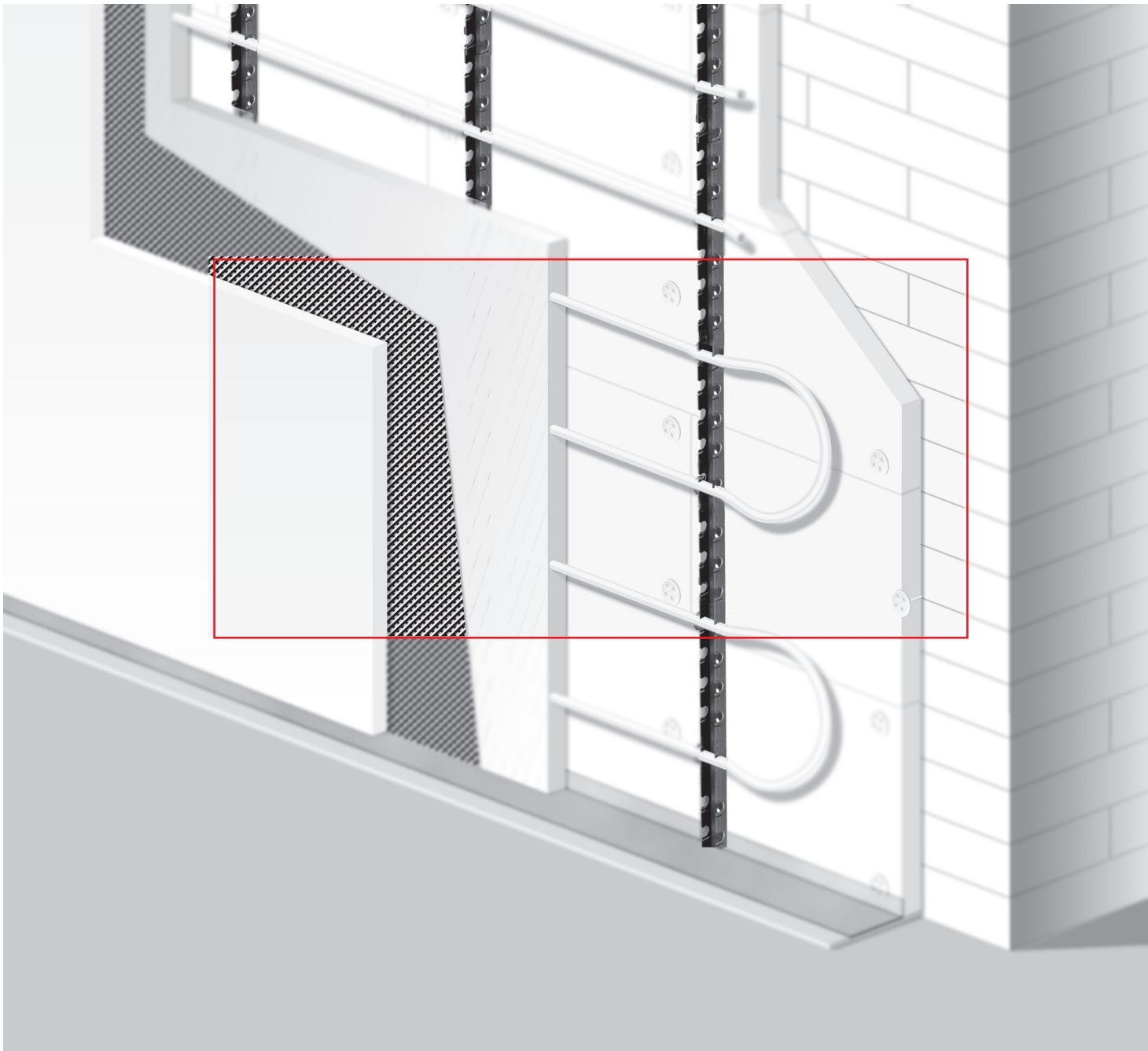
WALL HEATING AND COOLING SYSTEMS

TECHNICAL INFORMATION AND
ASSEMBLY INSTRUCTIONS



ECO ENERGY AND SANITARY SYSTEMS

Contents

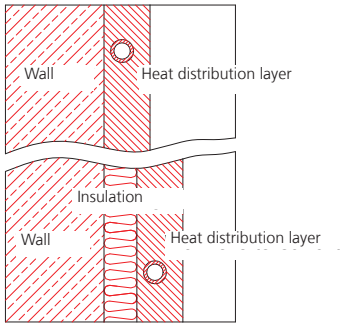
System description and system benefits

Wall heating and cooling systems are low-temperature systems, whereby large sections of the surfaces within a room can be used for installation purposes. The temperature of the heating medium or coolant is only slightly above or below the temperature of the ambient air and favours the use of heat sources with low inlet temperatures (heat pumps, condensing boilers). They can be combined with floor heating or cooling applications. The Roth wall heating and cooling system helps reduce energy consumption, makes rooms feel noticeably more comfortable, and improves the quality of the ambient air without imposing any restrictions in terms of interior design.
Roth wall heating and cooling systems can be based on various Roth radiant heating and cooling systems:

- Roth pipefix system Ø 11, Ø 14
- Roth ClimaComfort® Panel System

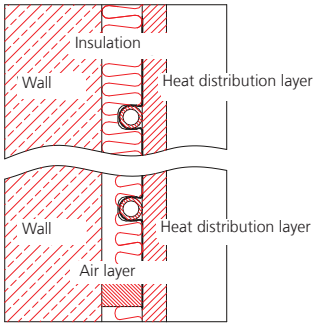
Construction types for wall heating and cooling systems:

Roth pipefix system



Construction type A:
The system pipes are integrated into the heat distribution layer (plaster or dry construction panel). Equipment can be installed directly against the wall or an additional layer of insulation can be used.

Roth ClimaComfort® Panel System



Construction type B:
The system pipes are integrated into the layer of insulation (possibly with a deflector plate). Equipment can be installed directly against the wall or an additional layer of insulation can be used.

Applications

Roth pipe types:
- DUOPEX S5®
- X-PERT S5®+
- Alu-Laserflex
- ClimaComfort S5

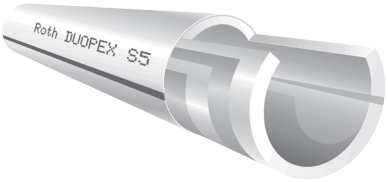
The Roth wall heating and cooling system can be used for all building types specified in DIN EN 1264 - residential, office, and commercial buildings, as well as other buildings used the same (or at least in a similar way as residential buildings.)

Wall heating and cooling systems are perfectly suited for use in low-energy homes, although they can also be used in existing buildings. The ideal hygienic conditions in rooms with wall heating and cooling systems make them suitable for use in hospitals and sports facilities too. Given the reduced risk of accidents and the comfort requirements associated with bathrooms, spa areas, and swimming pools, wall heating can provide an ideal heating system in such places, since it can also be combined with floor or ceiling heating.

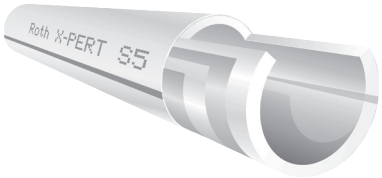
Plaster systems (construction type A)
With wall systems, pipes are positioned and attached against the wall directly or against a layer of insulation. The plaster inside the room acts as a heat-transmitting surface. Any standard wall plaster can be used on the wall.
Wall without additional insulation (construction type B)
The Roth wall heating and cooling system can be installed directly on internal walls without additional thermal or sound insulation requirements and external walls where the level of insulation is already sufficient (EnEV).
Wall with additional insulation (construction type B)
Plans must be made regarding any measures needed to prevent the diffusion of water vapour or any renovation work like drying out masonry.

Wallpaper, paint, textured plaster, tiles, or natural stone can be used as wall coverings.

System components



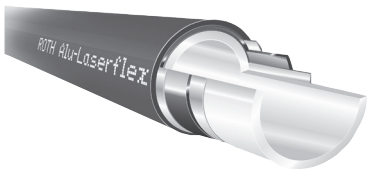
Roth System Pipe DUOPEX S5®



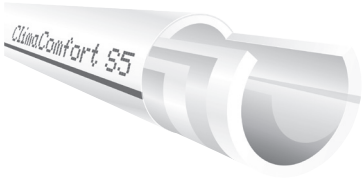
Roth System Pipe X-PERT S5®+

	Material no.	Length delivered/ Weight per PU	Material no.	Length delivered/ Weight per PU
Pipe dimension Ø 14	1135006211 1135001713	240 m/20 kg 600 m/50 kg	1115009062 1135002778	240 m/21 kg 600 m/53 kg
Properties	Very robust, very resilient		Very flexible	
Colour	Light yellow pipe with red stripes		Light yellow pipe with red stripes	
Pipe layers	5-layer pipe		5-layer pipe	
Production methods	S5 coex Technology		S5 coex Technology	
Thermal conductivity	0,35 W/mK			
Linear elongation coefficient [1/K]	1,14 x 10^{4}		1,95 x 10^{-4}	
Building material class	B2			
Min. bending radius	5 x da			
Pipe roughness	0,007 mm			
	Water content [l/m]			
Pipe dimension Ø 14	0,079		0,079	
Pipe markings	Metre details, pipe designation, material, dimensions, manufacturer, pipe class, max. temperature (long term), oxygen tightness, testing institute, date of manufacture, internal number (manufacturer), running metre details			
Max. temperature over long term	95 °C		70 °C	
Max. temperature over short term	110 °C		100 °C	
Max. pressure	6 bar		6 bar	
Testing and certification basis	DIN 4726 DIN ISO 15875		DIN 4726 DIN ISO 22391	
Approval number	DIN CERTCO 3V203		DIN CERTCO 3V266	
Connection technology	Roth PPSU PressCheck® Roth MS PressCheck® Roth MS screw connector Roth Heating & Cooling (dim. 20 and 25 mm)		Roth PPSU PressCheck® Roth MS PressCheck® Roth MS screw connector Roth Heating & Cooling (dim. 20 mm)	
Area of application	Construction type A with pipefix Ø 14		Construction type A with pipefix Ø 14 Construction type B with ClimaComfort Panel System	
Optimal installation temperature	> 0 °C		> 0 °C	
Permissible water additives	Roth antifreeze FKN 28			

