC 17025 and is from DINCERTCO recognised as an independent test laboratory. Further on the Institute is also an accreditated inspection body according to ISO/IEC 17020.



Test report
for the determination of the cooling capacity
of cooling surfaces for rooms in acc. to DIN EN 14240

closed ceiling
Type: BLife ®

ceiling panels (gypsum board), pipes of PE-Xa (da: 8mm), distance between the pipes: 74mm, pressed in profiles of aluminumsheet, glued on panels, length and width of panel: 2400 / 1200mm and 1200 / 1200mm, with insulation on upper side (EPS, 40mm)

LOEX srl
I – 39018 Terlano (BZ)

test report

no: VF18 K26.4814k

nominal capacity: 45 W/m² (Δt: 8K)

(active ratio: 88%; active area: 11,39m²; installed area: 12,96m²)

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11027-01-00

This test report consists of 9 pages and it may be reproduced only in its integral form.
The results of the test refer only to the test samples.

The HVAC Institute, Lehrstuhl für Heiz- und Raumlufttechnik (LHR), is from DAR accreditated according to ISO/IEC 17025 and is from DINCERTCO recognised as an independent test laboratory. Further on the Institute is also an accreditated inspection body according to ISO/IEC 17020.

5.2 THERMAL OUTPUT TABLES

The following tables allow to easily determine the thermal output of the BLife® system basing on the water delivery temperature and on the design room temperature.
If someone wants to determine more accurately the thermal output of the system or the water temperature, it is necessary to refer to the output diagrams in chapter 5.3.

5.2.1 Heating

		WATER DELIVERY TEMPERATURE (°C)									
		25,0		30,0		35,0		40,0		45,0	
		Output	Surface temp.	Output	Surface temp.	Output	Surface temp..	Output	Surface temp.	Output	Surface temp.
		(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)
ROOM TEMPERATURE (°C)	15,0	31,5	19,8	53,3	23,2	75,9	26,7	99,0	30,2	122,5	33,9
	16,0	27,3	20,2	48,9	23,5	71,3	27,0	94,4	30,5	117,8	34,1
	17,0	23,1	20,5	44,5	23,8	66,8	27,3	89,7	30,8	113,1	34,4
	18,0	18,9	20,9	40,1	24,2	62,3	27,6	85,1	31,1	108,4	34,7
	19,0	14,9	21,3	35,8	24,5	57,8	27,9	80,5	31,4	103,7	35,0
	20,0	**10,9**	**21,7**	**31,5**	**24,8**	**53,3**	**28,2**	**75,9**	**31,7**	**99,0**	**35,2**
	21,0	7,0	22,1	27,3	25,2	48,9	28,5	71,3	32,0	94,4	35,5
	22,0	3,3	22,5	23,1	25,5	44,5	28,8	66,8	32,3	89,7	35,8
	23,0	0,0	23,0	18,9	25,9	40,1	29,2	62,3	32,6	85,1	36,1
	24,0	0,0	24,0	14,9	26,3	35,8	29,5	57,8	32,9	80,5	36,4
	25,0	0,0	25,0	10,9	26,7	31,5	29,8	53,3	33,2	75,9	36,7

*Calculation with a temperature difference between delivery and return equal to 4.0°C
The values highlighted in red exceed the limit output indicated in the ISO EN UNI 11855 norm

