Uponor Siccus technical guide

UNDERFLOOR HEATING AND COOLING

04 | 2013

The Siccus product line

The Uponor Siccus floor heating product line has been developed for use with suspended timber floors and is suitable for new constructions as well as for modernising old buildings. The panels are installed on the floor below the load distribution layer consisting of dry screed panels or heating screeds.

Uponor Siccus can be installed on any type of surface, and there is probably no product available in the market that is more compact. The minimum construction height is 50 mm. In new buildings, the floor construction height might be raised to 56 or 65 mm respectively, depending on the impact noise insulation requirements. There is normally no need to remove the existing floor covering, provided that it is level and has the necessary load capacity.

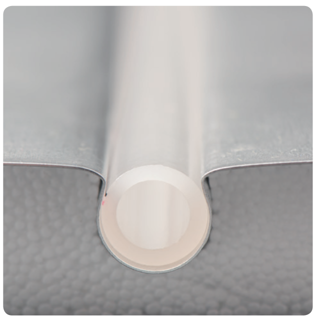
Uponor Siccus essentially consists of four components: the installation panel, the heat emission plate, the heating pipe and the PE foil. The heat emission plates and the Uponor heating pipes are placed in the guide channels of the Uponor installation panels. The installation panels are easy to cut to size and are fully equipped with channels for pipes, etc.

The integral pipe guide channels in the Siccus mounting sheet hold the heat conducting plates and heating pipes

The panels are joined butt to butt and can be adjusted to suit any room shape. If additional channels are required, they can be cut with any conventional electric cutting tool.

Simply place the installation panels on the level bare floor. If necessary provide additional insulation. The dimensional tolerances of the bare floor must meet the requirements in DIN 18202, 5/86, table 3 (line 4 for dry screed panes, line 3 for KB 650 cement screeds). Subsequently install the aluminium heat emission plates, which also serve as fixtures for the heating pipe.

The pipe spacing is based on the actual heating requirements: 15 cm, 22.5 cm or 30 cm. A PE type 200 intermediate foil separates the heating system from the load distribution layer.



Omega shape of the heat conduction plate ensures perfect heat transfer

Divide the heat conduction plate simply by bending it

Additional channels are created using the electric cutting tool

Siccus components

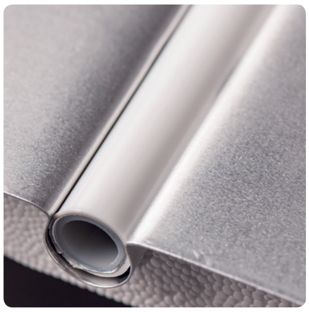
Just four components

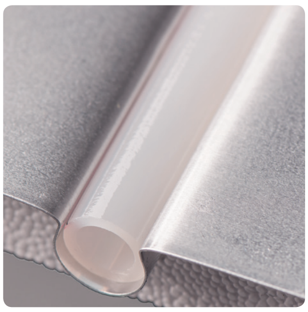
- Mounting sheet
- Heat conducting plate
- Heating pipe
- PE foil

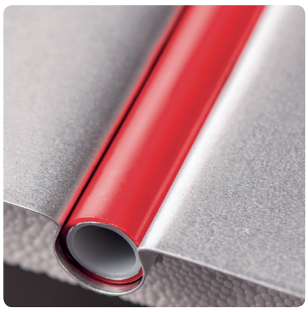
Applicable pipe types

The following pipes can be installed with Siccus:

- Uponor PE-Xa pipe (14 x 2.0 mm)
- Uponor MLCP RED composite pipe (14 x 1.6 mm)
- Uponor MLCP WHITE composite pipe (14 x 2.0 mm)



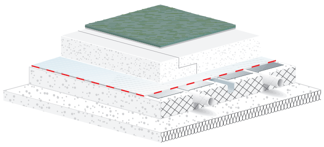




Design data

Uponor Siccus design tables (heating)

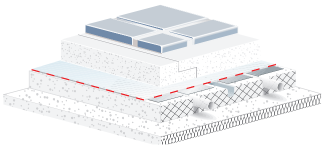
The design tables below allow for a fast approximate calculation of the pipe spacing and maximum heating circuit size. They do however not replace proper planning and calculation of the project.