System description



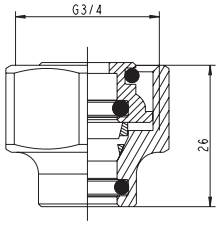
Roth System Pipe Alu-Laserflex



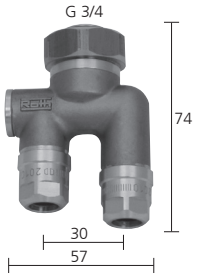
Roth ClimaComfort S5® System Pipe

	Material no.	Length delivered/ Weight per PU	Material no.	Length delivered/ Weight per PU
Pipe dimension Ø 11	–		1135003441 1135003741	120 m/5 kg 240 m/10 kg
Pipe dimension Ø 14	1135002391 1135006212 1135002798	100 m/11 kg 240 m/26 kg 600 m/66 kg	–	
Properties	Excellent dimensional stability		Narrow diameter for minimal installation heights	
Colour	Red pipe		Light yellow pipe with red stripes	
Pipe layers	5-layer pipe		5-layer pipe	
Production methods	–		S5 coex Technology	
Thermal conductivity	0,35 W/mK			
Linear elongation coefficient [1/K]	0,3 x 10^{-4}		1,95 x 10^{-4}	
Building material class	B2			
Min. bending radius	5 x da (bending spring can be used)		5 x da	
Pipe roughness	0,007 mm			
	Water content [l/m]			
Pipe dimension Ø 11	–		0,049	
Pipe dimension Ø 14	0,079		–	
Pipe markings	Metre details, pipe designation, material, dimensions, manufacturer, pipe class, max. temperature (long term), oxygen tightness, any testing institute, date of manufacture, A number (manufacturer), running metre details			
Max. temperature over long term	70 °C		70 °C	
Max. temperature over short term	95 °C		100 °C	
Max. pressure	10 bar		6 bar	
Testing and certification basis	DIN 4726 DIN ISO 22391		DIN 4726 DIN ISO 22391	
Approval number	DIN CERTCO 3V332		DIN CERTCO 3V331	
Connection technology	Roth PPSU PressCheck® Roth MS PressCheck® Roth MS screw connector		Roth screw coupling and transfer connector or screw connection	
Area of application	Construction type A with pipefix Ø 14		Construction type A with pipefix Ø 11	
Optimal installation temperature	-20 °C to +40 °C		> 0 °C	
Permissible water additives	Roth antifreeze FKN 28			

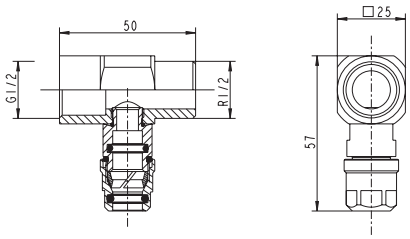
System description



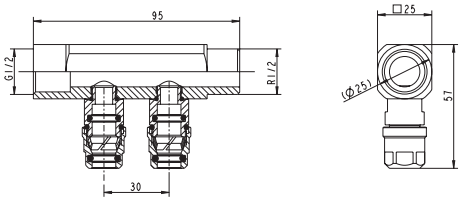
Roth CC Compact screw fitting



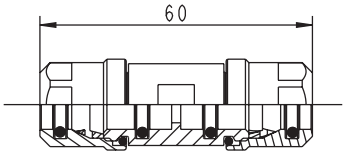
Roth CC Compact T Connection



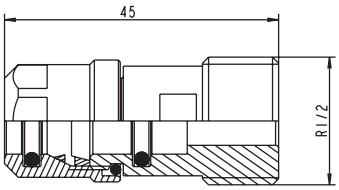
Roth CC Compact single submanifold



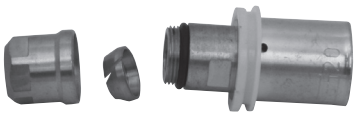
Roth CC Compact double submanifold



Roth CC Compact coupling



Roth CC Compact reducing pipe nipple



Roth CC Compact press fitting

System description

Roth wall heating and cooling systems
with Roth pipefix system:
- Roth pipefix
- Roth System Pipes
- Roth edge insulating strip

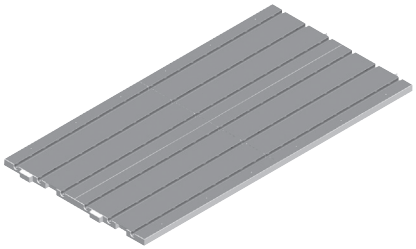
Please note functionality is only guaranteed if matching system components are used.

Roth pipefix

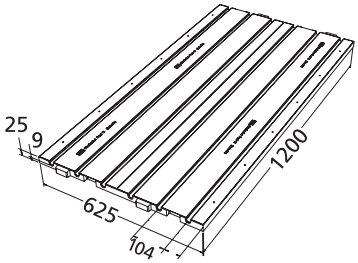
Roth RTS attachment pin

Type	Length	Grid	Colour	Width	Height
Roth pipefix Ø 11	2,5 m	25 mm	Red	22 mm	13 mm
Roth pipefix Ø 14	2,5 m	25 mm	Blue	38 mm	19 mm

System description



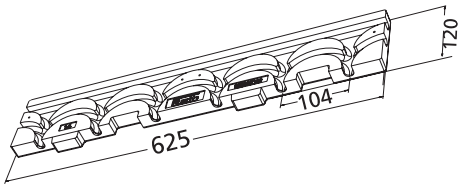
Roth ClimaComfort® Panel Ø 14 floor/wall/ceiling



Roth ClimaComfort® Panel Ø 14 floor/wall/ceiling

Technical data/Area of application	Ø 14 floor/wall/ceiling
Material (support element, heat-conducting lamella)	Polystyrene (EPS), aluminium
Dimensions	1200 x 625 x 25 mm
Effective installation area	0,75 m²
Pipe dimension	14 mm
Installation distances	10 cm/20 cm
Thermal conductivity	0,031 W/mK
Thermal resistance $R_{,ins}$	0,75 m²K/W
Max. system temperature	50 °C
Covering wall and ceiling	Dry construction covering, thickness 10mm (Rigips Climafit), from 12,5 mm for standard panels
Load distribution layer floor	Various load distribution systems (see performance data)
max. live load	35 kN/m²
Building material class	B2
Weight	2,2 kg/panel
Mass per unit area (incl. water and system pipe)	4,7 kg/m²

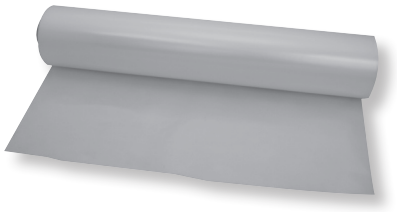
Roth ClimaComfort® Panel System guide panel Ø 14



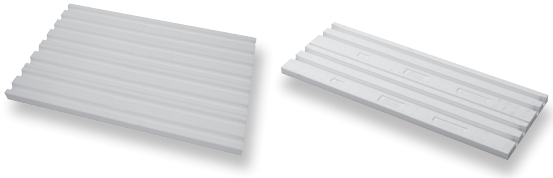
Roth ClimaComfort® Panel System guide panel Ø 14

Technical data	Ø 14
Material	Expanded polypropylene (EPP)
Dimensions	120 x 625 x 25 mm
Pipe dimension	14 mm
Installation distances	10 cm/20 cm
Thermal conductivity	0,043 W/mK
Thermal resistance $R_{,ins}$	0,5 m²K/W
Max. system temperature	50 °C
max. live load	>35 kN/m²
Building material class	B2
Weight	135 g/unit

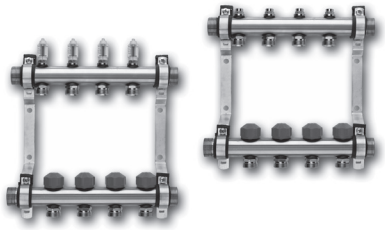
Roth edge insulating strips 80 mm



Roth PE cover film



Roth pipe guide panel for floor Ø 14

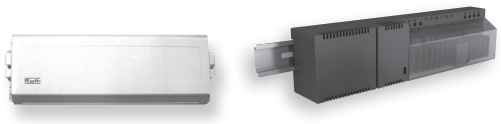


Roth manifold

Roth universal screw connection Ø 14

Roth manifold cabinets

Roth room thermostats (radio and cable version)



Roth connection modules (heating/cooling, radio and cable version)

Roth moisture sensor with watchdog function

Roth actuators

Wall heating and cooling systems in dry construction applications (Roth ClimaComfort® Panel System)

The following points must be clarified before installing a Roth wall heating and cooling system:

- The heat requirement needs to be determined based on the heating load under DIN EN 1264. The values based on the adjusted heat requirement should be used when devising the heating surfaces.
- The Roth wall heating and cooling system should be selected to suit the building specifications for the type of object involved (e.g. new or old building).
- A decision needs to be made about the structure of the walls, including any proposed wall coverings like wallpaper or tiles.
- The required operating temperature for the Roth wall heating and cooling systems needs to be calculated, based on the heat flow density. Plans will need to be corrected if the operating temperatures are higher than required or capable of damaging individual components. In such cases, improved building insulation can reduce the heat requirement or the proportion of the wall surface available to accommodate the Roth wall heating and cooling systems can be increased in order to reduce the heat flow density required.