5.2.2 Cooling

		WATER DELIVERY TEMPERATURE (°C)									
		10,0		12,0		14,0		16,0		18,0	
		Output	Surface temp.	Output	Surface temp.	Output	Surface temp..	Output	Surface temp.	Output	Surface temp.
		(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)	(W/m²)	(°C)
ROOM TEMPERATURE (°C)	21,0	50,7	16,4	38,6	17,5	26,8	18,6	15,3	19,6	4,6	20,6
	22,0	56,9	16,8	44,6	17,9	32,6	19,0	21,0	20,1	9,9	21,1
	23,0	63,1	17,3	50,7	18,4	38,6	19,5	26,8	20,6	15,3	21,6
	24,0	69,4	17,7	56,9	18,8	44,6	19,9	32,6	21,0	21,0	22,1
	25,0	75,7	18,1	63,1	19,3	50,7	20,4	38,6	21,5	26,8	22,6
	26,0	**82,1**	**18,5**	**69,4**	**19,7**	**56,9**	**20,8**	**44,6**	**21,9**	**32,6**	**23,0**
	27,0	88,5	19,0	75,7	20,1	63,1	21,3	50,7	22,4	38,6	23,5
	28,0	94,9	19,4	82,1	20,5	69,4	21,7	56,9	22,8	44,6	23,9
	29,0	101,4	19,8	88,5	21,0	75,7	22,1	63,1	23,3	50,7	24,4
	30,0	107,9	20,2	94,9	21,4	82,1	22,5	69,4	23,7	56,9	24,8
	31,0	114,4	20,6	101,4	21,8	88,5	23,0	75,7	24,1	63,1	25,3

*Calculation with a temperature difference between delivery and return equal to 4.0°C
The minimum surface temperature (lower than the medium indicated one) must always be higher than the dew temperature of the environment to avoid the formation of surface condensation.

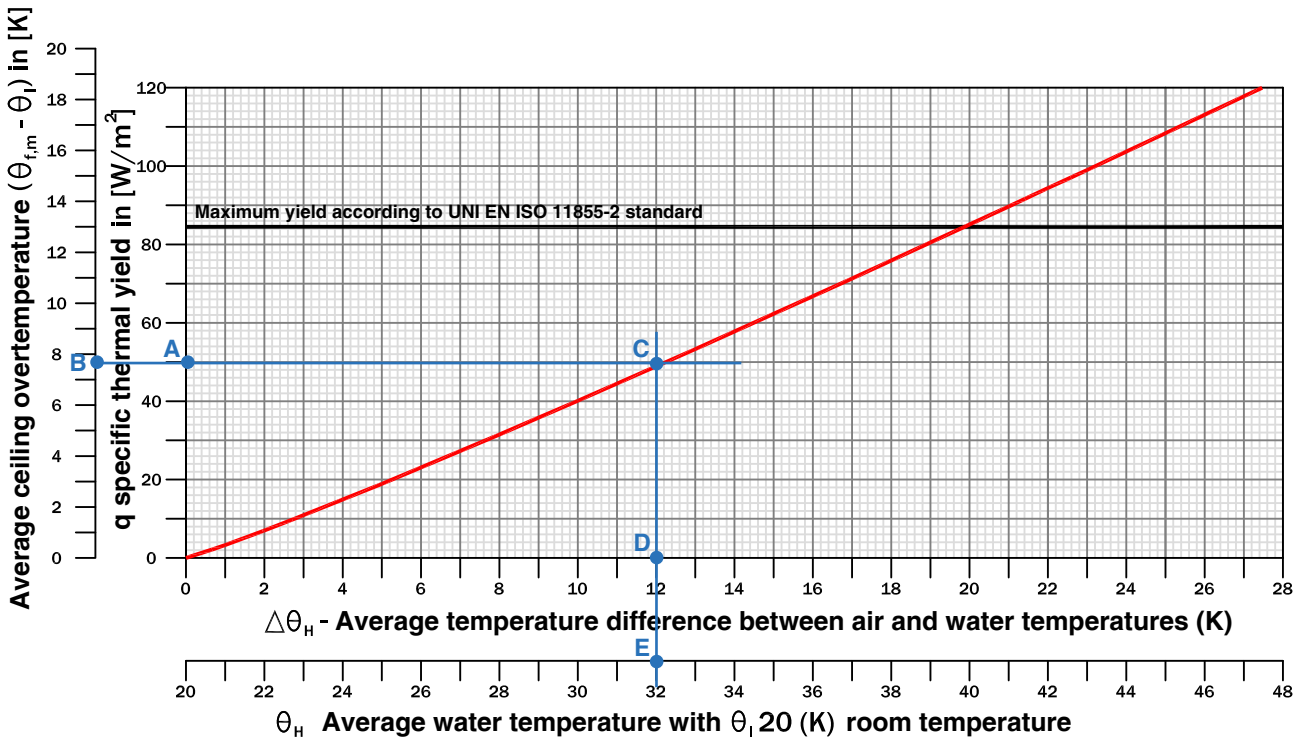
ATTENTION !!!
The thermal output values refer only to the active surface

