LEONARDO

Plasterboard climate ceiling

COMFORTABLE AND ENERGY-EFFICIENT

SUSTAINABLE CLIMATE CONCEPT

CREATIVE POSSIBILITIES

www.leonardosolutions.be

The revolutionary climate ceiling

- Pipes integrated into the plasterboard
- Easy assembly due to the modular system
- Performance tested in the WSP Lab in Stuttgart
- Fittings without O-rings for long-lasting water-tightness

The Leonardo climate ceiling offers a range of possibilities. The system consists of modular plasterboards into which 10 x 1.3 mm pipes are integrated in a winding pattern* to make the heat transfer area between the pipes and the plasterboard as large as possible. Each board consists of two circuits.
An EPS insulation board that ensures high thermal performance is fitted to the plasterboard.

*With the exception of System 3.5, Lux and Acoustic

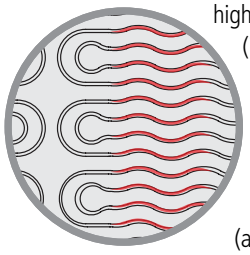
WSP Lab

Certified system

Standardised heating and
cooling performance according to
EN 14037-5 - EN 14240

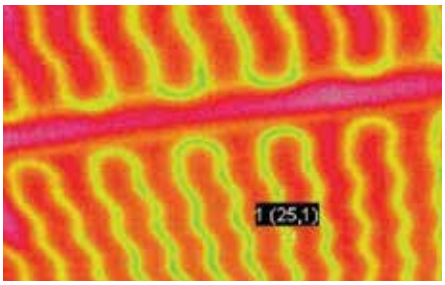
ENERGY-EFFICIENT

The climate ceiling is designed to make the active part of the ceiling (the area that can heat and cool the space) as large as possible. In this way the ceiling guarantees substantial energy savings. In the winter a traditional radiator, because of its limited surface area, needs a high supply temperature (70°C). Because a radiant system transfers the heat over a larger surface area, the supply temperature is lower (approximately 32°C) and operating costs drop.

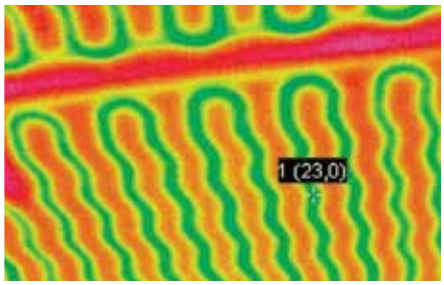


LOW THERMAL INERTIA

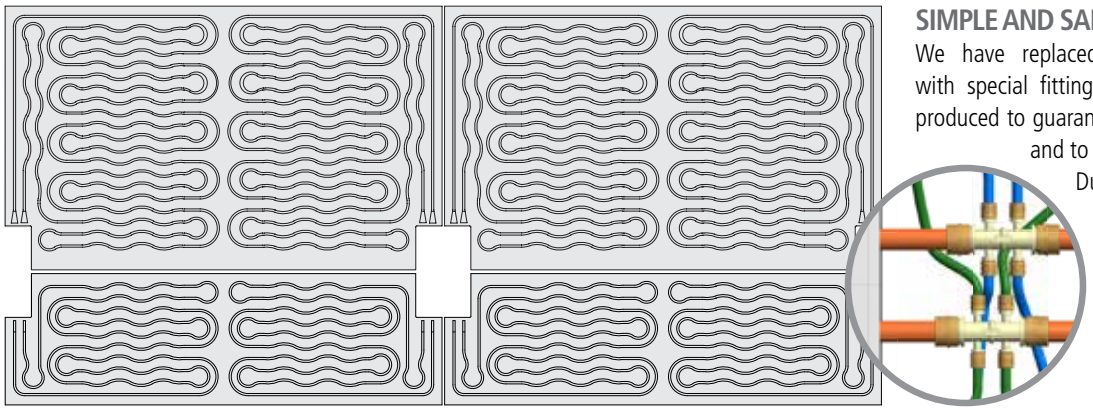
The diameter and thickness of the pipes used (10 x 1.3 mm), the integration of the pipes into the plasterboard and the special winding pattern of the pipes ensure a high-performance climate ceiling with a very low thermal inertia. Below you see two thermal images of the climate ceiling in cooling mode with an average water temperature of 18°C. As you see, the system has already reached its full capacity after barely 20 minutes.



5 minutes after start-up



20 minutes after start-up

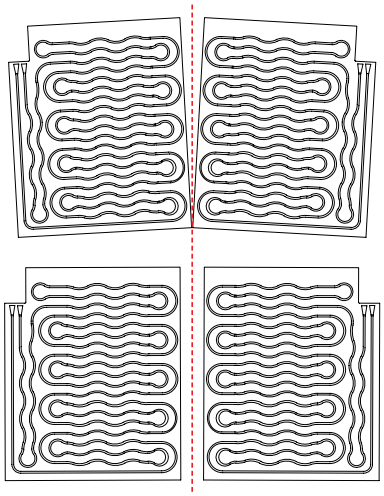


SIMPLE AND SAFE INSTALLATION

We have replaced the traditional O-rings with special fittings. They are designed and produced to guarantee lasting water-tightness and to limit pressure loss.

Due to the design of these fittings you can make pipe connections with the right clamps very simply and quickly, so that installation requires less time.

FLEXIBLE AND MODULAR



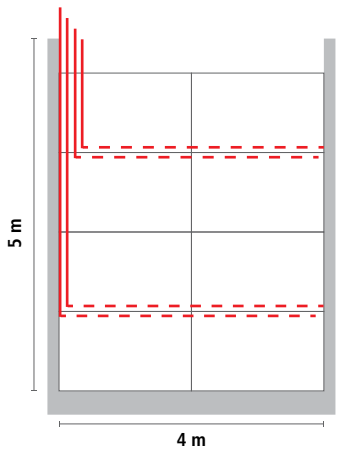
Every system board can be divided into two smaller boards because they each contain two circuits.
So you can cut the plasterboard into two mirror-image parts, each with its own pipes.

10 X 1.3 MM PIPE

Traditional pipe
8 x 1.1 mm

Pipe
10 x 1.3 mm

1. fitting ring
2. fitting
3. fitting ring
4. end piece (fitting (2) + end piece)



*Estimated values for a 20 m² living area.

MAXIMUM ACTIVE SURFACE AREA

In comparison with a traditional climate ceiling (~72%*), the Leonardo climate ceiling can maximise the active surface area (to 96%*) because the pipes are integrated. A larger active surface area ensures more uniform heating or cooling and so more comfort too.

72%* **traditional** climate ceiling

96%* **Leonardo** climate ceiling

Leonardo climate ceilings

Composition

LEO **10**

Insulation	EPS
Finish	plasterboard
Pipe	10x1.3 mm
Pipe distance	**10 cm**
System board thickness	**50 mm**

LEO **5.5**

Insulation	Graphite sintered EPS
Finish	plasterboard
Pipe	10x1.3 mm
Pipe distance	**5.5 cm**
System board thickness	**50 mm**

LEO **HYDRO**

Insulation	Graphite sintered EPS
Finish	water-resistant plasterboard
Pipe	10x1.3 mm
Pipe distance	**5.5 cm**
System board thickness	**50 mm**

LEO **LUX**

Insulation	Graphite sintered EPS
Finish	plasterboard
Pipe	10x1,3 mm
Pipe distance	**5.5 cm**
System board thickness	**50 mm**

LEO **3.5**

Insulation	Graphite sintered EPS
Finish	plasterboard
Pipe	10x1.3 mm
Pipe distance	**3.5 cm**
System board thickness	**50 mm**

LEO **3.5 HIGH PERFORMANCE**

Insulation	Graphite sintered EPS
Finish	plasterboard with graphite
Pipe	10x1.3 mm
Pipe distance	**3.5 cm**
System board thickness	**50 mm**

LEO **RF**

Insulation	glaswol
Finish	plasterboard
Pipe	10x1.3 mm
Pipe distance	**5.5** | **10 cm**
System board thickness	**65 mm**

LEO **ACOUSTIC**

Insulation	verpakte rotswol tegels*
Finish	- perforated plasterboard - acoustic fleece - perforated plasterboard
Pipe	10x1.3 mm
Pipe distance	**6 cm**
System board thickness	**25 mm**