Surface temperatures during operation:

- Maximum surface temperature in heating mode: 40 °C
- Recommended surface temperature for optimal comfort: approx. 33 °C
- Minimum surface temperature in cooling mode: 19 °C
- Maximum inlet temperature: 50 °C
  The usual inlet temperatures in cooling mode do not present a problem to wall plasters. Dew point monitoring stops condensation forming on walls and prevents moisture damage.
- The size of the Roth manifold needs to be determined and somewhere chosen to install it. When making this decision, it is important to think about the pipe guidance between the Roth manifold and the Roth wall heating and cooling system. In most cases, the connecting pipe to the Roth wall heating and cooling system is run via the floor structure.

Cooling

During cooling, it is important to ensure the cooling system operates within an average temperature range above the dew point temperature.

Generally speaking and depending on the requirements and conditions outside (the temperature outside and relative air humidity), the cooling water temperature should lie between 16 °C and 19 °C. It is important to ensure the temperature does not fall below 16 °C to avoid the risk of condensation.

The Roth dew point monitor in Roth E^x heat pumps offers some protection, as do controls in individual rooms.

Based on a dew point temperature of 18 °C, for example, and an inside temperature for cooling systems of 26 °C, the temperature difference between the room and the average cooling water temperature would be around 8 °C. In many cases, maintaining an adequate margin above the dew point will also satisfy physiological requirements.

Wall-based energy distribution

With larger rooms, it makes sense to fit the wall heating and cooling system to 2 opposite walls, since the radiating effect on the body decreases with the square of the distance. It is important to consider seating and how a room is divided and set out when arranging energy-distributing surfaces, as well as the impact of any glass surfaces.

It is also important when planning wall heating or cooling surfaces to consider where any wall-mounted fittings like shelves or wall cupboards are to be attached. The wall heating and cooling system should not extend to these areas, as cupboards or items of furniture can prevent the energy-distributing surface from delivering heat or cold. Otherwise, any possible attachment or drilling points would have to be included in the plans. Insulating wall coverings reduce the performance of wall heating or cooling systems, so should be ruled out at the planning stage.

The Roth manifold should be used to ventilate the Roth wall heating and cooling system. Alternatively, some other ventilation option can be arranged above the Roth wall heating and cooling system.

The number of heating circuits will depend on the size and nature of the wall heating surface, the pipe dimensions, and the number and nature of any wall recesses (such as doors and windows).

Insulation

- With renovation projects, a heat transfer coefficient <0,45 or 0,35 W/m² K applies to external walls as per EnEV. The requirements associated with the EnEV energy performance certificate may also needed to be taken into account.

- **Note:** In terms of selecting insulation structures, we recommend compliance with the minimum requirements based on DIN EN 1264. The designer will specify any requirements based on the building as a whole in the light of EnEV.

The entire insulation structure for the heating and cooling systems should be tailored to the building's specific requirements.
As far as wall heating and cooling systems are concerned, it is not compulsory to apply a layer of insulation to separating walls between rooms with similar heating requirements. It makes sense to do so in energy terms, however, to avoid heating the whole of the wall unnecessarily. It also makes it easier to control the temperature within individual rooms.
Insulation is always applied to separating walls between different residences.

Interior insulation for external walls

During energy-related renovation work in existing residential buildings, it is often impossible to provide insulation from the outside via a composite thermal insulation system. This may be the case in the following situations:

- The facade of the building is listed or the existing design features need to be retained (exposed masonry).

- Nearby buildings or insufficient clearances make external insulation impossible.
- The insulation measure can only be carried out in individual residences or spaces (owner-occupied properties, etc.).

- There is an option to convert cellar areas into residential or 'hobby' rooms.

It is also worth remembering that rooms where the external walls have been insulated from the inside heat up more quickly, since the bulky sections of the external wall do not need to heat through.
This means rooms can be used and heated for short periods only without long waits for the heat to 'kick in'.

Driving rain protection

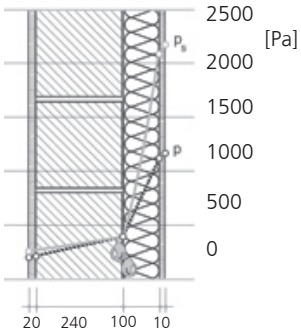
Any damage to the facade of single-layer external walls (damaged and cracked plaster, broken cement in exposed masonry) must be remedied. The external plasterwork must be sufficiently impermeable to driving rain when fitting the ClimaComfort panel system to single-layer external walls. There should be no moisture-related problems if the w value for the external plasterwork is 0,1 kg/m²h or better, since the wall will not be able to take up any critical levels of moisture from the outside. Modern, commercially available paints used on facades meet this requirement. Where single-layers walls consisting of brickwork or natural stone are involved, the building should undergo a specialist moisture assessment based on dynamic simulations.

Vapour barrier film

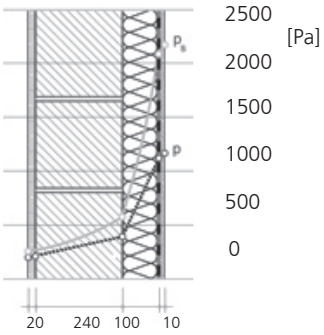
Below a certain temperature (the dew point temperature) the water in the ambient air or in building materials in the form of water vapour starts to condense or 'dew' on the surface of components, at the edges of component layers, or even across wide areas of building materials. Even before the dew point temperature is reached there may be some 'moistening' on the surface of components, which can cause mould to form in places like the corners of rooms and window reveals. The vapour barrier is supposed to prevent moisture passing through walls or roofs. If any of the moisture in the warm ambient air is able to pass unobstructed onto the cold external wall, it will condense there and cause moisture damage or even frost damage.

Attaching a vapour block/barrier on top of the interior insulation inside a room keeps the vapour on the 'warm' side and prevents the construction suffering from moisture damage. It is vital that all the vapour barrier's connection points are watertight.

Vapour pressure curve
(interior insulation)

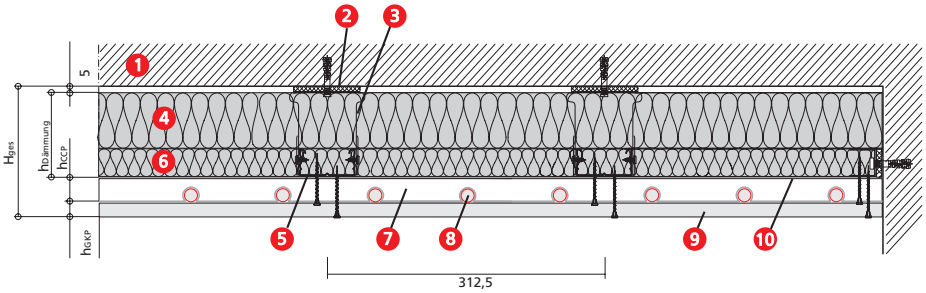


Vapour pressure curve
(interior insulation with vapour block)



Roth ClimaComfort® Panel System Ø 14, external wall structure

On top of up to 6 cm of interior insulation 4 (WLG 035) between a partition wall and external wall, 3 cm of insulation 6 between the partitions and the EPS support plate (WLG 031) of the ClimaComfort panel will ensure the insulation requirements under Germany's Energy Saving Ordinance (Energieeinsparverordnung - EnEV) 2009 are satisfied.



1 External wall
2 Connection seal
3 Adjustment clamp
4 Insulation WLG 035
5 CD profile 60/27
6 Insulation WLG 035
7 ClimaComfort Panel 14
8 System Pipe X-PERT S5®+
9 Dry construction panel
10 Vapour barrier

Achievable heat transfer coefficients for internal wall insulation					Installation height	
Previous* heat transfer coefficient in W/m²K, across the board	Insulation 4 behind the profiles h of 1st insulation	Insulation 6 between the profiles h of 2nd insulation	h of Roth ClimaComfort® Panel 7	Heat transfer coefficient in W/m²K	Covering 9 example for Rigips Climafit h GKP	Total installation height H total
2,00 Example, brickwork 240 mm	6 cm 4 cm 2 cm None	3 cm	2,5 cm	0,26 0,31 0,37 0,48	1 cm	12,5 cm 10,5 cm 8,5 cm 6,5 cm
1,50	6 cm 4 cm 2 cm None	3 cm	2,5 cm	0,25 0,29 0,35 0,44	1 cm	12,5 cm 10,5 cm 8,5 cm 6,5 cm

* Based on an unrenovated external wall and an assumed heat transfer coefficient

Diffusion-open insulation (Ytong Multipor)

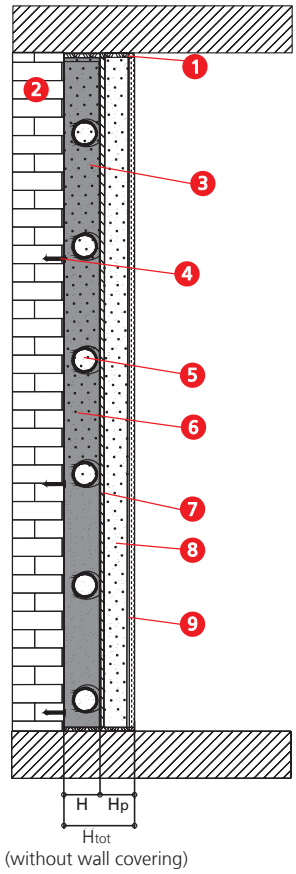
The advantage with diffusion-open insulation is the way the open-pore structure can take up moisture from a room and release it again. This kind of insulation does not need a vapour barrier film, since any water which condenses is taken up by the insulation.

The first step involves sticking the insulation panels to the inside of the external wall, ensuring the whole surface is covered. The dry construction element can either be secured inside the wall through the insulation or to the floor and ceiling as an attachment.