Uponor Siccus load area for dry screed load distribution layer (nominal thickness 25 mm):

Design table (θ_i = 20 °C , $R_{\lambda,B}$ = 0.15 m²K/W)

			$\theta_{V,des}$ = 56 °C[1]		$\theta_{V,des}$ = 50 °C		$\theta_{V,des}$ = 45 °C
$\theta_{F,m}$ [°C]	q_{des} [W/m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]
27.5	82.5	15	7.5				
27.3	80	15	8.0				
26.9	75	15	13.0				
26.5	70	15	17.0				
26.1	65	22.5	12.5	15	9.0		
25.7	60	22.5	19.5	15	13.0		
25.2	55	22.5	26.0	15	17.5	15	8.0
24.8	50	30	16.0	22.5	16.5	15	13.0
24.4	45	30	27.5	22.5	23.0	15	18.0
≤ 23.9	≤ 40	30	38.0	22.5	29.5	15	21.0

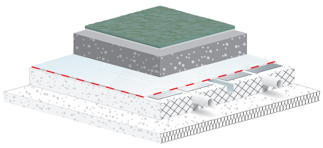


Design table for bathrooms (θ_i = 24 °C , $R_{\lambda,B}$ = 0.02 m²K/W)

			$\theta_{V,des}$ = 56 °C[1]		$\theta_{V,des}$ = 50 °C		$\theta_{V,des}$ = 45 °C
$\theta_{F,m}$ [°C]	q_{des} [W/m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]
33.0	100						
32.6	95						
32.2	90	15	16.5	15	6.0		
31.8	85	15	19.0	15	8.5		
31.3	80	15	21.0	15	11.0		
30.9	75	15	21.0	15	13.5		
30.5	70	15	21.0	15	16.0	15	8.0
≤ 30.1	≤ 65	15	21.0	15	18.0	15	11.0

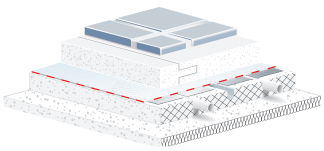
The values in the design tables are based on the following key figures:
$R_{\lambda, ins}$ = 0,75 m²K/W, θ_u = 20 °C, 130 mm concrete floor, spread = 3-30 K, max. heating circuit length = 150 m
max. pressure drop per heating circuit including 2 x 5 m connecting line Δp_{max} = 250 mbar
For other flow temperatures, thermal resistance values, etc. please refer to the design diagrams.
[1] For max. temperature load of dry sceeds please note the instructions from the manufacturer

Uponor Siccus load area for cement screed load distribution layer with KB 650N (nominal thickness 30 mm, heat conductivity 1.2 W/mK):



Design table (θ_i = 20 °C , $R_{\lambda,B}$ = 0.15 m²K/W)

			$\theta_{V,des}$ = 53.9 °C[1]		$\theta_{V,des}$ = 50 °C		$\theta_{V,des}$ = 45 °C
$\theta_{F,m}$ [°C]	q_{des} [W/m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]
29.0	100						
28.6	95	15	6.0				
28.2	90	15	9.0				
27.8	85	15	11.5	15	5.5		
27.3	80	15	14.5	15	8.5		
26.9	75	22.5	13.0	15	12.0		
26.5	70	22.5	17.0	15	15.0	15	6.0
26.1	65	22.5	21.0	22.5	14.0	15	10.0
25.7	60	30	14.5	22.5	18.5	15	14.0
25.2	55	30	21.0	22.5	23.0	15	17.0
24.8	50	30	28.0	30	19.0	22.5	18.5
24.4	45	30	34.5	30	26.5	22.5	24.0
≤ 23.9	≤ 40	30	42.0	30	34.0	30	22.0