LEO **HIGH PERFORMANCE ACOUSTIC**

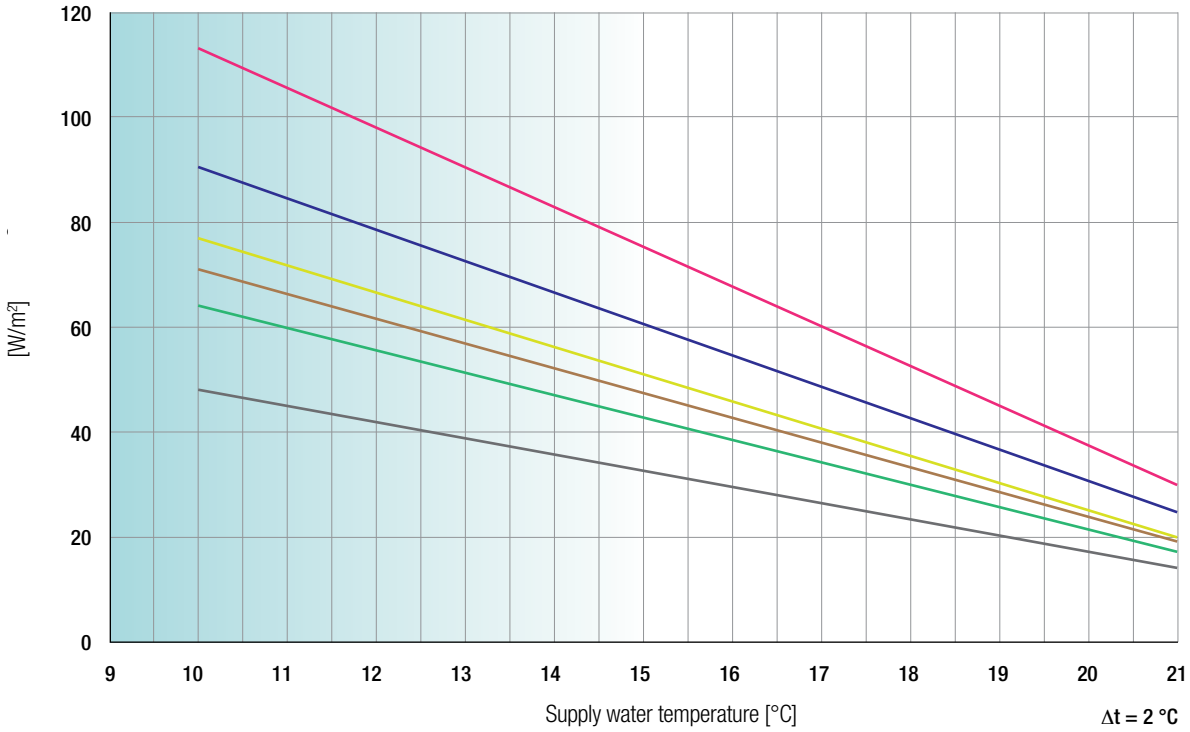
Insulation	verpakte rotswol tegels*
Finish	- akoestisch vlies - perforated plasterboard - acoustic fleece - perforated plasterboard with graphite
Pipe	10x1.3 mm
Pipe distance	**6 cm**
System board thickness	**22,5 mm**

*Optional insulation not included

Power output in cooling and heating

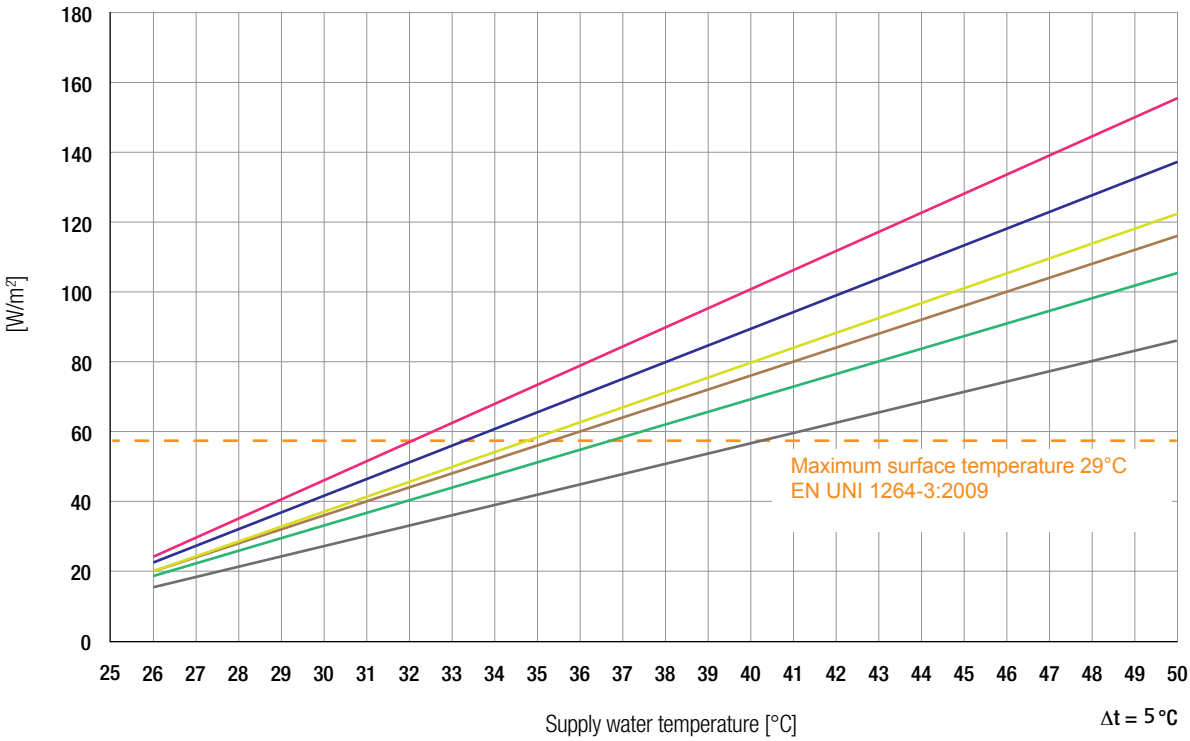
Cooling

Curves have been derived from the power reports according to UNI EN 14240:2005 in cooling mode WSPLab



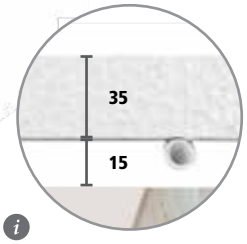
Heating

Curves have been derived from the power reports according to prEN 14037-5:2011 in heating mode WSPLab



LEO **5.5**
LEO **5.5 HYDRO**
LEO **LUX**
LEO **10**
LEO **3.5 HIGH PERFORMANCE**
LEO **3.5**
LEO **RF 5.5**
LEO **RF 10**
LEO **ACOUSTIC**
LEO **HIGH PERFORMANCE ACOUSTIC**

Leo 10 Climate Ceiling



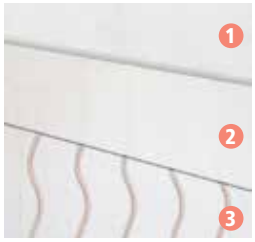
dimensions in millimetres

Insulation	λ_D [W/mK]*	Thickness [mm]	Weight [kg/m2]**	Pipe [mm]	Pipe distance [cm]
EPS	**0.035**	**15+35**	**~13**	**10x1.3**	**10**
plasterboard					

*refers to the EPS layer

** weight of the board with water in the pipes

The Leo 10 climate ceiling consists of a 15 mm plasterboard combined with a 35 mm EPS board. The total thickness is 50 mm. Pipes are integrated into the plasterboard. These are constructed of 5 layers of polyethylene and an EVOH oxygen diffusion barrier. To allow heat transfer to take place optimally, the lines are integrated into the boards in a winding pattern. The distance between the lines is 10 cm.



1. EPS insulation board
2. Plasterboard
3. MidiX Plus 10X1.3 mm pipe with 10 cm pipe distance

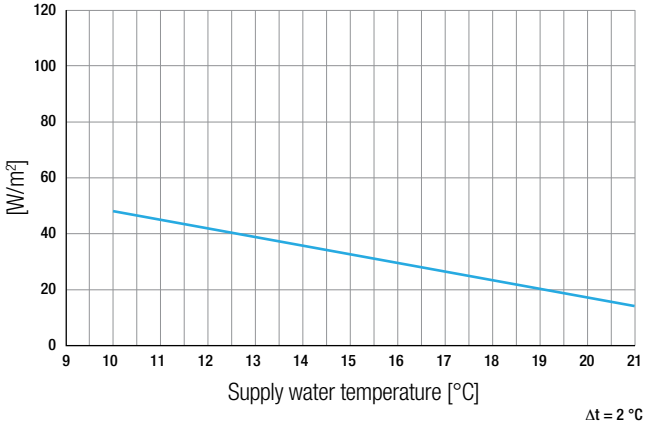
Assembly

Consult the Knauf D11 technical datasheet for the composition of the metal substructure.
We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure.
It is advisable to use 60 mm-wide C profiles in assembly. To facilitate assembly, it is best to maintain a minimum height of 15 cm between the ceiling and the fully assembled product.

Cooling

WSPLab

Curves derived from the output certificates according to UNI EN 14240:2005 in cooling mode

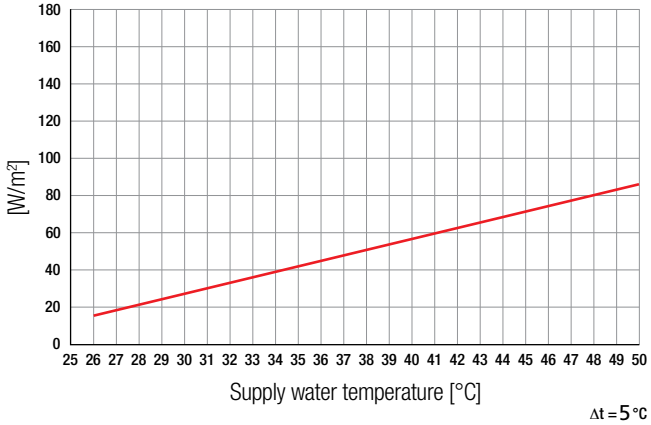


Δt = 2 °C

Heating

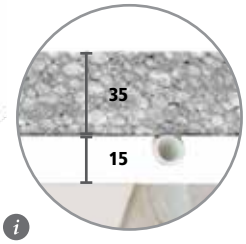
WSPLab

Curves derived from the output certificates according to prEN 140375:2011 in heating mode



Δt = 5 °C

Leo 5.5/Leo 5.5 Hydro Climate Ceiling



afmetingen in **millimeter**

Insulation	λ_D [W/mK]*	Thickness [mm]	Weight [kg/m²]**	Pipe [mm]	Pipe distance [cm]
EPS + graphite	**0.030**	**15+35**	**~13**	**10x1.3**	**5.5**
plasterboard					

* refers to the EPS layer

**weight of the board with water in the pipes

The Leo 5.5 climate ceiling consists of a 15 mm plasterboard combined with a 35 mm EPS board equipped with graphite for a total thickness of 50 mm. Pipes are integrated into the plasterboard. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. To allow heat transfer to take place optimally, the pipes are integrated into the boards in a winding pattern. The distance between the pipes is 5.5 cm. The system is also available in a water-resistant version (HYDRO) with plasterboards that are resistant to moisture.