Lining internal walls

Internal walls do not require additional insulation or a vapour barrier if the rooms are used in similar ways. The insulation properties of the ClimaComfort panel already satisfy the minimum requirement (R_λ = 0,75 m²K/W) for insulation between rooms used in similar ways.

Roth wall heating and cooling systems based on the pipefix system



1. Roth edge insulating strips 80 mm
2. Wall
3. Roth pipefix Ø 11, Ø 14
4. Fixing screws with pin
5. Roth System Pipe Ø 11, Ø 14
6. 1st layer of plaster
7. Plaster base
8. 2nd layer of plaster
9. Wall covering

Description	Ø 11	Ø 14
H: Height of pipefix	13 mm	19 mm
H_p: Height of layer of plaster	10-15 mm	10-15 mm
H_{tot}: total height (without wall covering)	23-28 mm	29-34 mm

Roth wall heating and cooling systems with Roth pipefix Ø 11, plaster with 15 mm pipe covering (spread 12,5 K)

Pipefix plaster with 15 mm pipe covering Spread 12,5 K Ø 11			Heating medium temp. 35 °C		Heating medium temp. 40 °C		Heating medium temp. 45 °C		Heating medium temp. 50 °C		Heating medium temp. 55 °C	
	Installation spacing	System pipe requirement 11 mm	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature
	VA (cm)	L (m/m²)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)
Inside temperature **15 °C**	7,5	13,3	113	29,1	142	37,8	170	36,3	198	39,8	227	-
	15,0	6,4	91	26,4	114	29,3	137	32,3	159	34,9	182	37,8
	22,5	4,4	73	24,1	92	26,5	110	28,8	128	31,0	146	33,3
Inside temperature **18 °C**	7,5	13,3	96	30,0	125	33,6	153	37,1	181	-	210	-
	15,0	6,4	77	27,6	100	30,5	123	33,4	146	36,3	168	39,0
	22,5	4,4	62	25,8	81	28,1	99	30,4	117	32,6	135	34,9
Inside temperature **20 °C**	7,5	13,3	85	30,6	113	34,1	142	37,8	170	-	199	-
	15,0	6,4	68	28,5	91	31,1	114	34,3	137	37,1	159	39,9
	22,5	4,4	55	26,9	73	29,1	92	31,5	110	33,8	128	36,0
Inside temperature **22 °C**	7,5	13,3	74	31,3	102	34,8	130	38,3	159	-	187	-
	15,0	6,4	59	29,4	82	32,3	105	35,1	127	37,9	150	-
	22,5	4,4	48	28,0	66	30,3	84	32,5	103	34,9	121	37,1
Inside temperature **24 °C**	7,5	13,3	62	31,8	91	35,4	119,0	38,9	147	-	176	-
	15,0	6,4	50	30,3	73	33,1	95,6	36,0	118	38,8	141	-
	22,5	4,4	40	29,0	59	31,4	76,9	33,6	95	35,9	114	38,3

Roth wall heating and cooling systems with Roth pipefix Ø 14, plaster with 15 mm pipe covering (spread 12,5 K)

Pipefix plaster with 15 mm pipe covering Spread 12,5 K Ø 14			Heating medium temp. 35 °C		Heating medium temp. 40 °C		Heating medium temp. 45 °C		Heating medium temp. 50 °C		Heating medium temp. 55 °C	
	Installation spacing	System pipe requirement 14 mm	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature	Thermal output max.	Average surface temperature
	VA (cm)	L (m/m²)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)	q (W/m²)	ϑo (°C)
Inside temperature **15 °C**	10	10,00	120,33	28,86	150,42	31,50	180,50	34,15	210,58	36,79	240,67	39,44
	15	6,60	104,96	25,30	131,19	27,27	157,43	29,23	183,67	31,20	209,91	33,16
	20	5,00	87,96	22,98	109,94	24,50	131,93	26,02	153,92	27,54	175,91	29,07
	25	4,00	70,96	21,44	88,69	22,67	106,43	23,90	124,17	25,13	141,91	26,36
	30	3,30	53,94	20,39	67,42	21,41	80,91	22,44	94,39	23,47	107,87	24,50
	35	2,80	36,93	19,62	46,16	20,50	55,40	21,38	64,63	22,26	73,86	23,15
Inside temperature **18 °C**	10	10,00	102,28	30,28	132,37	32,92	162,45	35,56	192,53	38,21	222,62	40,85
	15	6,60	89,21	27,12	115,45	29,09	141,69	31,05	167,93	33,02	194,17	34,98
	20	5,00	74,76	25,07	96,75	26,59	118,74	28,11	140,73	29,63	162,72	31,15
	25	4,00	60,31	23,71	78,05	24,94	95,79	26,17	113,53	27,40	131,27	28,62
	30	3,30	45,85	22,77	59,33	23,80	72,82	24,82	86,30	25,85	99,78	26,88
	35	2,80	31,39	22,09	40,62	22,97	49,86	23,85	59,09	24,74	68,32	25,62
Inside temperature **20 °C**	10	10,00	90,25	31,22	120,33	33,86	150,42	36,51	180,50	39,15	210,58	41,79
	15	6,60	78,72	28,34	104,96	30,30	131,19	32,27	157,43	34,23	183,67	36,20
	20	5,00	65,97	26,46	87,96	27,98	109,94	29,50	131,93	31,02	153,92	32,55
	25	4,00	53,22	25,22	70,96	26,45	88,69	27,67	106,43	28,90	124,17	30,13
	30	3,30	40,45	24,36	53,94	25,39	67,42	26,41	80,91	27,44	94,39	28,47
	35	2,80	27,70	23,74	36,93	24,62	46,16	25,50	55,40	26,38	64,63	27,27
Inside temperature **22 °C**	10	10,00	78,22	32,17	108,30	34,81	138,38	37,45	168,47	40,09	198,55	42,74
	15	6,60	68,22	29,55	94,46	31,52	120,70	33,48	146,94	35,45	173,18	37,41
	20	5,00	57,17	27,85	79,16	29,37	101,15	30,89	123,14	32,42	145,13	33,94
	25	4,00	46,12	26,73	63,86	27,95	81,60	29,18	99,34	30,41	117,08	31,64
	30	3,30	35,06	25,95	48,54	26,98	62,03	28,00	75,51	29,03	89,00	30,06
	35	2,80	24,01	25,39	33,24	26,27	42,47	27,15	51,70	28,03	60,94	28,91
Inside temperature **24 °C**	10	10,00	66,18	33,11	96,27	35,75	126,35	38,39	156,43	41,04	186,52	43,68
	15	6,60	57,73	30,77	83,96	32,73	110,20	34,70	136,44	36,66	162,68	38,63
	20	5,00	48,38	29,24	70,36	30,76	92,35	32,29	114,34	33,81	136,33	35,33
	25	4,00	39,03	28,24	56,76	29,46	74,50	30,69	92,24	31,92	109,98	33,15
	30	3,30	29,67	27,54	43,15	28,57	56,63	29,59	70,12	30,62	83,60	31,65
	35	2,80	20,31	27,04	29,55	27,92	38,78	28,80	48,01	29,68	57,24	30,56