5.3 THERMAL OUTPUT DIAGRAMS

The thermal output diagrams represent the typical performance of the BLife ceiling radiant system and allow the calculation of the system sizing parameters putting in relation the following quantities: over and under medium water temperature, medium surface temperature and thermal output to the environment. The diagrams can be used in different ways.

For example, it is possible to determine the thermal output that can be obtained with a specific water temperature; or it can be determined which water temperature is necessary to satisfy the required (output) demand.

5.3.1 Example of using the thermal output diagram in heating mode



5.3.2 Example of using the thermal output diagram in cooling mode

In the example below, the goal is to determine the thermal output of the BLife system supplying the system with medium water temperature of 16°C (for example with delivery 14°C and return 18°C).

A) After having identified the 16°C value on the horizontal scale, it is necessary to draw a vertical line upward;

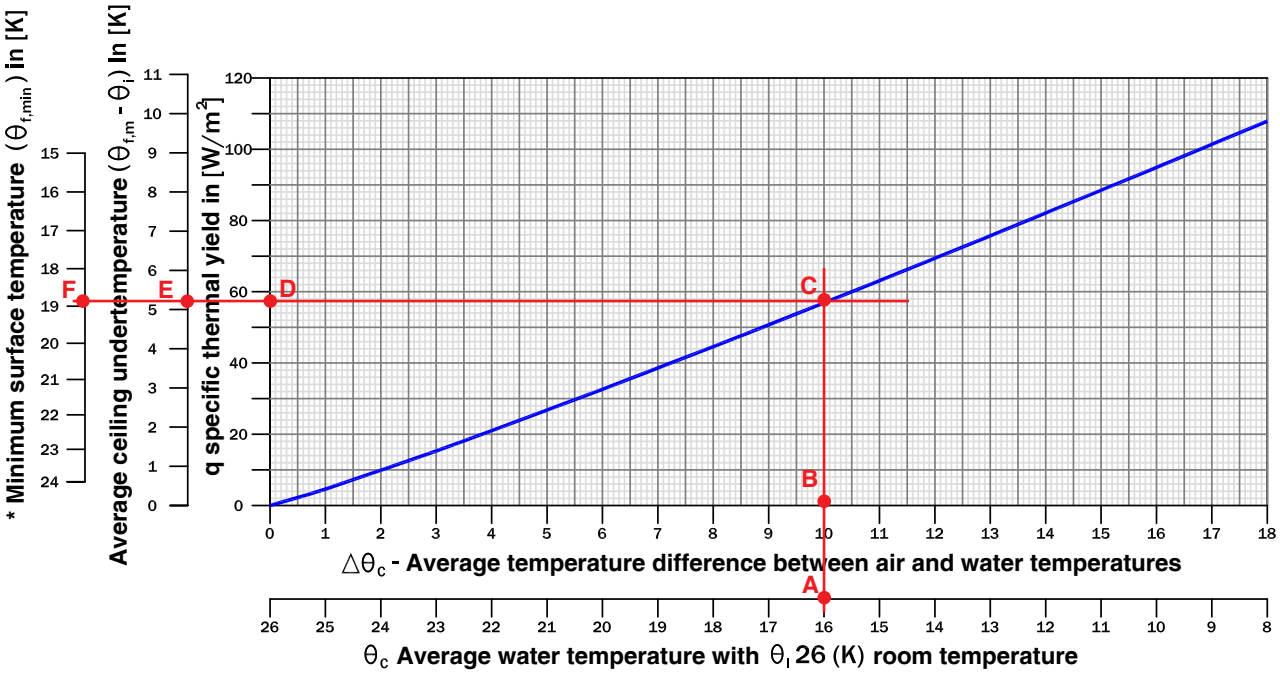
B) On the over horizontal scale, it is necessary to identify the difference between the medium water temperature and the environment equal to 10°C;