LEO 5.5

1. EPS insulation board with graphite
2. Plasterboard
3. 10 x 1.3 mm pipe with 5.5 cm pipe distance

LEO 5.5 HYDRO

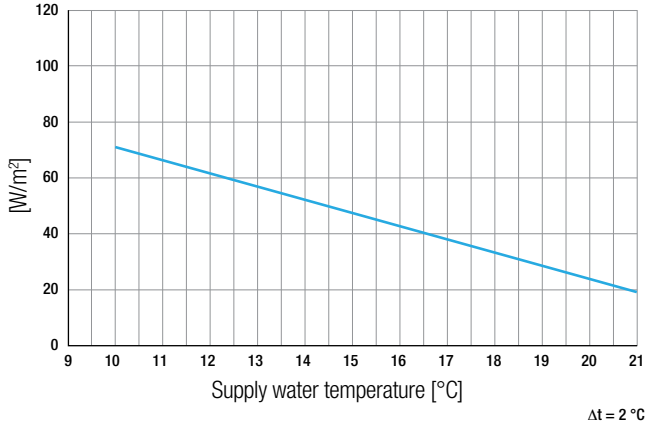
1. EPS insulation board with graphite
2. Water-resistant plasterboard
3. 10 x 1.3 mm pipe with 5.5 cm pipe distance

Consult the Knauf D11 technical datasheet for the composition of the metal substructure.
We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure.
It is advisable to use 60 mm-wide C profiles in assembly. To facilitate assembly, it is best to maintain a minimum height of 15 cm between the ceiling and the fully assembled product.

Cooling

WSP Lab

Curves derived from the output certificates according to UNI EN 14240:2005 in cooling mode

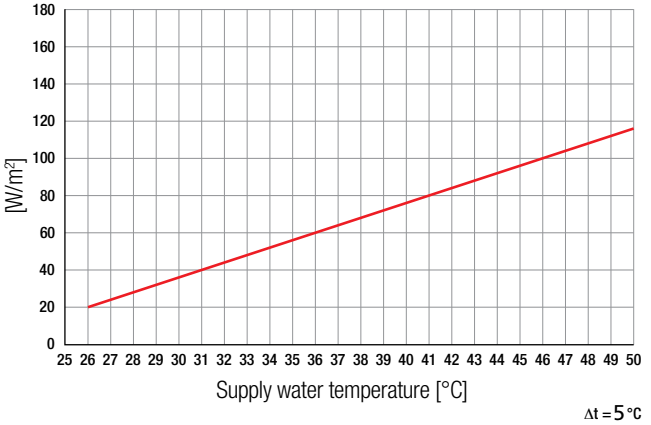


Δt = 2 °C

Heating

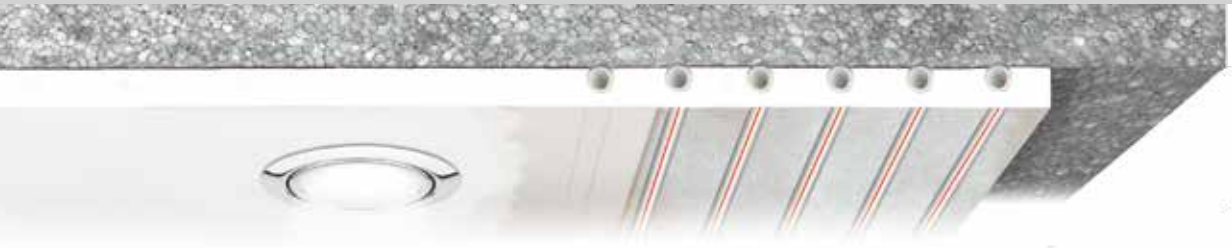
WSP Lab

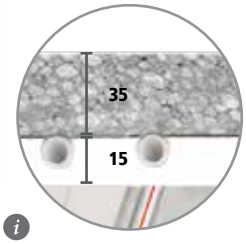
Curves derived from the output certificates according to prEN 140375: 2011 in heating mode



Δt = 5 °C

Leo **Lux** Climate Ceiling

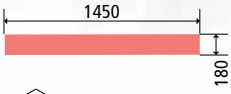


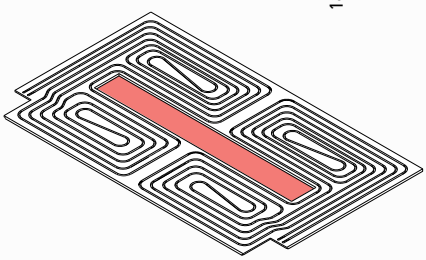


dimensions in millimetres

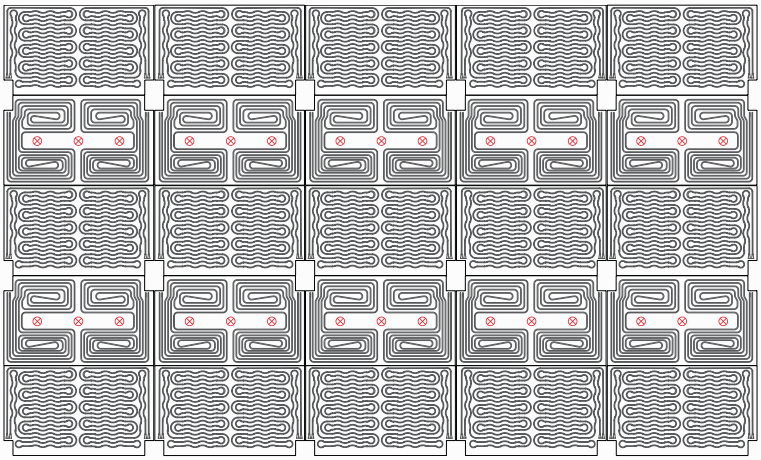
The Leo Lux Climate Ceiling guarantees greater design flexibility, so you can quickly and easily integrate lighting fixtures, air vents, etc. into the area where there are no pipes. This passive area measures 1450 mm x 180 mm.

The Leo Lux Climate Ceiling consists of a 15 mm plasterboard combined with a 35 mm EPS board equipped with graphite for a total thickness of 50 mm. Pipes are integrated into the plasterboard. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. To allow heat transfer to take place optimally, the pipes are integrated into the boards in a spiral pattern. The distance between the pipes is 5.5 cm.



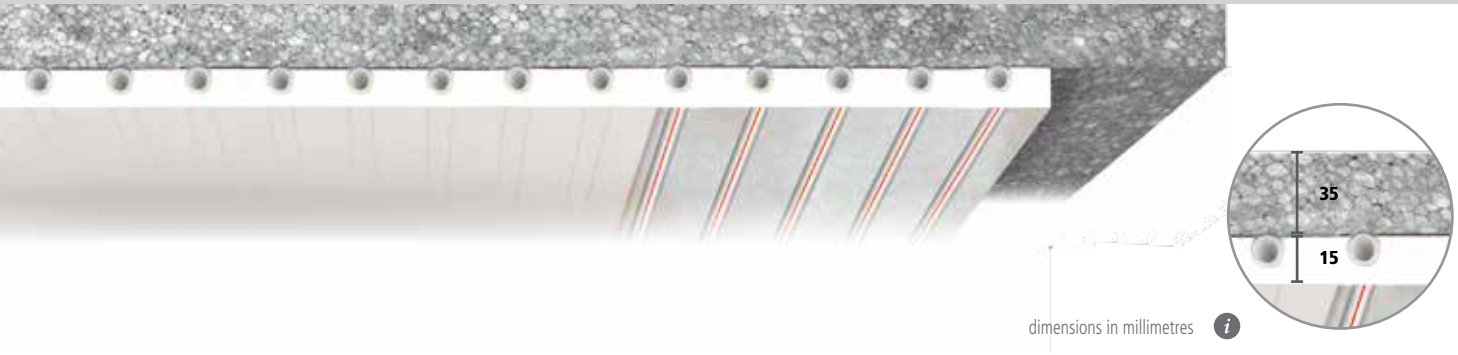


*can be connected to circuits with a pipe distance of 5.5 cm



The adjacent drawing shows a configuration of a climate ceiling with Lux boards for an office space. In an office environment a modular layout with lighting fixtures is a must.

Leo 3.5 Climate Ceiling



dimensions in millimetres

Insulation	λ_D [W/mK]*	Thickness [mm]	Weight [kg/m2]**	Pipe [mm]	Pipe distance [cm]
EPS + graphite plasterboard	**0.030**	**15+35**	**~18**	**10x1.3**	**3.5**

*refers to the EPS layer

**weight of the board with water in the pipes

The Leo 3.5 Climate Ceiling consists of a 15 mm plasterboard combined with a 35 mm EPS board sintered with graphite for a total thickness of 50 mm. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. The PE pipes, which are resistant to high temperatures, are laid out in a spiral pattern with an intermediate distance of 3.5 cm.