Roth ClimaComfort® Panel System Ø 14

Covering	Thermal resistance of surface R_λ = 0,00 m²K/W, corresponds to Paint, wallpaper, fine filler Spread 7,5 K	Installation spacing	System pipe req. 14 mm	Heating medium temperature ϑH 35 °C			Heating medium temperature ϑH 40 °C			Heating medium temperature ϑH 45 °C			Heating medium temperature ϑH 50 °C		
				Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area
		VA	L	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR
		[cm]	[m/m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]
Rigips Climafit 10 mm	Inside temperature	10	10,0	100	28,4	8,50	129	31,4	7,50	158	34,5	6,50	188	37,6	6,00
	18,00 °C	20	5,0	82	26,6	12,50	107	29,1	10,50	131	31,6	9,50	155	34,2	8,50
	Inside temperature	10	10,0	88	29,2	9,50	117	32,2	8,00	147	35,3	7,00	176	38,3	6,00
	20,00 °C	20	5,0	73	27,6	13,50	97	30,1	11,50	121	32,6	10,00	145	35,1	9,00
	Inside temperature	10	10,0	76	29,9	10,50	106	33,0	8,50	135	36,1	7,00	164	39,1	6,50
	22,00 °C	20	5,0	63	28,6	15,00	87	31,1	12,00	112	33,6	10,50	136	36,1	9,00
	Inside temperature	10	10,0	65	30,7	11,50	94	33,8	9,00	123	36,8	7,50	153	39,9	6,50
	24,00 °C	20	5,0	53	29,6	16,50	78	32,1	13,00	102	34,6	11,00	126	37,1	9,50
Rigips Bauplatte RB 12,5 mm	Thermal resistance of surface R_λ = 0,00 m²K/W, corresponds to Paint, wallpaper, fine filler Spread 7,5 K	Installation spacing	System pipe req. 14 mm	Heating medium temperature ϑH 35 °C			Heating medium temperature ϑH 40 °C			Heating medium temperature ϑH 45 °C			Heating medium temperature ϑH 50 °C		
				Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area
		VA	L	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR
		[cm]	[m/m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]
	Inside temperature	10	10,0	82	26,5	9,50	106	29,0	8,50	130	31,6	7,50	154	34,1	6,50
	18,00 °C	20	5,0	68	25,1	14,00	88	27,1	12,00	108	29,2	10,50	128	31,3	9,50
	Inside temperature	10	10,0	72	27,5	10,50	96	30,0	9,00	121	32,5	7,50	145	35,1	7,00
	20,00 °C	20	5,0	60	26,2	15,50	80	28,3	13,00	100	30,4	11,00	120	32,5	10,00
	Inside temperature	10	10,0	63	28,5	11,50	87	31,0	9,50	111	33,5	8,00	135	36,1	7,00
	22,00 °C	20	5,0	52	27,4	17,00	72	29,5	14,00	92	31,5	11,50	112	33,6	10,50
	Inside temperature	10	10,0	53	29,5	13,00	77	32,0	10,00	101	34,5	8,50	125	37,1	7,50
	24,00 °C	20	5,0	44	28,6	19,00	64	30,6	15,00	84	32,7	12,50	104	34,8	11,00
Fermacell Powerpanel H2O	Thermal resistance of surface R_λ = 0,00 m²K/W, corresponds to Paint, wallpaper, fine filler Spread 7,5 K	Installation spacing	System pipe req. 14 mm	Heating medium temperature ϑH 35 °C			Heating medium temperature ϑH 40 °C			Heating medium temperature ϑH 45 °C			Heating medium temperature ϑH 50 °C		
				Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area
		VA	L	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR
		[cm]	[m/m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]
	Inside temperature	10	10,0	73	25,6	10,50	94	27,8	9,00	115	30,0	8,00	137	32,2	7,00
	18,00 °C	20	5,0	60	24,3	15,00	78	26,1	13,00	96	28,0	11,50	114	29,8	10,00
	Inside temperature	10	10,0	64	26,7	11,50	86	28,9	9,50	107	31,1	8,50	128	33,4	7,50
	20,00 °C	20	5,0	53	25,5	16,50	71	27,4	14,00	89	29,2	12,00	106	31,1	10,50
	Inside temperature	10	10,0	56	27,8	12,50	77	30,0	10,00	98	32,2	8,50	120	34,5	7,50
	22,00 °C	20	5,0	46	26,8	18,00	64	28,6	15,00	82	30,5	12,50	99	32,3	11,00
	Inside temperature	10	10,0	47	28,9	14,00	68	31,1	11,00	90	33,3	9,00	111	35,6	8,00
	24,00 °C	20	5,0	39	28,1	20,00	57	29,9	16,00	75	31,8	13,50	92	33,6	11,50
Eternit dry construction Hydropanel	Thermal resistance of surface R_λ = 0,00 m²K/W, corresponds to Paint, wallpaper, fine filler Spread 7,5 K	Installation spacing	System pipe req. 14 mm	Heating medium temperature ϑH 35 °C			Heating medium temperature ϑH 40 °C			Heating medium temperature ϑH 45 °C			Heating medium temperature ϑH 50 °C		
				Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area	Thermal output max.	Average surface temp.	Max. heating circ. area
		VA	L	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR	q	ϑo	AHKR
		[cm]	[m/m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]	[W/m²]	[°C]	[m²]
	Inside temperature	10	10,0	87	27,0	9,50	112	29,7	8,00	138	32,4	7,00	164	35,0	6,50
	18,00 °C	20	5,0	72	25,5	13,50	93	27,7	11,50	114	29,9	10,00	135	32,0	9,00
	Inside temperature	10	10,0	77	28,0	10,50	102	30,6	8,50	128	33,3	7,50	153	36,0	6,50
	20,00 °C	20	5,0	63	26,6	15,00	84	28,8	12,50	105	31,0	10,50	127	33,2	9,50
	Inside temperature	10	10,0	66	28,9	11,50	92	31,6	9,00	118	34,2	8,00	143	36,9	7,00
	22,00 °C	20	5,0	55	27,7	16,50	76	29,9	13,50	97	32,1	11,50	118	34,3	10,00
	Inside temperature	10	10,0	56	29,9	12,50	82	32,5	10,00	107	35,2	8,50	133	37,8	7,00
	24,00 °C	20	5,0	46	28,8	18,00	67	31,0	14,50	89	33,2	12,00	110	35,4	10,50

Installation requirements

Structural requirements

Roth wall heating and cooling systems can be installed on brick/stone walls, prefabricated or concrete walls, and dry-type walls mounted on partition structures.

- The walls need to satisfy the structural requirements for bearing wall heating and cooling systems and any specified structural engineering requirements.
- Angle and evenness tolerances for walls must comply with DIN 18202 (Tolerances in building construction).
- Any electrical or sanitation work involving the untreated walls must be completed and properly defined.
- Walls must be dry and free of any significant dirt.
- Any existing construction joints on the wall must be of the same width, have clean edges and straight lines, and run flush along the surface. Wall surfaces must be interrupted when crossing structural joints within buildings.
- Windows and doors must be fitted before installing the Roth wall heating and cooling system. If necessary, non-glazed openings should be covered with film.
- During installation of the Roth wall heating and cooling system and when the plaster is being applied, the temperature of the ambient air must not fall bellow +5 °C.
- The relevant processing instructions of the plaster and smoothing agent manufacturers must be observed. Thermal insulation plasters are not suitable for wall heating and cooling systems.

During installation of Roth wall heating and cooling systems, it is important to bear the following information in mind when fitting or processing the individual system components:

- The surface of the wall must be dry, firm, and even.
- Any residual mortar or concrete must be removed. Any substances like oil, dust, wax, paint, or solvent residue must be removed to ensure the surface is smooth and free of dust and grease.
- Any cracks must be properly filled.
- Surfaces where moisture may be a factor must be properly sealed.
- Once they have been prepared this way, the surfaces of the wall are coated with a primer.
- Any of the various commercially available plasters can be used for the plaster layer (e.g. lime plaster, clay plaster, gypsum plaster).

Wall joints: Roth Pipefix System Ø 11, Ø 14

- To ensure there is some 5 mm room for manoeuvre, Roth edge insulating strip should be fitted all the way around any surrounding walls, ceilings, fixtures/fittings, and floors without leaving any gaps. Any protruding remnants should only be cut off once all work is complete.
- Expansion joints and the resulting heating circuit lengths need to be clarified with the designer before work starts and in line with the provisions under DIN 18560. According to these, feeder lines to individual heating circuits may cut across expansion joints. These feeder lines need to be fitted with a flexible protective pipe at least 600 mm long, ensuring the pipes on either side of the joint are surrounded for at least 300 mm. Roth pipefix rails should be installed vertically from floor to ceiling.
- During installation of Roth System Pipes, the bending radius must not be less than 5 x da.

Tools

The following tools are recommended or required when installing Roth wall heating and cooling systems:

- Roth pipe cutter
- Open-end spanner SW 30 mm
- Roth knife
- Roth calibration tool
- Tape measure or folding ruler

For installing the Roth ClimaComfort® Panel System on walls or ceilings:

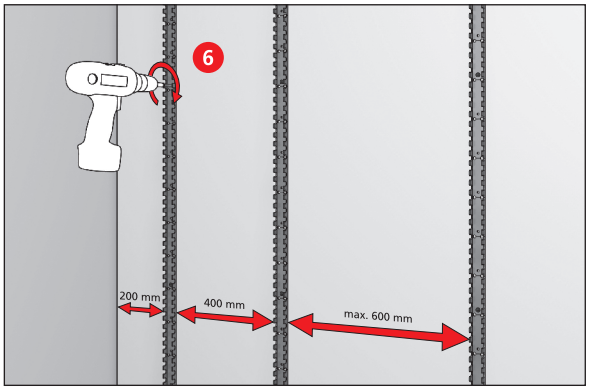
- Drywall screwdriver with stop

Accessories, dry construction, and covering:
From Rigips, for example, or a similar manufacturer:
Rigips CD 60/27 ceiling profile
Rigips UD 28 connection profiles
Rigips connection seal
Rigips CD 60/27 adjustment clamp

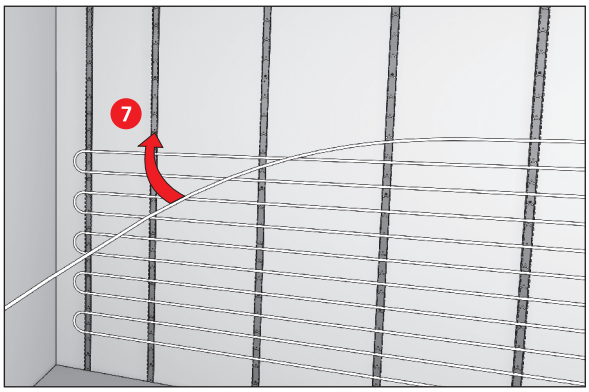
Screws needed:
Roth ClimaComfort® Panel System:
Dry wall screw 3,5 x 35 mm
For dry construction panels up to 12,5 mm:
Dry wall screws 3,5 x 45 mm
For Rigips Climafit 10 mm:
Rigips Climafit Gold TN dry wall screws
3,5 x 45 mm

Construction type A, plaster system: Roth Pipefix System Ø 11, Ø 14

1. Check the installation requirements.
2. Install the Roth edge insulating strip.
3. If applicable, decide on the expansion joints in the wall structure.
4. If applicable: apply the installation. Use a suitable mounting material (adhesive/insulation pins) to ensure the insulation is adequately secured.
5. Depending on the plaster type, coat the surface with a suitable primer.
6. Use Roth attachment pins to attach the Roth pipefix to the insulation.
   Also secure each pipefix rail element to the supporting wall structure at various points. If you are not using insulation, attach the pipefix with pins and screws to the wall itself.

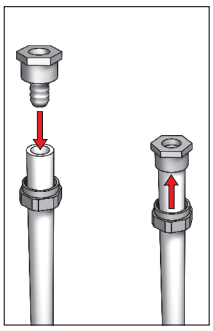


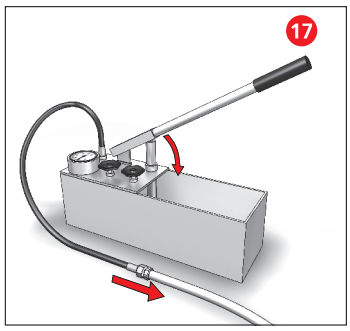
7. Once you have installed the Roth pipefix, lay the Roth system pipes in a meandering pattern rising up the wall and press them into the pipefix rails (from bottom to top).