C) From the intersection of the line drawn with the blue line (C) a horizontal line is drawn on the left;

D) On the first vertical scale, the thermal output equal to 57 W/m^2 is identified;

E) On the second vertical scale, the medium under temperature of the ceiling is identified compared to the environment equal to 5,1°C and, consequently, the medium ceiling temperature of 26 – 5,1 = 20,9°C;

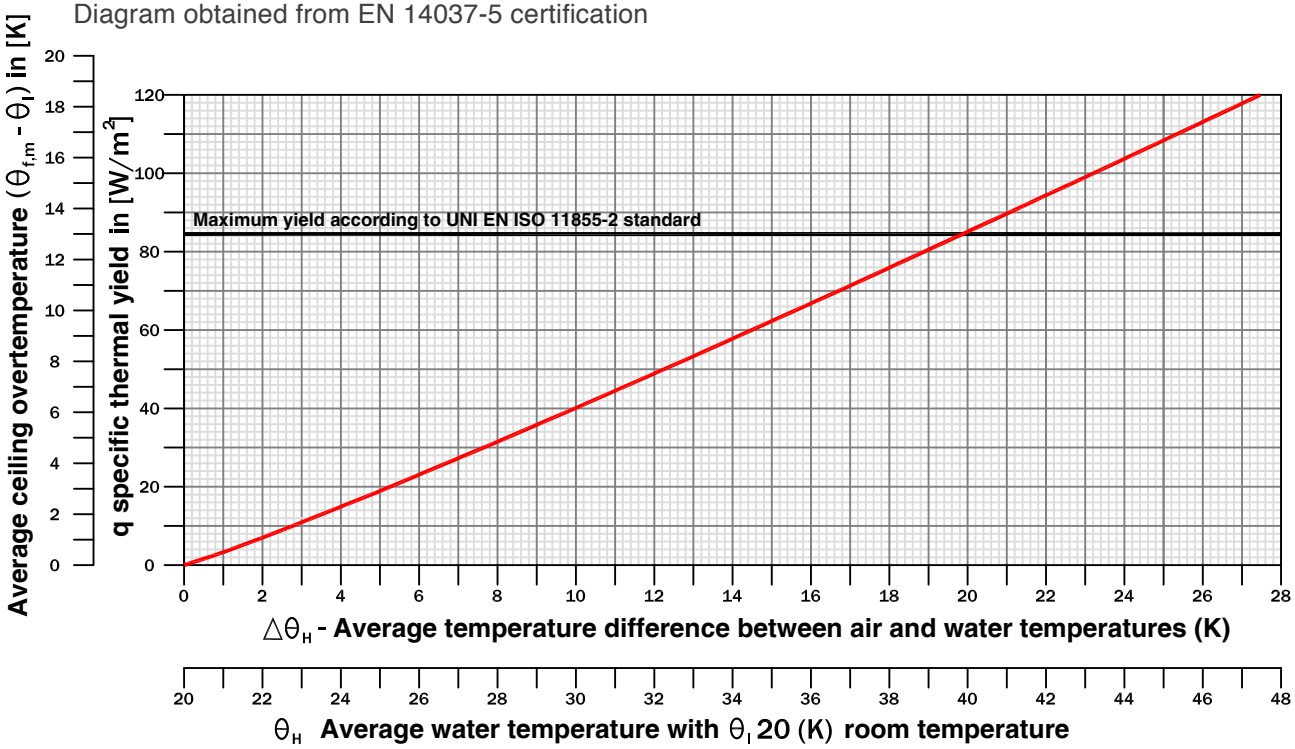
F) On the third vertical scale, the minimum ceiling temperature value near the delivery piping of the circuits is identified. The room condensation temperature must always be lower than this value of at least 1,0°C.