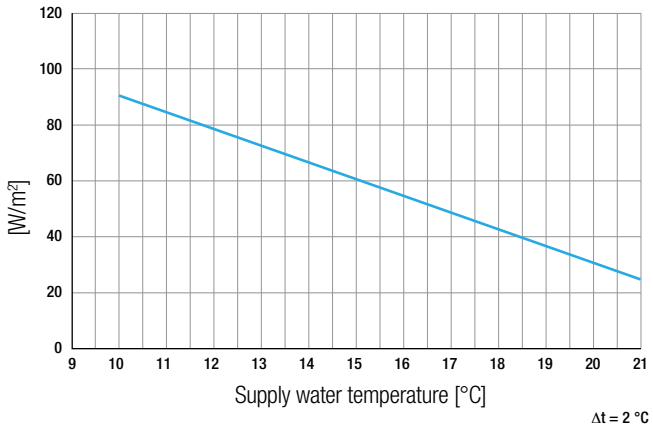
1. EPS insulation board with graphite
2. Plasterboard
3. 10 x 1.3 mm pipe with 3.5 cm pipe distance

The system must be installed perpendicular to the 500 mm axial base line of the base profiles. Consult the Knauf D11 technical datasheet for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly. To facilitate assembly, it is best to maintain a minimum height of 15 cm between the ceiling and the fully assembled product. Use a suitable primer in damp locations.

Cooling

WSP Lab

Power table according to UNI EN 14240:2005

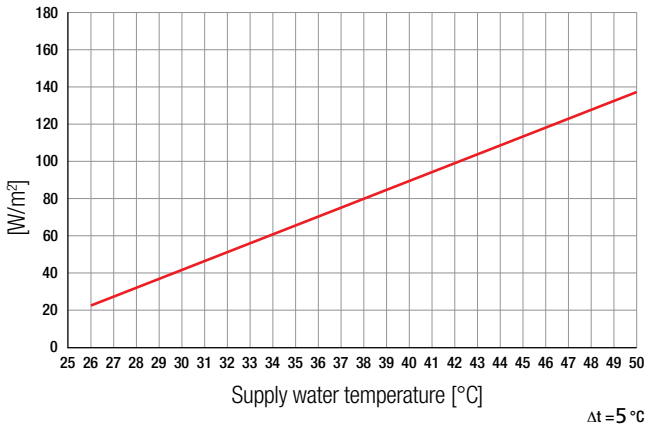


Δt = 2 °C

Heating

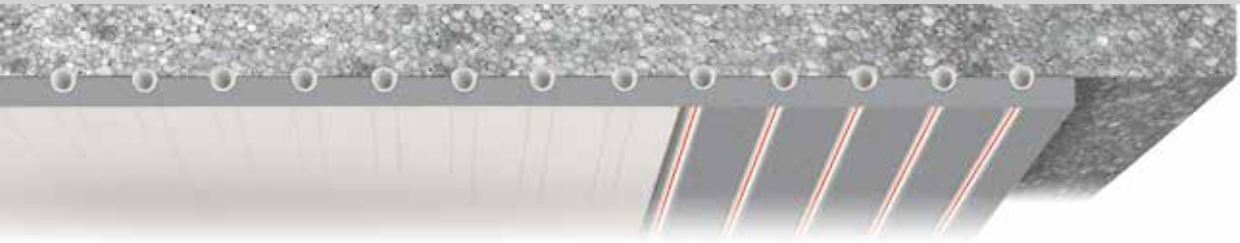
WSP Lab

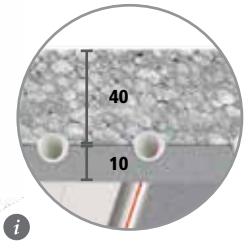
Power table according to prEN 14037-5:2011



Δt = 5 °C

Leo **3.5 High Performance** Climate Ceiling





dimensions in millimetres

Insulation	λ_D [W/mK]*	Thickness [mm]	Weight [kg/m²]**	Pipe [mm]	Pipe distance [cm]
EPS + graphite	**0.030**	**10+40**	**~18**	**10x1.3**	**3.5**
plasterboard + graphite					

*refers to the EPS layer

**weight of the board with water in the pipes

The Leo 3.5 climate ceiling consists of a 10 mm plasterboard with graphite combined with a 40 mm EPS board sintered with graphite for a total thickness of 50 mm. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. To allow heat transfer to take place optimally, the lines are integrated into the boards in a spiral pattern. The distance between the lines is 3.5 cm. The Leo 3.5 High Performance climate ceiling is the most efficient system for both cooling and heating.

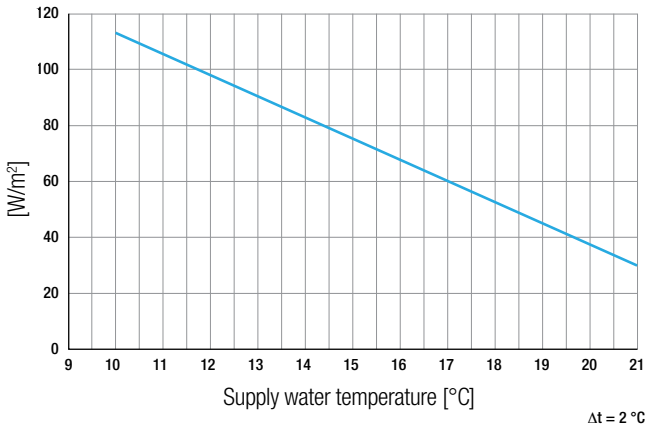
1. EPS insulation board with graphite
2. Plasterboard with graphite
3. 10 x 1.3 mm pipe with 3.5 cm pipe distance

The system must be installed perpendicular to the 500 mm axial base line of the base profiles. Consult the Knauf D11 technical datasheet for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly. To facilitate assembly, it is best to maintain a minimum height of 15 cm between the ceiling and the fully assembled product. Use a suitable primer in damp locations.

Cooling

WSPLab

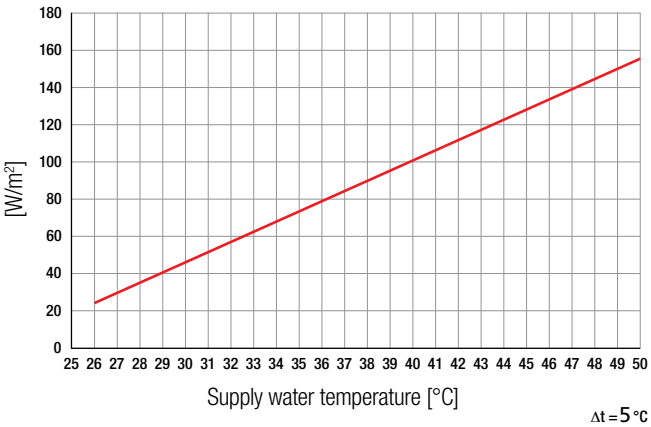
Power table according to UNI EN 14240:2005



Heating

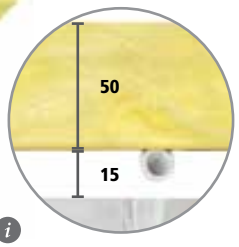
WSPLab

Power table according to prEN 14037-5:2011



Leo RF Climate Ceiling

fire reaction test compliant with UNI EN 13501-1 and EN 13964



dimensions in millimetres

Insulation	λ_D [W/mK]*	Thickness [mm]	Weight [kg/m²]**	Pipe [mm]	Pipe distance [mm]
High-density fibreglass plasterboard	**0.037**	**15+50**	**~19**	**10x1.3**	**5.5 | 10**

*of the fibreglass layer

**weight of the board with water in the pipes

The fire-resistant **Leo RF climate ceiling** consists of a 15 mm plasterboard combined with a 50 mm high-density fibreglass board (fire class A2-s1, d0 in compliance with UNI EN 13501-1) for a total thickness of 65 mm. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. The PE pipes, which are resistant to high temperatures, are laid out in a winding pattern with an intermediate distance of 5.5 or 10 cm to make heat transfer between the pipe and the plasterboard as great as possible.

LEO RF 5.5

1. Insulation board of high-density fibreboard
2. FR plasterboard
3. 10 x 1.3 mm pipe with pipe distance 5.5 cm

LEO RF 10

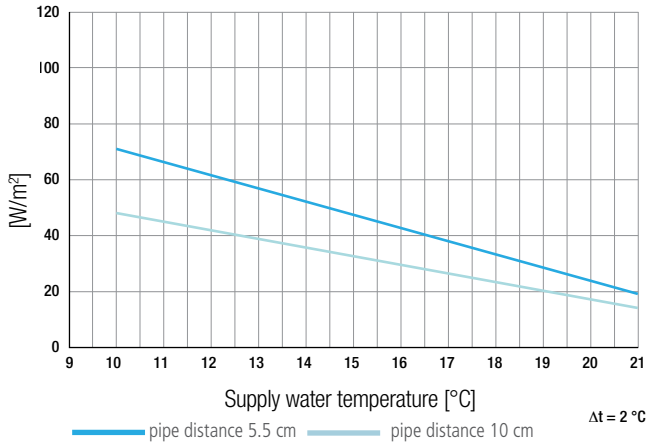
1. Insulation board of high-density fibreboard
2. FR plasterboard
3. 3. 10 x 1.3 mm pipe with pipe distance 10 cm

Consult the Knauf D11 technical datasheet for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly. To facilitate assembly, it is best to maintain a minimum height of 15 cm between the ceiling and the fully assembled product.