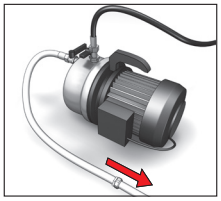


8. Pressure test with a view to conducting a leak test on radiant heating and cooling systems in accordance with DIN EN 1264, Part 4.

   Procedure:
   Check the heating and cooling circuits within the Roth ClimaComfort® Panel System for leaks before and during the plastering phase by performing a water or compressed air test.

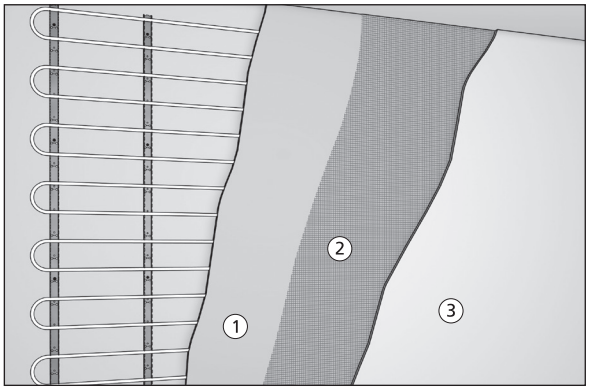






Pressure test (protocol p. 25)

9. Apply the plaster in **two** stages.
   Firstly, surround the Roth System Pipe with plaster ①. Then press some form of plaster reinforcement material (made of metal, mineral-based fibres, or plastic fibres, for example) into the fresh layer of plaster ②.
   The next, **second layer of plaster should cover the pipe by 10 to 15 mm**. Any of the various commercially available plaster materials can be used for the plaster layer (e.g. lime plaster, clay plaster, gypsum plaster). ③

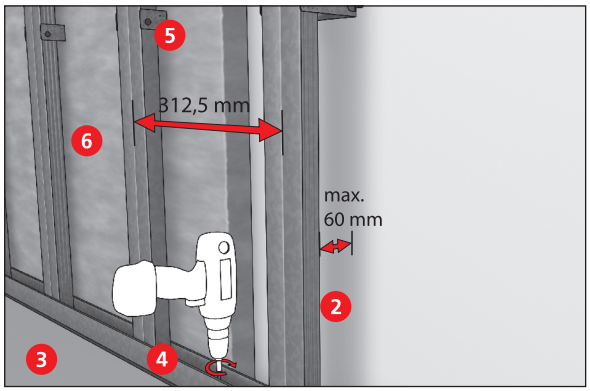


10. Roth wall heating and cooling systems installed using a cement-bonded plaster or smoothing agent may only be heated up 21 days after the plaster or smoothing agent was applied.
    With a gypsum-bonded plaster or smoothing agent, and also with clay plaster, you need to wait at least 7 days. Be sure to follow the instructions provided by the plaster manufacturer in either case.

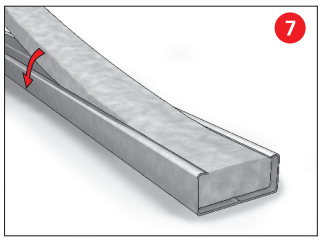
11. Once this work is complete, you can apply additional wall coverings (e.g. wallpaper, tiles).

Construction type B, dry construction system: Roth ClimaComfort® Panel System, wall with interior insulation Ø 14

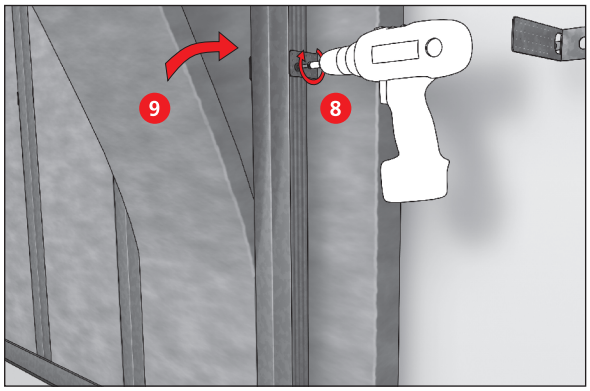
The Roth ClimaComfort® Panel System is designed for fitting metal substructures in dry construction applications. Installation should be based on the processing guidelines under DIN 18181.



1. Check the installation requirements.
2. Determine the wall clearance (insulation thickness max. 6 cm).
3. Stick a self-adhesive connection seal under the U-shaped profile for sound absorption.
4. Be sure to leave the required wall clearance when fitting the U-shaped profile.
5. Attach the adjustment clamps to the wall. Leave <125 mm between the adjustment clamps and 312,5 mm between each profile centre.
6. Fit the rear insulation, ensuring the whole of the wall is covered.

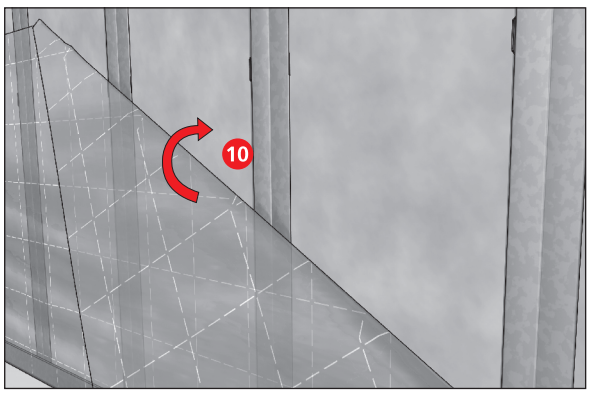


7. Make sure the wall profile is also filled with insulating material to avoid thermal bridges.



8. Screw CD profiles to the adjustment clamps.

9. Fit out the area between the profiles or partitions with insulation.



10. Apply a vapour barrier in accordance with the manufacturer's instructions.

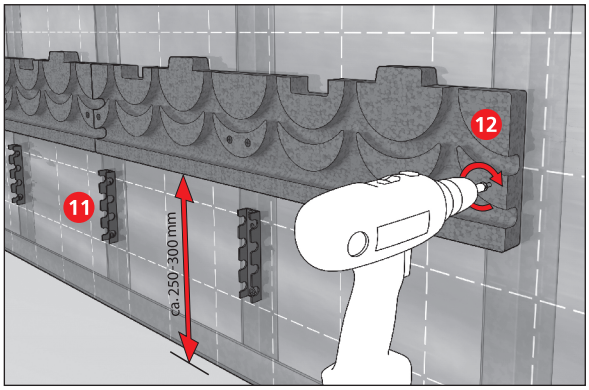
Use an adhesive or adhesive tape to seal the joints and connection areas with in accordance with the manufacturer's instructions to prevent moisture from condensing on the 'cold' side of the insulation.

Make sure the vapour barrier is not damaged during the rest of the installation process (apart from screw-in points).

Allow around 250 to 300 mm of installation space in the bottom section for introducing forward and return flow pipes and other installations.

11. To make it easier to secure the forward and return flow pipes, attach pipefix rails Ø14 to the profiles.

12. Screw the pipe guide panels to the specified screw positions on the CD profile.
The screw positions are indicated in the panel to facilitate installation.

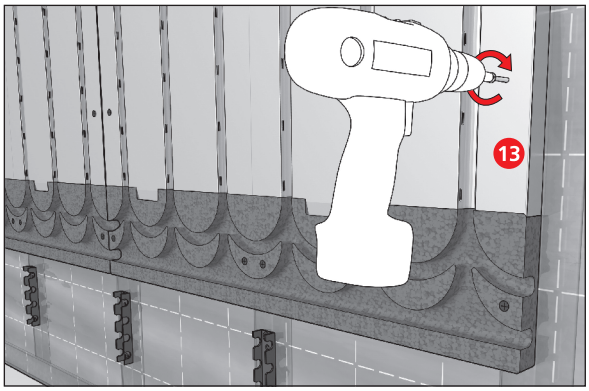


13. Attach the panels.
The screw positions are indicated by bore holes to facilitate installation.

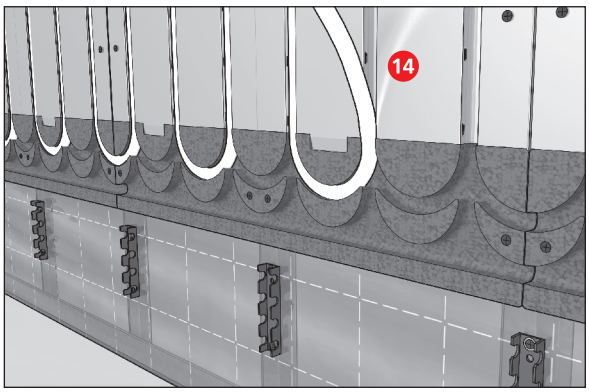
Depending on the particular needs/room size, you can use either a circular saw or a jigsaw to cut the ClimaComfort panels. For a clean cut edge, make sure the metal side is facing downwards!

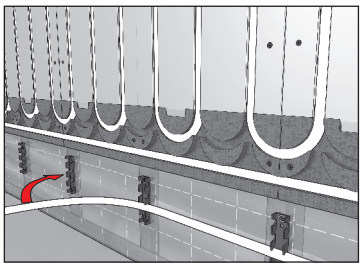
The pipe guidance area must be clean and free of burrs at the cut edge to avoid damaging the pipe.

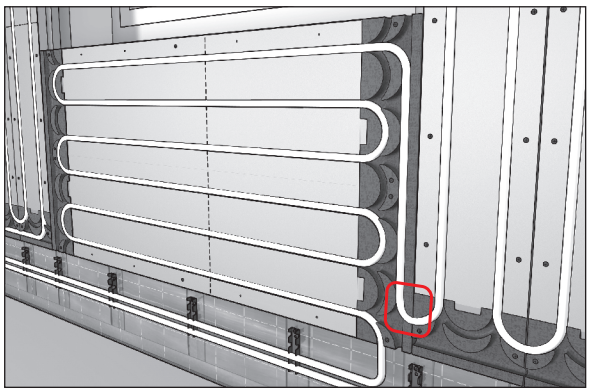
Recesses need to be made in the ClimaComfort panels where any electrical installations or other installation elements need to be accommodated.