5.3.3 Thermal output diagrams in heating

Heating

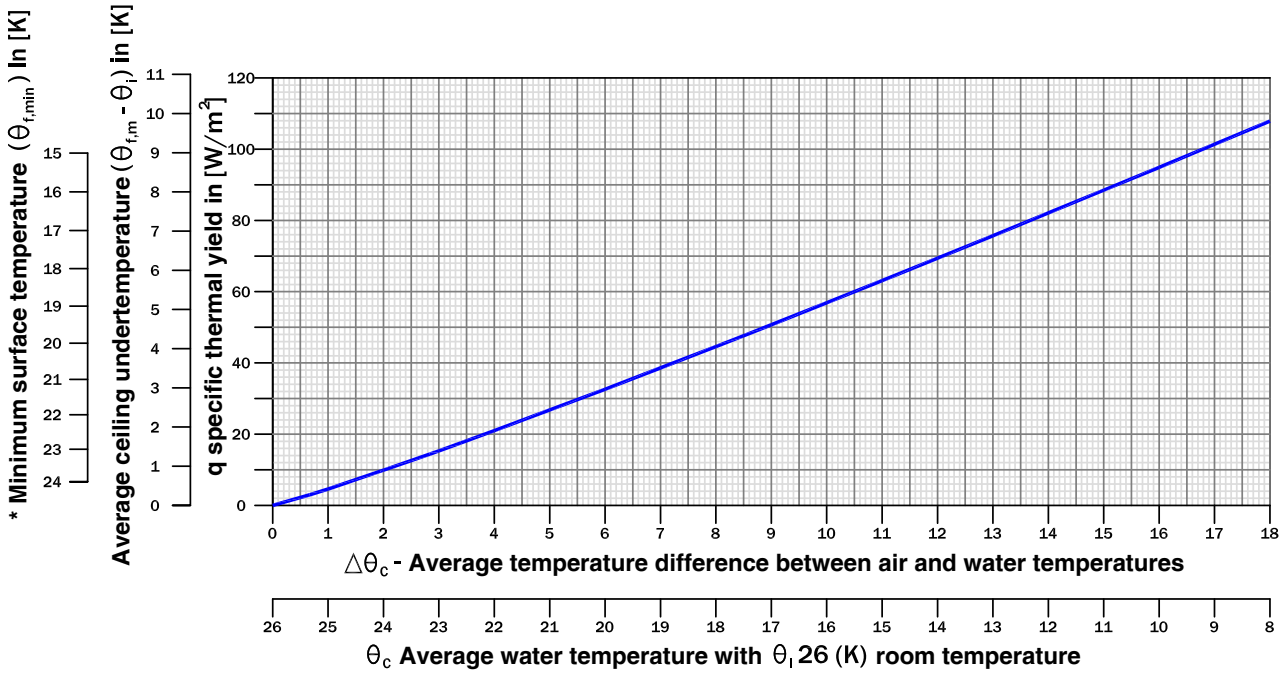
Sizing diagram of BLife system
Diagram obtained from EN 14037-5 certification



5.3.4 Thermal output diagrams in cooling

Cooling

Sizing diagram of BLife system
Diagram obtained from EN 14240 certification



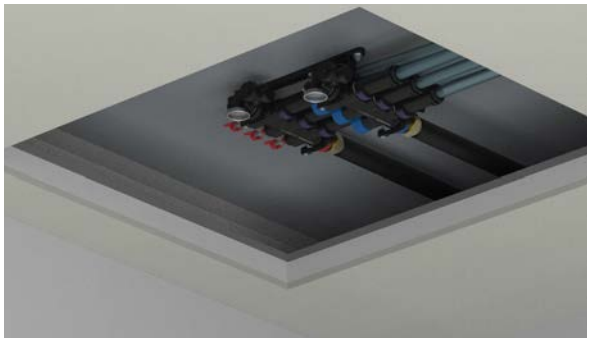
* Minimum temperature on the vertical of the first tabulation with room temperature of 26°C and difference between delivery and return of 4°C (it is necessary to use it to verify the absence of condensation)