Cooling

WSP Lab

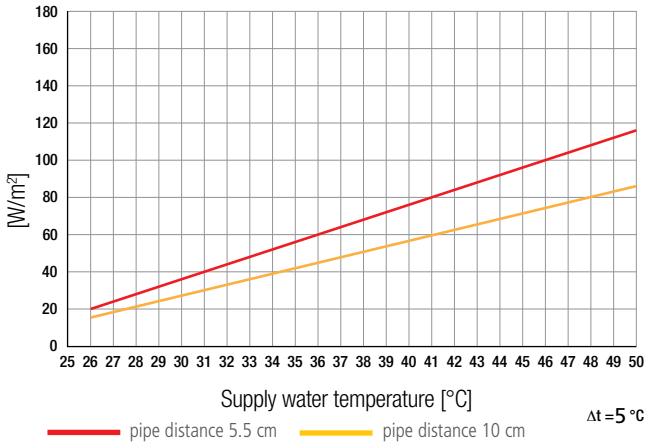
Power table according to UNI EN 14240:2005



Heating

WSP Lab

Power table according to prEN 14037-5:2011

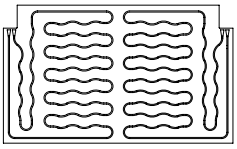


CLIMATE CEILING BOARDS

Insulation | Area | Weight | Length of the circuit

including 10 x 1.3 mm pipe and 20 x 2 mm pipe coupling

LEO **10 CM**



EPS board + plasterboard

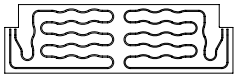
1200x2000x50 mm

EPS | 2.4 m² | 30 kg | 12 m

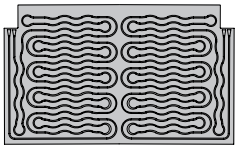
EPS board + plasterboard

600x2000x50 mm

EPS | 1.2 m² | 15 kg | 6 m



LEO **5.5 CM**



EPS board with graphite + plasterboard

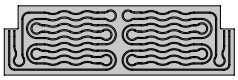
1200x2000x50 mm

EPS graphite | 2.4 m² | 30 kg | 20 m

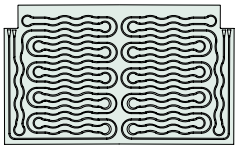
EPS board with graphite + plasterboard

600x2000x50 mm

EPS graphite | 1.2 m² | 15 kg | 10 m



LEO **5.5 CM HYDRO**



EPS board with graphite + water-resistant plasterboard

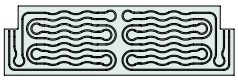
1200x2000x50 mm

EPS graphite | 2.4 m² | 30 kg | 20 m

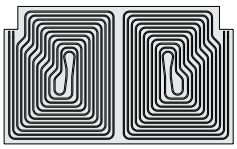
EPS board with graphite + water-resistant plasterboard

600x2000x50 mm

EPS graphite | 1.2 m² | 15 kg | 10 m



LEO **3.5 CM**



EPS board with graphite + plasterboard

1200x2000x50 mm

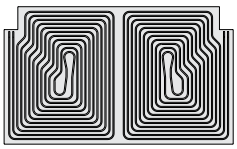
EPS graphite | 2.4 m² | 40 kg | 28 m

EPS board with graphite + plasterboard

600x2000x50 mm

EPS graphite | 1.2 m² | 20 kg | 13 m

LEO **3.5 CM HIGH PERFORMANCE**



EPS board with graphite + plasterboard with graphite

1200x2000x50 mm

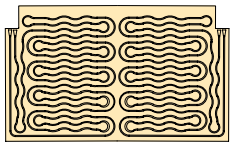
EPS graphite | 2.4 m² | 40 kg | 28 m

EPS board with graphite + plasterboard with graphite

600x2000x50 mm

EPS graphite | 1.2 m² | 20 kg | 13 m

LEO **RF 5.5 CM**



Fibreglass board+ plasterboard

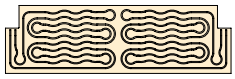
1200x2000x65 mm

Fibreglass | 2.4 m² | 43 kg | 20 m

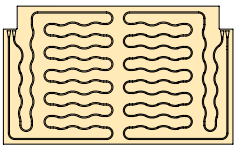
Fibreglass board+ plasterboard

600x2000x65 mm

Fibreglass | 2.4 m² | 21.5 kg | 10 m



LEO **RF 10 CM**



Fibreglass board+ plasterboard

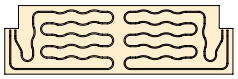
1200x2000x65 mm

Fibreglass | 2.4 m² | 44 kg | 12 m

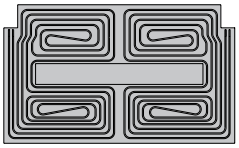
Fibreglass board+ plasterboard

600x2000x65 mm

Fibreglass | 2.4 m² | 22 kg | 6 m



LEO **LUX**



EPS board with graphite + plasterboard

1200x2000x50 mm

EPS graphite | 2.4 m² | 30 kg | 21.2 m

Perfect for the installation of light fixtures, ventilators and other components

PASSIVE BOARDS

EPS board + plasterboard

1200x2000x50 mm

EPS | 2.4 m² | 31 kg

EPS board + water-resistant plasterboard

1200x2000x50 mm

EPS | 2.4 m² | 31 kg

Fibreglass board+ plasterboard

1200x2000x65 mm

Fibreglass | 2.4 m² | 45 kg

COMPONENTS

CLOSURE PANEL FITTINGS

plasterboard

420x260 mm REF 300 203 560

water-resistant Plasterboard

420x260 mm REF 300 203 660

plasterboard with graphite

420x260 mm REF 300 203 930

ATTACHMENT CLIP

ring clip

PIPE COUPLING

extra circuit

L 2 m

PANEL ADHESIVE

adhesive for closure panels

REF 300 202 300

INSPECTION HATCH

inspection hatch

600x600 mm REF 300 202 320

PRE-INSULATED PIPE

pre-insulated pipe 20 x 2 mm

L 25 m red

L 25 m blue

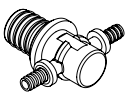
RED REF 201 200 320 BLUE REF 201 200 310

FITTINGS

20-10-20-10

4 pieces REF 201 200 223

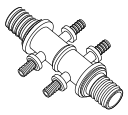
10-20-10



version **with cap**

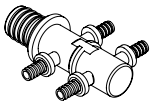
4 pieces REF 201 200 234

20-10-10-20-10-10



4 pieces REF 201 200 224

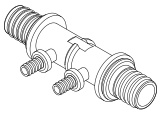
10-10-20-10-10



version **with cap**

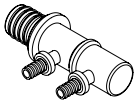
4 pieces REF 201 200 236

20-10-10-20



4 pieces REF 201 200 228

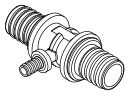
20-10-10



version **with cap**

4 pieces REF 201 200 237

20-10-20



4 pieces REF 201 200 227

20-10

version **with cap**

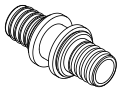
4 pieces REF 201 200 235

20-20

elbow

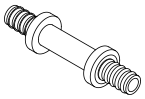
4 pieces REF 201 200 226

20-20



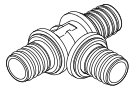
4 piecesREF 201 200 225

10-10



4 pieces REF 201 200 233

20-20-20



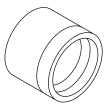
4 pieces REF 201 200 229

FITTING RINGS

Ø 10 MM

8 pieces REF 201 200 230

Ø 20 MM



8 pieces REF 201 200 231

Acoustic climate ceilings

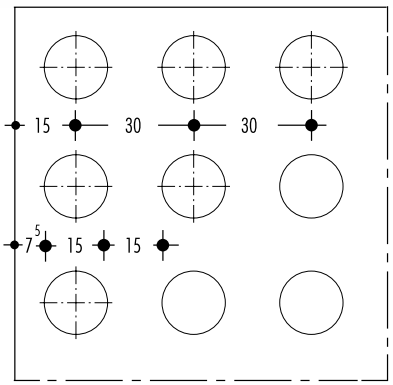
Leo **Acoustic** Climate Ceiling

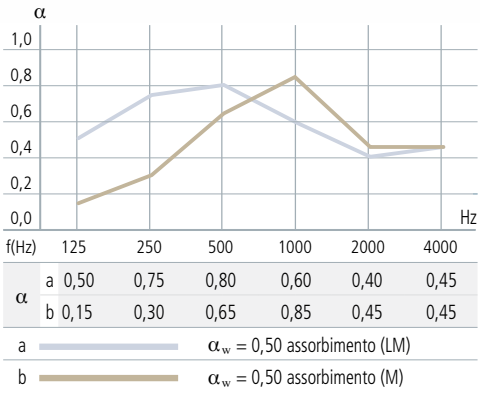
Sound-absorbing radiant comfort

- high sound absorption capacity
- reduction in the concentration of pollutant substances in the air
- large active surface
- fittings without O-rings for long-lasting water-tightness
- high cooling capacity
- tested by WSP Lab

With the Leo Acoustic ceiling system you can make a climate ceiling for multiple applications. The system consists of modular plasterboards into which pipes are incorporated.

1. Sound-absorbent plasterboard
2. Sound-absorbent felt
3. Sound-absorbent plasterboard with pipes





f(Hz)		125	250	500	1000	2000	4000
α	a	0,50	0,75	0,80	0,60	0,40	0,45
	b	0,15	0,30	0,65	0,85	0,45	0,45

a — α_w = 0,50 assorbimento (LM)

b — α_w = 0,50 assorbimento (M)

ACOUSTIC PERFORMANCE

Thanks to the double acoustic plasterboard, this system combines the thermal comfort of a climate ceiling with a high sound absorption capacity. The board can eliminate disturbing noise.

Sound absorption values compared to single acoustic plasterboard (Knauf technical datasheet)

Mounting: a = 200 mm | b = 60 mm

f(Hz)	125	250	500	1000	2000	4000
α_s	0.7	1.0	0.95	0.9	0.95	0.90

Sound absorption value **α** calculated for the acoustic ceiling in combination with a 50 mm rock wool board. Calculated in compliance with the EN 29053 and ASTM C522 standards, assuming a gap of 200 mm.