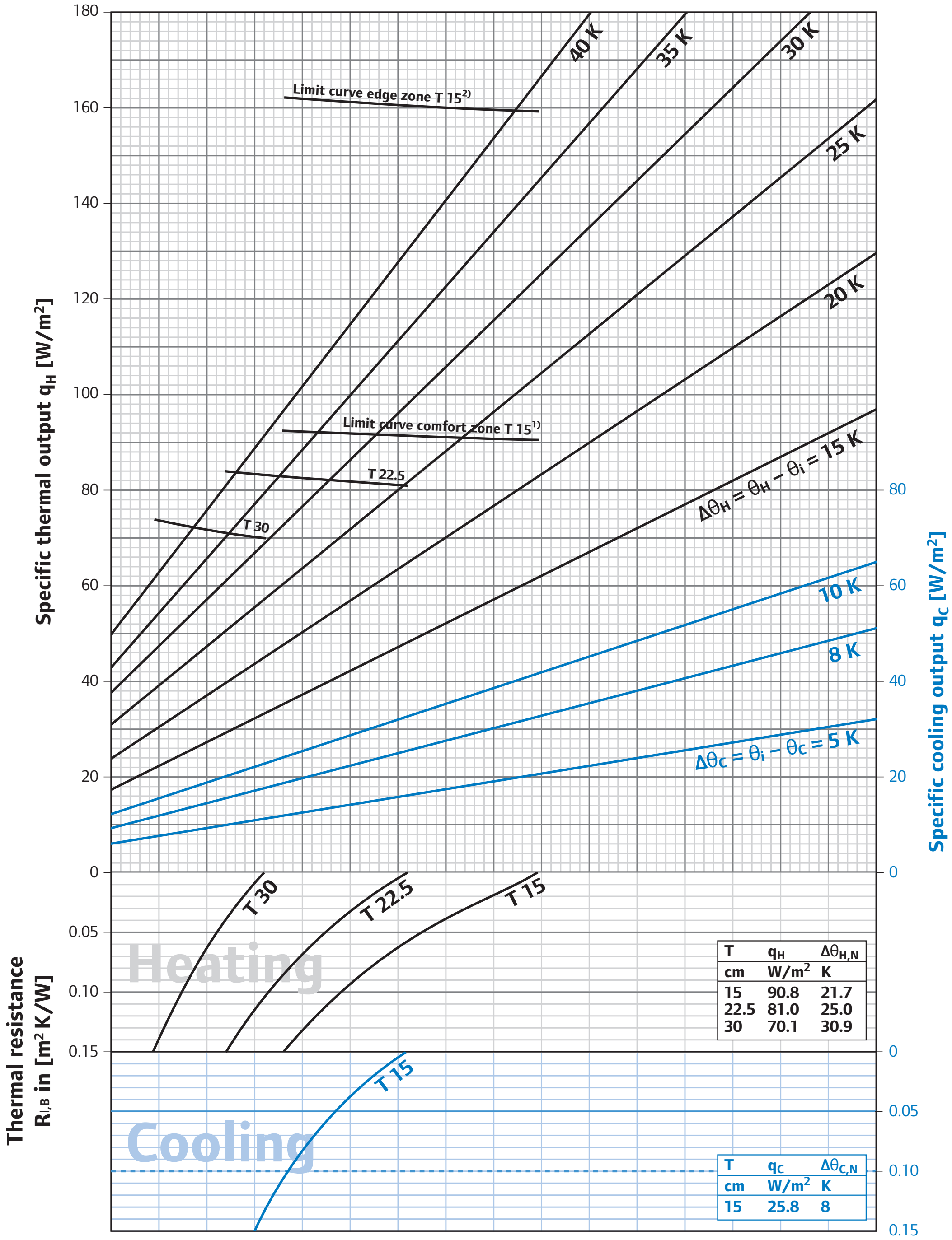


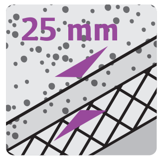
Design table for bathrooms (θ_i = 24 °C , $R_{\lambda,B}$ = 0.02 m²K/W)

			$\theta_{V,des}$ = 53.9 °C[1]		$\theta_{V,des}$ = 50 °C		$\theta_{V,des}$ = 45 °C
$\theta_{F,m}$ [°C]	q_{des} [W/m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]	T [cm]	$A_{Fmax.}$ [m²]
33.0	100						
32.6	95	15	18.5	15	15.0	15	9.0
32.2	90	15	20.0	15	16.5	15	11.0
31.8	85	15	21.0	15	18.0	15	12.5
31.3	80	15	21.0	15	19.5	15	14.0
30.9	75	15	21.0	15	21.0	15	15.5
30.5	70	15	21.0	15	21.0	15	17.0
≤ 30.1	≤ 65	15	21.0	15	21.0	15	19.0

The values in the design tables are based on the following key figures:
$R_{\lambda, ins}$ = 0,75 m²K/W, θ_u = 20 °C, 130 mm concrete floor, spread = 3-30 K, max. heating circuit length = 150 m
max. pressure drop per heating circuit including 2 x 5 m connecting line Δp_{max} = 250 mbar
For other flow temperatures, thermal resistance values, etc. please refer to the design diagrams.
[1] At $\theta_{V, des}$ > 53,9 °C the limit heat flow density and thus the max. fl oor surface temperature of 29 °C (33 °C for bathrooms) are exceeded.