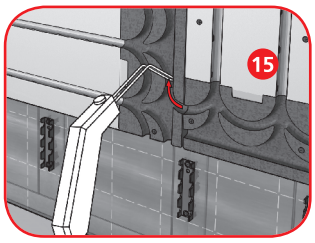
14. Lay the System Pipe X-PERT S5®+.



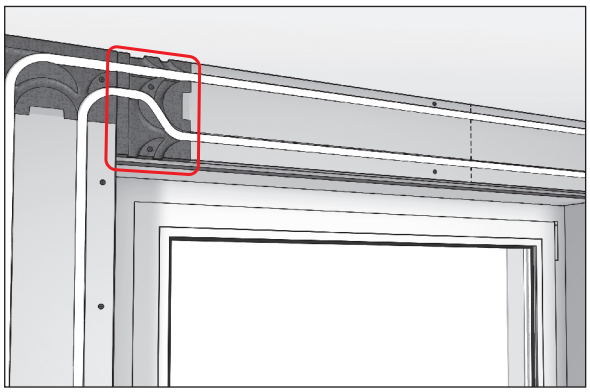




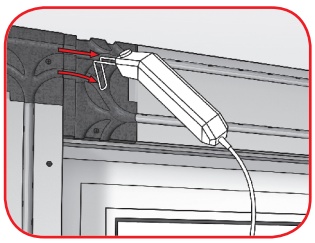
15. You can make suitable incisions in the baffle plates to connect the installation area to the ClimaComfort panels.

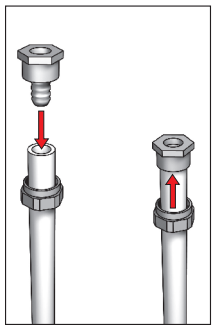


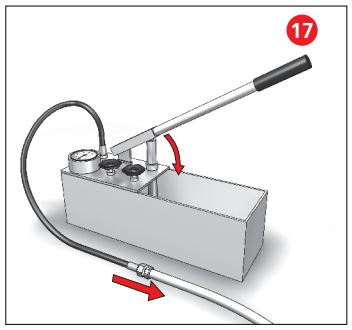
16. With ClimaComfort panels arranged horizontally to the profiles, you may need to arrange additional profiles to support the guide panels.

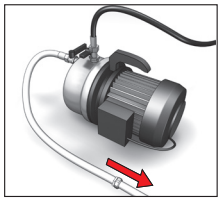


The equipment can only be installed above windows/doors if there are no roller shutter casings accessible from inside the property.









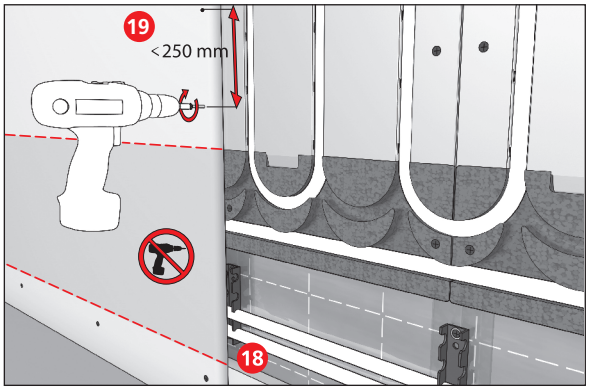
17. Pressure test with a view to conducting a leak test on radiant heating and cooling systems in accordance with DIN EN 1264, Part 4.

Procedure:
Check the heating and cooling circuits within the Roth ClimaComfort® Panel System for leaks before covering with dry construction panels by performing a water or compressed air test. Tightness against leaks must be ensured immediately before and during installation of the dry construction panels.

Pressure test (protocol p. 25)

18. Screw a 25 mm bar to the profiles at the bottom to ensure the dry construction panel is adequately stabilised.

19. Attach the dry construction panel.
Arrange the panel joints at intervals of 312,5 mm along the ClimaComfort panels, avoiding any cross joints.



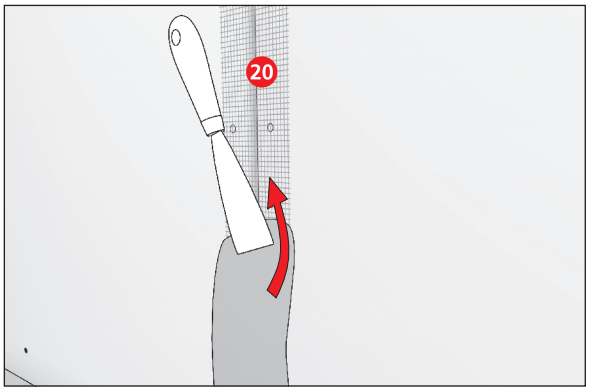
Make sure you size and mark the fixing points very precisely to avoid the system pipes becoming damaged! You will need to use special fixing points when providing the covering for horizontally arranged pipe sockets and ClimaComfort panels laid horizontal to the profiles.

The system pipes cross the supporting profiles in the baffle plate area; do not use any screws in these areas!

Where possible, arrange the panel joints for the Roth ClimaComfort® Panels and dry construction panels at intervals; avoid cross joints.

20. Smooth over the edges using joint tape in accordance with the manufacturer's instructions.

Smooth over all edges and screws. Apply joint tape to all joints to prevent stress cracks. Keep on sanding down and smoothing over until you achieve the desired surface quality.



21. Functional heating or cooling (protocol p. 28)
Follow the manufacturer's instructions to achieve the surface you want.

Construction type B, dry construction system: Roth ClimaComfort® Panel System, wall without interior insulation Ø 14

There is no need for an additional layer of insulation on internal walls with no additional thermal or sound insulation requirements or external walls where the standard of insulation is already adequate.

- Stick a self-adhesive connection seal under the U-shaped connection profile for sound absorption.
- Attach the U-shaped connection profile all the way around.
- Attach the adjustment clamps at 312,5 mm intervals halfway up the wall.
- Attach the CD profiles.
- There is no need for a vapour barrier.

Continue with installations step 8, 'wall with interior insulation' (not including points 9 and 10), on page 20.

Leak test protocol

with a view to conducting a leak test on radiant heating and cooling systems in accordance with DIN EN 1264, Part 4

Building project: _____

Client: _____

Contractor: _____

As part of the above-mentioned building project, the following Roth radiant heating and cooling system has been installed:

System	Pipe type	
☐ **Roth Original Tacker® System**	☐ **Roth DUOPEX S5®**	☐ **Ø14** ☐ **Ø17** ☐ **Ø20** ☐ **Ø25**
☐ **Roth Knob System**		
☐ **Roth ClimaComfort® Dry Construction System**		
☐ **Roth Pipefix System**	☐ **Roth X-PERT S5®+**	☐ **Ø14** ☐ **Ø16** ☐ **Ø17** ☐ **Ø20**
☐ **Roth ClimaComfort® Panel System**		
☐ **Roth ClimaComfort® Compact System**		
☐ **Roth industrial radiant heating/ not residential buildings**	☐ **Roth Alu-Laserflex**	☐ **Ø14** ☐ **Ø16**
☐ **Roth sport and sprung floor heating**	☐ **Roth ClimaComfort® S5**	☐ **Ø11**
☐ **Roth structural temperature control**	☐ **Roth PERTEX® S5**	☐ **Ø17**
☐ **Roth outdoor panel heating**		

The leak test can be performed using water, pressurised air, or inert gas.
The heating circuits have been checked for leaks before applying the load-distribution layer. All lines have been sealed with metal plugs, caps, or similar devices. Any apparatus, pressure containers, or fittings not needed for the pressure test have been removed from the lines.

Ambient temperature: _____ °C
Testing medium temperature: _____ °C

Leak test protocol

Testing medium, pressurised air or inert gas:

☐ Oil-free pressurised air ☐ Nitrogen ☐ Carbon dioxide

☐ _____

All lines have been sealed with metal plugs, caps, blanking plates, or blind flanges.
Any apparatus, pressure containers, or fittings not suitable for the pressure test have been removed from the lines.

☐ All pipe connections have been visually inspected to check they have been properly arranged

Test pressure: _____ 110 mbar

Test period (up to 100 l line volume) 30 min
For each additional 100 l _____ + 10 min

We waited until temperatures had been calibrated and a state of stability had been achieved in terms of any plastic materials before starting the test period.

Line volume: _____ l **Test period:** _____ min

☐ **No drop in pressure has been detected during the test period.**
☐ **There is no evidence of leaks.**
☐ **The test criteria have been satisfied.**

Load testing at increased pressure

Test pressure Ø ≤50 mm: _____ bar (maximum of 3 bar)
Test period: _____ min (minimum 10 min)

We waited until temperatures had been calibrated and a state of stability had been achieved in terms of any plastic materials before starting the test period.

☐ **No drop in pressure has been detected during the test period.**
☐ **There is no evidence of leaks.**
☐ **The test criteria have been satisfied.**

Town/City: _____ Date: _____

Builder/Client Stamp/Signature	Building manager/Architect Stamp/Signature	Heating engineering company/Installation company Stamp/Signature

Leak test protocol

Testing medium, water:

The test pressure must **not be less than 4 bar** and **not more than 6 bar.**

☐ The fill-up water has been filtered and the heating circuits fully vented.

☐ The temperature difference between the fill-up water and the environment does not exceed 10 °C.