FITTINGS WITHOUT O-RING

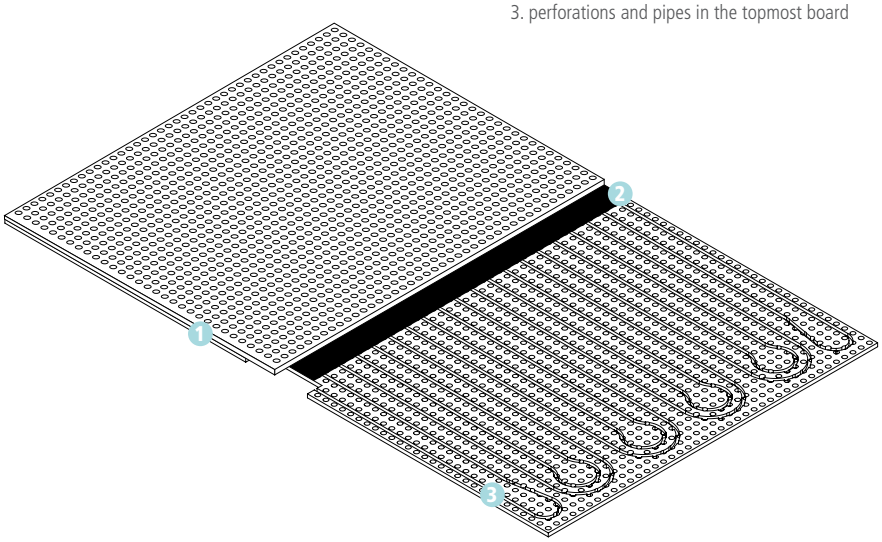
The use of special fittings without O-rings for the 10 x 1.3 mm pipe guarantees long-lasting water-tightness and less pressure loss.

1. fitting ring
2. fitting
3. fitting ring
4. end piece (fitting (2) + end piece (4)

10 X 1.3 MM PIPE

In most traditional plasterboard climate ceilings, 8 x 1.1 mm lines are used. In the new Leonardo Acoustic climate ceiling the lines have a diameter of 10 x 1.3 mm. Thanks to the 25% larger diameter the performance of the Leo Acoustic climate ceiling is clearly better.

1. two glued acoustic plasterboards
2. film
3. perforations and pipes in the topmost board



System appearance

Leo Acoustic Climate Ceiling

dimensions in millimetres

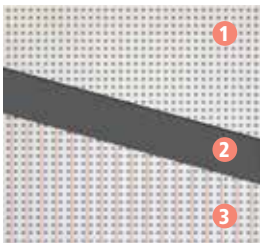
Insulation	λ_D [W/mK]**	Thickness [mm]	Weight [kg/m²]***	Pipe [mm]	Pipe distance [cm]
packed fibreglass board*	**0.036**	**12.5+12.5**	**~18**	**10x1.3**	**6**
acoustic plasterboard					

*not included in the system

**of the fibreglass insulation

***weight of the board with water in the pipes

The Leo Acoustic climate ceiling consists of two glued 12.5 mm thick, perforated plasterboards with acoustic fleece in between, for a total thickness of 25 mm. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. The PE pipes, which are resistant to high temperatures, are incorporated into the topmost board with a gap of 6 cm.



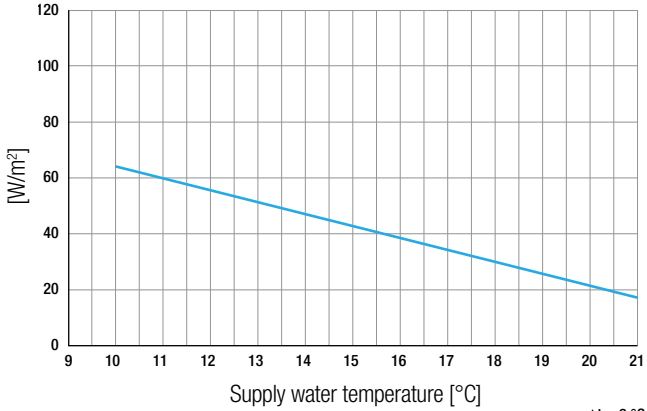
1. Acoustic plasterboard
2. Acoustic fleece
3. 10 x 1.3 mm pipe with pipe distance of 6 cm

The system must be installed perpendicular to the 330 mm axial base line of the base profiles. Consult the Knauf D11 technical datasheet for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly.

Cooling

WSPLab

Curves derived from the output certificates according to UNI EN 14240:2005 in cooling mode

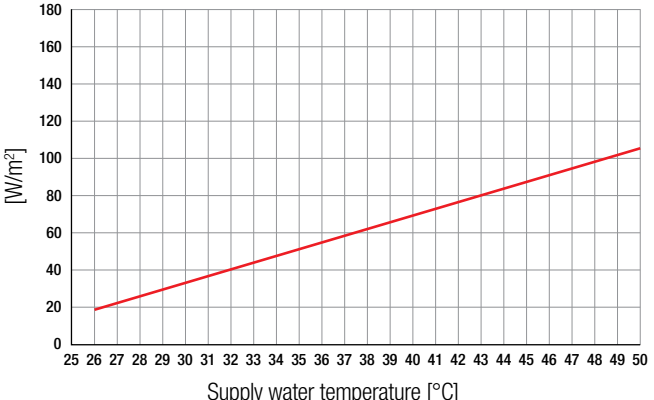


Δt = 2 °C

Heating

WSPLab

Curves derived from the output certificates according to prEN 14037-5:2011 in heating mode



Δt = 5 °C

Leo High Performance Acoustic Climate Ceiling

dimensions in millimetres

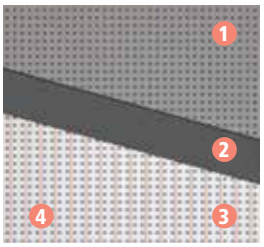
Insulation	λ_D [W/mK]**	Thickness [mm]	Weight [kg/m²]***	Pipe [mm]	Pipe distance [cm]
packed fibreglass board* **2 acoustic plasterboards, lower with graphite**	**0.036**	**12.5+10**	**~19**	**10x1.3**	**4.5**

*not included in the system

**of the fibreglass insulation

***weight of the board with water in the pipes

The Leo High Performance Acoustic climate ceiling consists of two visible glued perforated plasterboards with graphite with acoustic fleece in between and on top. The boards are 12.5 and 10 mm thick respectively, for a total thickness of 22.5 mm. These are constructed of five layers of polyethylene and an EVOH oxygen diffusion barrier. The PE pipes, which are resistant to high temperatures, are incorporated into the topmost board with a gap of 4.5 cm.

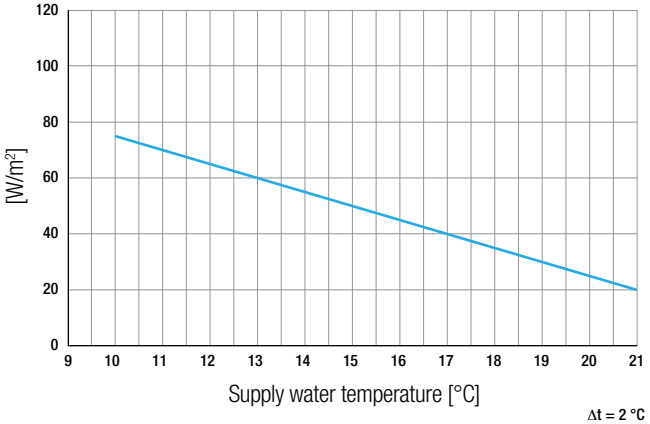


1. Acoustic plasterboard with graphite
2. Acoustic fleece
3. 10 x 1.3 mm pipe with 4.5 cm pipe distance
4. Acoustic plasterboard

The system must be installed perpendicular to the 330 mm axial base line of the base profiles. Consult the Knauf D11 technical datasheet for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly.

Cooling

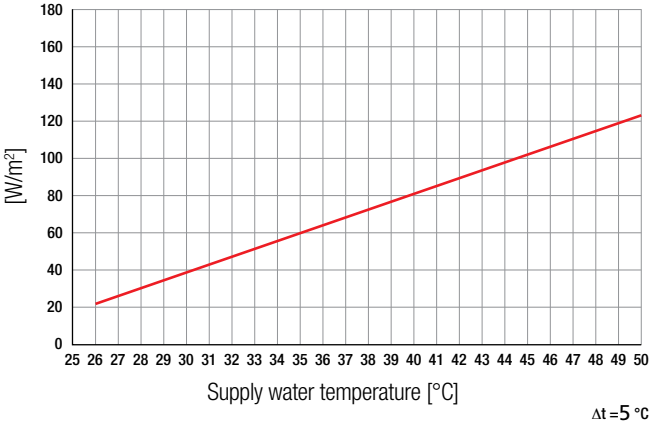
Output of the climate ceiling in cooling mode according to UNI EN 14240:2005 and UNI EN 15377-1



Δt = 2 °C

Heating

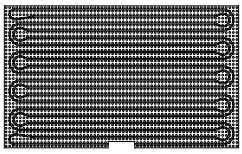
Output of the climate ceiling in heating mode according to prEN 14037-5:2011 and UNI EN 15377-1