6. INSTALLATION

The installation of the BLife ceiling radiant system requires skills characterized by technical abilities of different professional figures: plasterboard and hydraulic installers, who must coordinate themselves and alternate in the mounting sequence.
The following indications are of a general nature. For further details please require the installation instructions of the BLife system to our sales network or visit the website: **www.loex.it**

6.1 BLife MANIFOLD

First of all, the hydraulic installer must install the BLife manifold in the position defined in the project and connect it to the supply lines coming from the thermal power plant.
Please note that the BLife manifold must always be accessible. Therefore, if it is positioned inside the false ceiling, an opening hatch must be foreseen. Before the next phase, must be installed any other equipment that will be contained in the false ceiling (dehumidifiers, channels, electrical lines etc.).



6.2 SUPPORT STRUCTURE

The false ceiling installer places the support structure consisting of the hanging system and the load-bearing profiles. The structure must have the characteristics indicated in chapter 4.3 and is based on the arrangement of the BLife active panels indicated on the layout of the system.
After having drawn the precise height of the structure, the first element to install is the edge strip that must be mounted on the entire perimeter of rooms and also around the elevated structures that will cross the false ceiling (for example the columns). Afterwards, the perimeter C profile, the hanging system and the double or single supporting structure are installed.

6.3 SUPPLY LINES

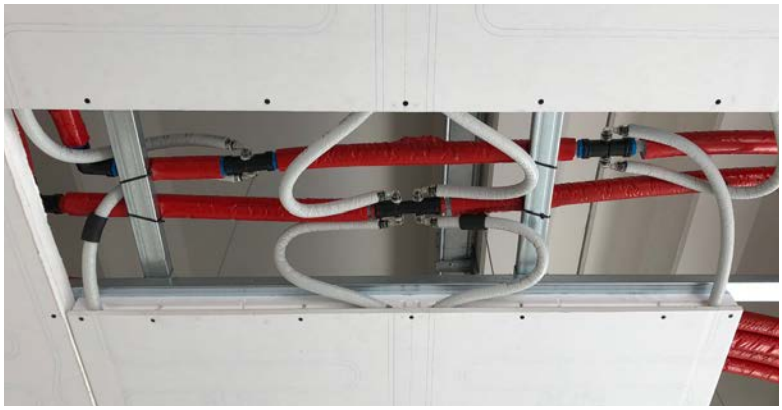
If it is foreseen that the supply lines are positioned above the support structure to simplify the installation, it is advisable to place them following the installation scheme of the system before proceeding with the following steps.

6.4 BLife ACTIVE PANELS

The false ceiling installer fixes to the supporting structure the BLife active panels in the position indicated on the system installation scheme. The fixings to the structure must only take place at the points indicated.

6.5 CONNECTION BETWEEN BLife ACTIVE PANELS

Once the active panels have been positioned, the hydraulic installer connects the panels circuits to the supply line using the different types of BLife fittings.
For a stable and reliable connection, please consult the installation instructions of the BLife system.



At the end of the connection of all active panels, before proceeding with the following steps, the hydraulic installer must carry out the leak test of the system according to the ISO EN UNI 11855 norm with air or water at a pressure between 4,0 and 6,0 bar. A report must be drawn up for this test.

6.6 DABBING, GROUTING AND SHAVING

After having checked the hydraulic leak of the system, the false ceiling installer places the BLife passive and neutral panels to block the false ceiling.
The finish ends with the grouting and shaving of the surface that precede the final painting of the product.

LOEX
comfort technology

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NEW RADIANT SYSTEMS

The widespread tendency to obtain consistent energy savings (in any mode of use) may explain the increasing interest in low temperature heating and cooling systems, now recognized as the most ecological and comfortable among the environmental heat diffusion systems.

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