Main test for smaller installations (e.g. on each floor) or preliminary test for large objects
Test period: 60 min

1. Permissible test pressure

P_{test} = 1,5 x $P_{operation}$ **P_{test} Test pressure applied: _____ bar**

2 x P_{test} in 30 min Test pressure generated twice within 30 min.
Time intervals between tests 10 min

2. Permissible pressure drop in 30 min

Max. 0,6 bar (0,1 bar/5 min)

P_{min} = P_{test} - 0,6 bar **$P_{act} \geq P_{min}$ (after 30 min): _____ bar**

☐ **There is no evidence of leaks.**

☐ **The test criteria have been satisfied.**

Main test for large objects (if required)
Test period 120 min

Permissible pressure drop: max. 0,2 bar

P_{min} = P_{test} - 0,2 bar **$P_{act} \geq P_{min}$ (after 120 min): _____ bar**

☐ **There is no evidence of leaks.**

☐ **The test criteria have been satisfied.**

Suitable measures need to be taken if there is a risk of frost. These include using antifreeze and temperature equalisation of the building. At the time the system began normal operation, any antifreeze can be drained and disposed of in accordance with national occupational health and safety requirements.
The system then needs to be rinsed out 3 times with clean water.

Town/City: _____ Date: _____

_____	_____	_____
Builder/Client Stamp/Signature	Building manager/Architect Stamp/Signature	Heating engineering company/Installation company Stamp/Signature

Functional heating/cooling protocol

for radiant heating and cooling systems, wall heating and cooling systems

Building project: _____

Client: _____

Construction stage: _____

Component: _____

Requirements

Functional heating should be performed to test whether the heated or cooled floor, wall, or ceiling structures are working properly.
With dry systems, functional heating should only be performed once any smoothing over or adhesive work is complete. The smoothing agent or adhesive must be allowed to harden over. Any manufacturer's instructions must be followed. It is important to observe the maximum specified inlet temperature (usually up to 45 °C) for 1 day.
If there is a risk of frost, the installation should then be left running accordingly. Any manufacturer specifications which deviate from the standard or this protocol should be observed and logged as well.

☐ Wall ☐ Ceiling ☐ Panel Ø 14 ☐ Roth pipefix Ø 11 ☐ Roth pipefix Ø 14

Documentation

Type of heat distribution layer (if necessary, the actual product): _____

Bonding agent used: _____

End of work on heat distribution layer (date): _____

Start of functional heating (date): _____

At constant max. specified inlet temperature t_V= _____ °C (if necessary, using manual control)

End of functional heating (date): _____

Suitable protective measures need to be adopted if there is a risk of frost (e.g. frost protection mode).
The rooms were ventilated without draughts and all windows are outer doors closed after the radiant heating and cooling system was switched off.

☐ Yes ☐ No

The installation was approved for further building work at an outside temperature of _____ °C.

☐ The installation was not in use at the time.

☐ The heat distribution layer was heated to an inlet temperature of _____ °C.

Caution: When switching off the radiant heating after the heating up period, the heating surface needs to be protected from draughts and from cooling down too quickly until it is completely cold.

Confirmation:

Builder/Client Stamp/Signature	Building manager/Architect Stamp/Signature	Heating engineering company/Installation company Stamp/Signature

Standards and directives

The following laws, directives, guidelines, and standards need to be taken into account when planning and creating a heating installation:

- German Energy Conservation Act (Energieeinsparungsgesetz - EnEG)
- German Energy Saving Directive (Energieeinsparverordnung - EnEV)
- German Heating Costs Directive (Heizkostenverordnung - HeizkostenV)
- The individual administrative instructions from the various German states regarding the EnEG

Standards, guidelines, and German Contract Procedures for Building Works (Verdingungsordnung für Bauleistungen - VOB):

- DIN 1168 Building plasters
- DIN 4108 Thermal insulation in buildings
- DIN 4109 Sound insulation in buildings
- DIN 4701 Part 10 Energy Efficiency of Heating and Ventilation Systems in Buildings
- DIN 4726 Warm water surface heating systems and radiator connecting systems - Plastics piping systems and multilayer piping systems
- DIN 18168 Ceiling linings and suspended ceilings with gypsum plasterboards
- DIN 18180 Gypsum plasterboards
- DIN 18181 Gypsum plasterboards for building construction
- DIN 18182 Accessories for use with gypsum plasterboards
- DIN 18183 Cladding with gypsum plasterboards
- DIN 18195 Water-proofing of buildings
- DIN 18202 Tolerances in building construction - Structures
- DIN 18336 VOB, Part C: Waterproofing
- DIN 18340 VOB, Part C: Dry lining and partitioning work
- DIN 18350 VOB, Part C: Plastering and rendering
- DIN 18352 VOB, Part C: Wall and floor tiling
- DIN 18380 VOB, Part C: Installation of central heating systems and hot water supply systems
- DIN 18382 electrical cable and wiring system in buildings
- DIN 18550 Plaster
- DIN 18557 Factory mortar
- DIN 18560 Floor screeds in building construction
- DIN V 18599 Energy efficiency of buildings – Calculation of the net, final and primary energy demand for heating, cooling, ventilation, domestic hot water and lighting
- DIN EN 1264 Water based surface embedded heating and cooling systems
- DIN EN 1991-1-1 Actions on structures
- DIN EN 12831 Heating systems in buildings - Method for calculation of the design heat load
- DIN EN 13162 – DIN EN 13171 Thermal insulation products for buildings
- DIN EN 13501 Fire classification of construction products and building elements
- DIN EN 13813 Screed material and floor screeds - Screed materials - Properties and requirements
- DIN EN 13914 Design, preparation and application of external rendering and internal plastering
- DIN EN 15243 Ventilation for buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems
- DIN EN ISO 7730 Ergonomics of the thermal environment - Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
- Data sheet 1: Site conditions (for dry lining and partitioning work involving plasterboard systems) (Baustellenbedingungen (für Trockenbauarbeiten mit Gipsplatten-Systemen)). Data sheet from the German Plaster Industry Association, plasterboard industrial group (Bundesverband der Gips- und Gipsbauplattenindustrie e.V. Industriegruppe Gipsplatten).
- Data sheet 2: Smoothing over plasterboard, surface qualities (Q1 - Q4) (Verspachtelung von Gipsplatten, Oberflächengüten (Q1 – Q4)). Data sheet from the German Plaster Industry Association, plasterboard industrial group (Bundesverband der Gips- und Gipsbauplattenindustrie e.V. Industriegruppe Gipsplatten).
- Data sheet 5: Bathrooms and wet rooms involving wooden or dry constructions (Bäder und Feuchteräume im Holzbau und Trockenbau). Data sheet from the German Plaster Industry Association, plasterboard industrial group (Bundesverband der Gips- und Gipsbauplattenindustrie e.V. Industriegruppe Gipsplatten).
- Data sheet 6: Pre-treatment of dry surfaces made from plasterboard before further surface covering or coating (Vorbehandlung von Trockenbauflächen aus Gipsplatten zur weitergehenden Oberflächenbeschichtung bzw. -bekleidung). Data sheet from the German Plaster Industry Association, plasterboard industrial group (Bundesverband der Gips- und Gipsbauplattenindustrie e.V. Industriegruppe Gipsplatten).
- VDI 2035 Part 2 Prevention of damage in water heating installations - Water-side corrosion

The guarantees and warranty conditions apply to Roth wall heating and cooling systems in accordance with the Roth warranty certificates enclosed with the products.

GUARANTEE DOCUMENT

Roth Floor Heating and Cooling Systems
Roth Pipe Installation Systems

1. Within 10 years from installation, yet no longer than 10 1/2 years after delivery of the system components, we will provide free product replacement of our choice, or repair and compensate for damage to the system components delivered by us if they are attributable to material defects or manufacturing faults.
Excluded from this are mechanical moving parts and products as well as electrical and electrically driven parts and products for which we provide the above-mentioned warranty within a period of 12 months from installation in cases of material defects or manufacturing faults.

2. Requirements for this guarantee are:

a. only system components belonging to the respective Roth radiant heating and cooling system/pipe installation system are used and fitted,
b. documented compliance of the planning, installation and operating instructions valid at the time of installation,
c. compliance with the standards and directives valid for these works and the applicable adjoining works in connection with the respective Roth radiant heating and cooling system/Roth pipe installation system,
d. that the installation company and the companies building and expanding the works are all recognised and approved specialist companies and these companies have provided confirmation on this certificate with their name and signature,
e. the immediate return of a copy of the completely filled out warranty certificate to us,
f. to immediately report damage and at the same time send the warranty certificate to us,
g. to raise the claim within the warranty period.

We are insured against claims from this promise by an extended public and product liability insurance policy with a sum insured of **Euro 5.000.000** for personal injury and material damage for each insured event.
The statutory consumer protection regulations remain unaffected by this warranty.

The above guarantee concerns:

Building _____

Builder _____

RADIANT HEATING AND COOLING SYSTEMS

- ☐ Roth Original Tacker® system
- ☐ Roth Knob System
- ☐ Roth ClimaComfort® TBS
- ☐ Roth ClimaComfort® Panel System
- ☐ Roth ClimaComfort® Compact System
- ☐ Roth Pipefix System
- ☐ Roth industrial radiant heating
- ☐ Roth sport and sprung floor heating
- ☐ Roth outdoor panel heating

PIPE INSTALLATION SYSTEMS

- ☐ Roth radiator connecting system
- ☐ Roth drinking water system

The system components belonging to the respective Roth radiant heating and cooling system or to the respective Roth pipe installation system were fully supplied and fitted on the day of installation.

Radiant heating and cooling system: _____ m^2 installed area

Radiator connecting system: _____ number of radiator connections

Drinking water system: _____ number of point of use connections

Specialist heating company: _____
Signature | Stamp | Installation date

Installed/extended works: _____
Signature | Stamp | Completion date

_____
Signature | Stamp | Completion date

Commissioning: _____
Signature | Stamp | Commissioning date

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Notes

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