Δt = 5 °C

Area Weight Length of one circuit

ACOUSTIC CEILING 6 CM PIPE DISTANCE



2 acoustic plasterboards*

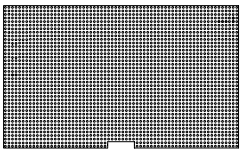
1200x1980x25 mm

2.376 m² 40 kg 38.7 m

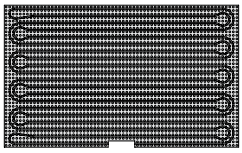
passive acoustic plasterboard

1200x1980x25 mm

2.376 m² 26 kg



HIGH PERFORMANCE ACOUSTIC CEILING 4,5 CM PIPE DISTANCE



2 acoustic plasterboards,* lower with graphite

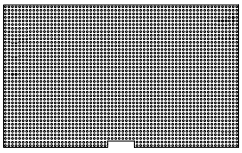
1200x1980x22.5 mm

2.376 m² 42 kg 38.7 m

passive acoustic plasterboard with graphite

1200x1980x22.5 mm

2.376 m² 28 kg



* including 10 x 1,3 mm pipe and 20 x 2 mm pipe coupling

COMPONENTS

INSULATION BOARD

Fibreglass packed in PE film (600 x 600 mm), easy to affix to active and passive suspended ceiling boards. They have a thickness of 50 mm. Euroclass A1 fibreglass, class 1 PE bag. Thermal conductivity 0.036 W/m.K. Thermal resistance 1.35 m².K/W

Packed fibreglass board

600x600x50 mm

ATTACHMENT CLIP

ring clip

PRE-INSULATED PIPE

pre-insulated PE-RT pipe 20 x2 mm

L 25 m rood

L 25 m blauw

RED REF 201 200 320 BLUE REF 201 200 310

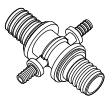
PIPE INSULATION

pipe insulation film

ø10 mm L 2 m

COUPLINGS

20-10-20-10



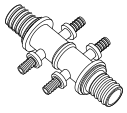
4 pieces REF 201 200 223

10-20-10

version with **cap**

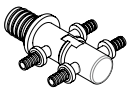
4 pieces REF 201 200 234

20-10-10-20-10-10



4 pieces REF 201 200 224

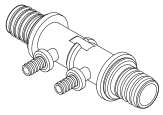
10-10-20-10-10



version with **cap**

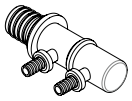
4 pieces REF 201 200 236

20-10-10-20



4 pieces REF 201 200 228

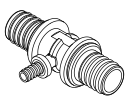
20-10-10



version with **cap**

4 pieces REF 201 200 237

20-10-20



4 pieces REF 201 200 227

20-10

version with **cap**

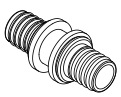
4 pieces REF 201 200 235

20-20

elbow

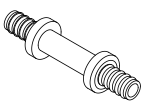
4 pieces REF 201 200 226

20-20



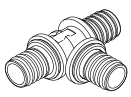
4 pieces REF 201 200 225

10-10



4 pieces REF 201 200 233

20-20-20



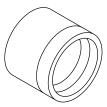
4 pieces REF 201 200 229

FITTING RINGS

Ø 10 MM

8 pieces REF 201 200 230

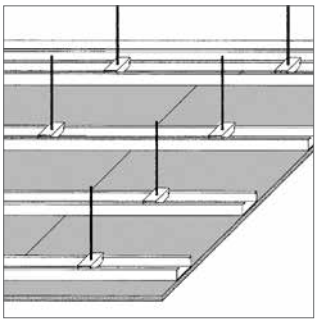
Ø 20 MM



8 pieces REF 201 200 231

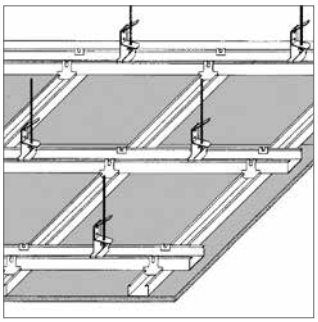
Assembly

METAL SUBSTRUCTURES



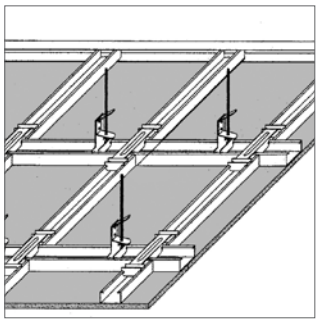
D111

Knauf D111 single metal suspended ceiling substructure



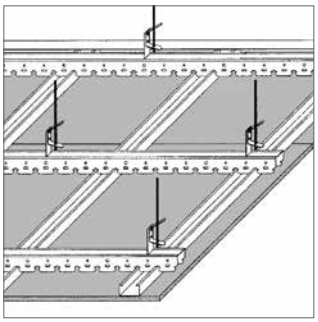
D112

Knauf D112 double overlapping metal suspended ceiling substructure



D113

Knauf D113 double metal substructure - level equal to suspended ceiling



D114

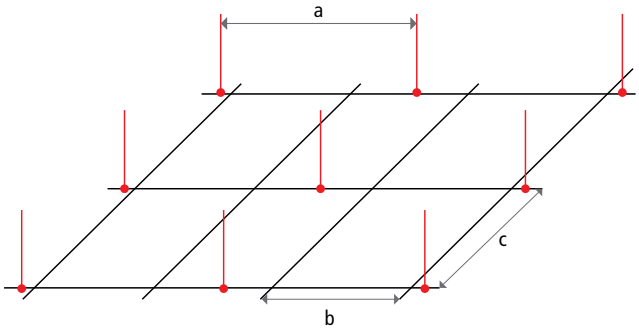
Knauf D114 double overlapping metal substructure suspended ceiling clickb system

TABLE OF DIMENSIONS
Knauf D11 suspended ceilings with load capacity 15<p<30 N/m²

type	**a** [mm]	**b** [mm]	**c** [mm]
D111	50		50(1)
D112	75	50(2)	100
D113	65	50(2)	120
D114	75	50(2)	100

1. The Leo system board filled with water in the pipes weighs: ~13 kg/m² (Leo 10), ~19 kg/m² (Leo RF) and ~18 kg/m² (Leo 3.5). Any extra load must be added as indicated in the Knauf D11 technical datasheet.
2. Horizontal assembly alone is allowed.

a: distance between suspension points (plugs)
b: axial distance of secondary profiles
c: axial distance of basic profiles



Take into account a minimum installation height of 15 cm (16 cm for Leo RF) for the ceiling.

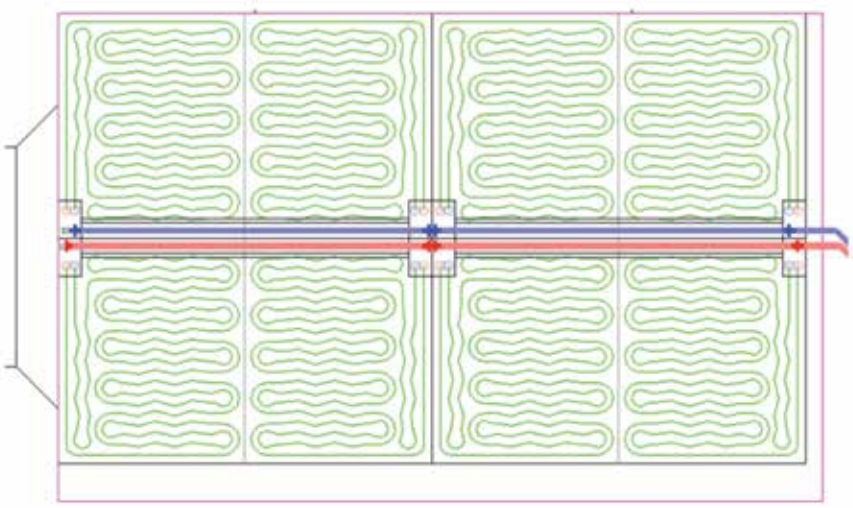
ASSEMBLY OF THE METAL SUBSTRUCTURE

1. Determine the level with a laser.
2. Mark out the perimeter line.
3. Prepare the clamps and attach them.
4. Check whether the basic substructure is level.
5-6. Assemble the secondary substructure.

Assembly

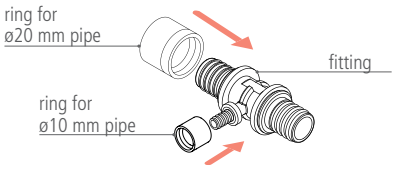
HYDRAULIC CONNECTION

In the adjacent illustration you see how the four boards are hydraulically connected. The supply line (red) comes from the manifold and is connected to the couplings in the board. The water is conveyed through the special couplings of the climate ceiling to the pipes with a diameter of 10 mm that run through the board, after which it enters the return line (blue). If possible we advise crossing the joints of the ceiling boards that are not connected to the same supply line.

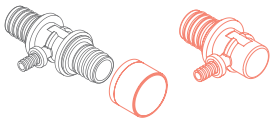


Supply line with 20 mm pipe
Return line with 20 mm pipe

To connect the 20 mm lines (illustration 1) with each other, connect both pipes to the fitting with a ring that you press closed with special pliers.



An end piece (cap) or a coupling with an end stop goes on the end of the pipe.



To connect the 10 mm pipes of the circuit to the coupling, follow the same procedure (illustration 4). The couplings for the hydraulic connections have no O-rings. They are specially designed to guarantee long-lasting water-tightness of the pipes and to prevent leaks.

AVOID exposure to solvents and reagents; they can damage the fittings. Ensure that the material does not come into contact with strong concentrated acids such as hydrochloric acid, nitric acid and sulphuric acid. Reagents and solvents can cause stress cracks. This is the case with, among other things, aromatic solvents and oxygenated solvents such as ketones and ethers that are also in some types of PU foam, liquid Teflon and other products.

PRESSURE TESTS

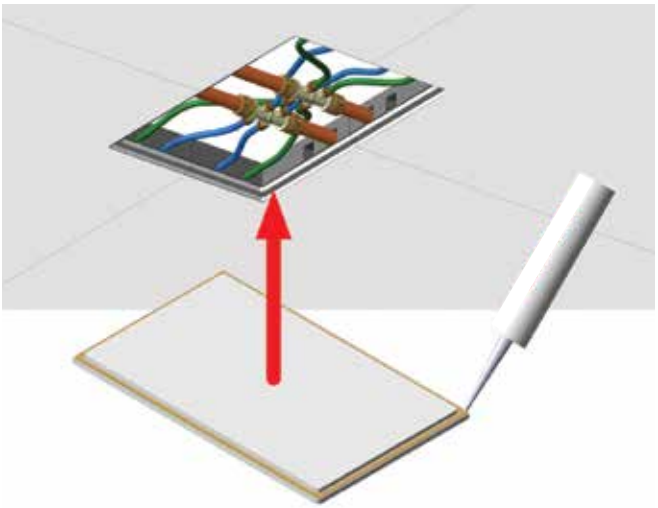
Put the system under 6 bars of air pressure for 24/48 hours. After 24/48 hours let the air out of the system and fill it with water at operating pressure. Keep the system under pressure during the works until you start it up it for the first time at operating pressure. The pressure test with water must be conducted at a temperature of more than 5°C. During the winter or when frost is predicted, do the same procedures with air and use leak detection foam or soap and water on each fitting. Depending on the type of test (water or air) the discrepancies must be negligible to consider the test to be PASSED. Always have a test certificate drawn up with the results.

INSTALLATION OF COLLECTORS

Place the collector preferably against the ceiling and provide a sufficiently large inspection hatch.

ASSEMBLY OF THE CLOSURE BOARDS

Mount a closure panel with the right mounting adhesive for plasterboard. Support the board while the adhesive dries.



Assembly

The aesthetic aspect must be considered in assembling the system. In contrast to traditional systems, the Leo Acoustic system must be glued. Due to the special properties of the perforated boards, both these items must be resistant to cracks and fissures.

STRUCTURE

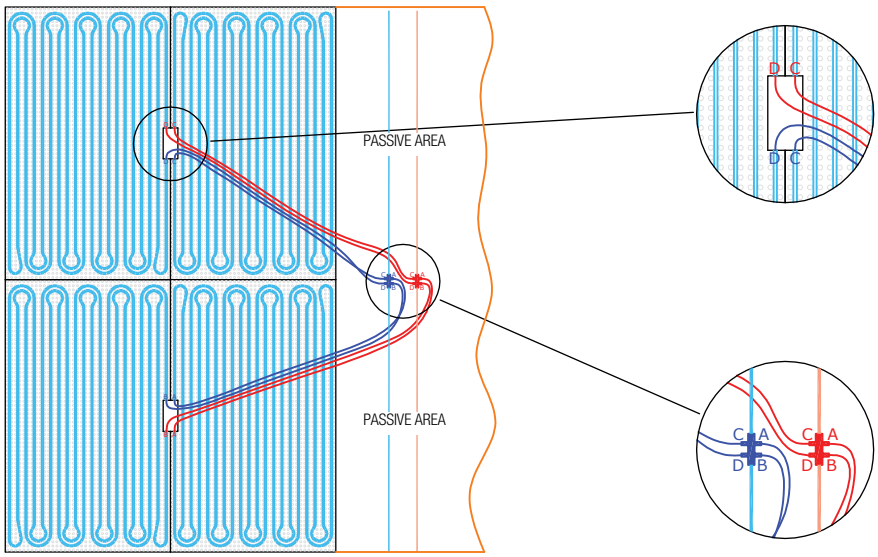
The attachment structure (usually the secondary substructure) must be perpendicular to the long board side and the raster must have a distance of 330 mm. You can use Knauf technical datasheet D11 for the composition of the metal substructure. We recommend choosing the double substructures D112 or D114 with a class 'p' load capacity of more than 15 kg/m² to calculate the distances for the clamps and the basic structure. It is advisable to use 60 mm-wide C profiles in assembly.
The expansion joints (these can be structural or isolation joints) must allow asymmetric movements and must be installed:
- on the load-bearing structural joints in the building;
- everywhere for materials of a different nature or that behave differently;
- for large dimensions, every 10-12 m of ceiling length.

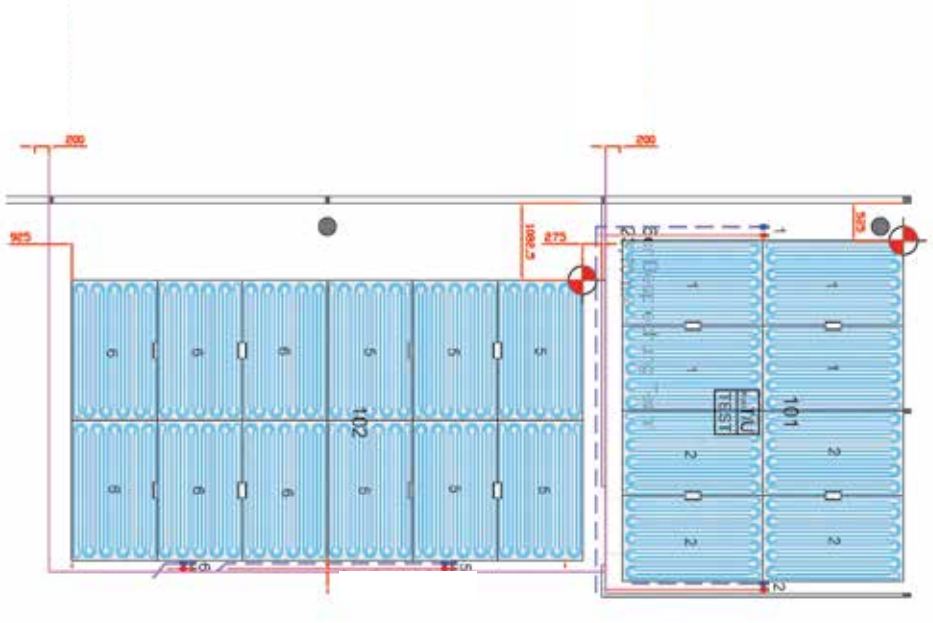
ORIENTATION AND ASSEMBLY

The boards, the long side of which must be perpendicular to the raster axial distance line of 330 mm, must be attached to the specially placed targets. In addition to the usual means of alignment such as a laser or a string, use the right templates to align the boards. You must always install the passive boards with the right templates. Check whether the holes are aligned in the perpendicular and diagonal directions. Use self-tapping screws with a phosphate coating and a flared head that are suitable for use with plasterboard.

HYDRAULIC CONNECTIONS

In the acoustic ceiling, groups of boards with the right coupling are connected to the distribution line outside the boards and to the pipes with a diameter of 10 mm that have an excess length of 4 m. Insulate these lines afterward with pipe insulation.



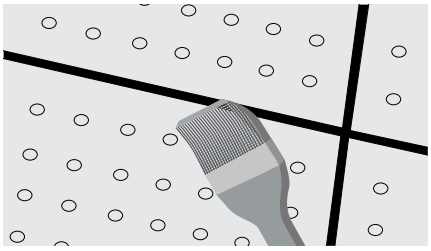


Example of an installation of the acoustic climate ceiling (detail); a number is affixed to the boards that refers to the group of boards. In addition the starting point of the area that is activated is also indicated to achieve the desired result.

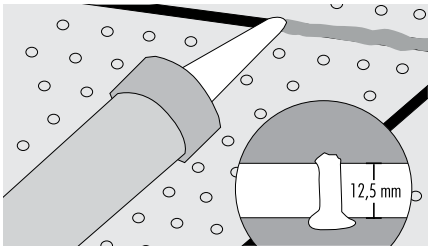
INSTALLATION OF INSULATION MATERIAL

Normally you install the insulation material in the opening above the board. Do this when you install the finishing layer, because the opening is then still accessible. When installing the packed fibreglass insulation, ensure that it fully covers the surface to prevent thermal bridges or acoustic bridges insofar as possible.

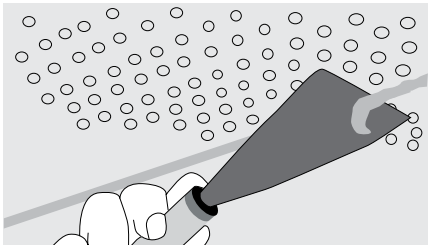
CEMENTING



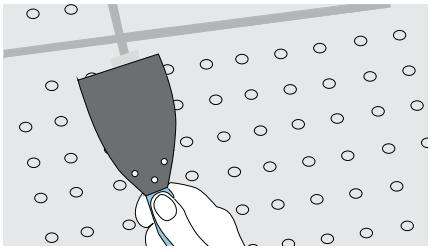
As soon as you have assembled the perforated boards, dust the joints (approximately 2.5 to 4 mm wide, depending on the perforation used) with a damp brush.



Prepare the Knauf Uniflott cement separately as a liquid mixture and pour it into the cartridge. Cut the plastic to the right joint width and put it on the cartridge. Fill the joints slightly overfull with the cartridge.



When the Uniflott cement is dry, remove the excess material and smooth the surface.



When the Knauf Uniflott cement is sufficiently dry, apply a thin layer of Fugenfuller Leicht cement as needed and also cover the heads of the screws. Remove any cement that has run into the perforations with a suitable spatula. Sand down the surface after it is cemented and the cement is fully cured.

LEONARDO
Plasterboard climate ceiling

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