Design diagram heating/cooling for Uponor Siccus 14 x 2 mm PE-Xa Pipe
with dry screed load distribution layer
($s_ü$ = 25 mm with $l_ü$ = 0.28 W/mK)





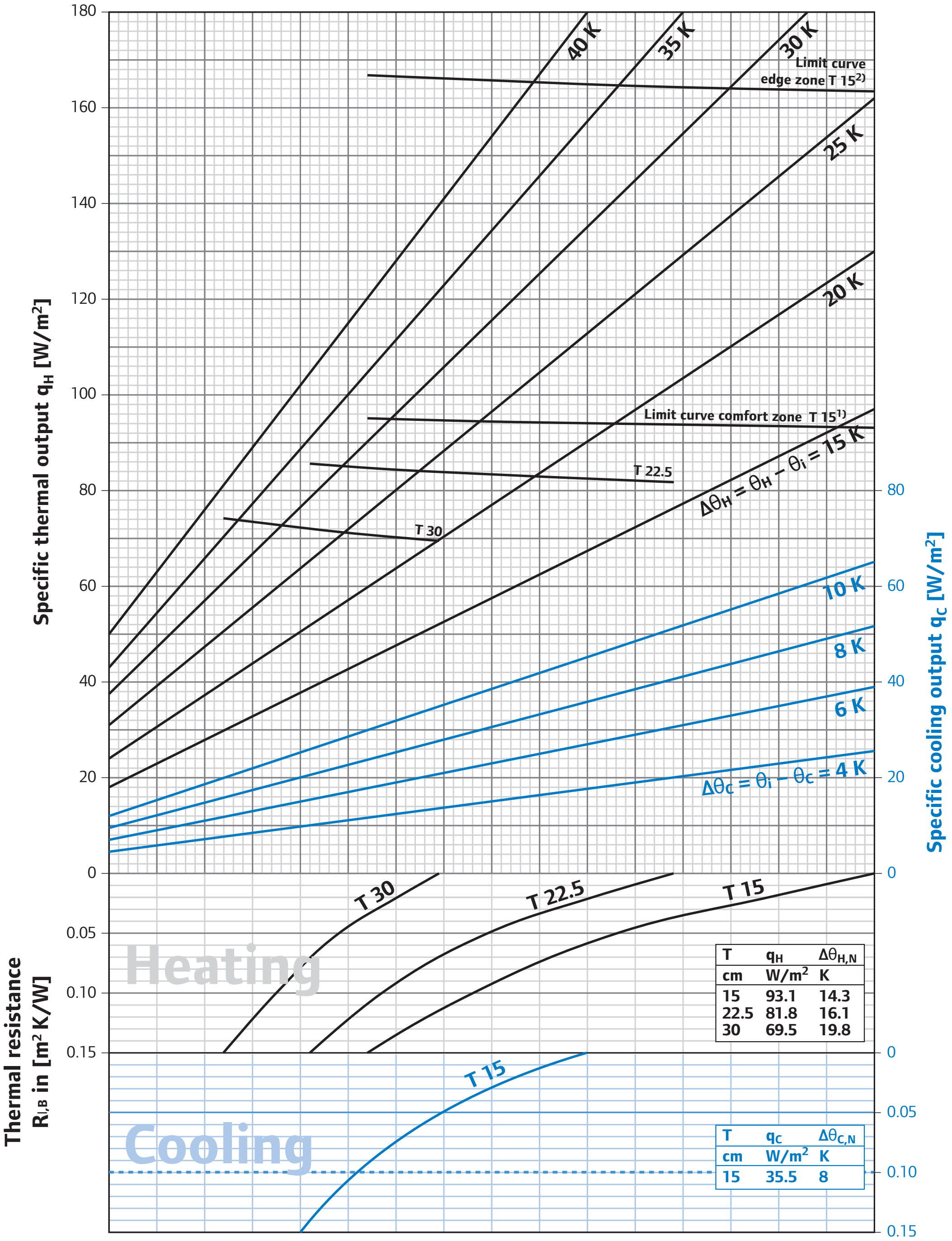
14 x 2 PE-Xa

7F 009 -F

1) Limit curve valid for θ_i 20 °C and $\theta_{F, max}$ 29 °C or θ_i 24 °C and $\theta_{F, max}$ 33 °C
2) Limit curve valid for θ_i 20 °C and $\theta_{F, max}$ 35 °C

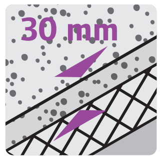
Note: According to DIN EN 1264 are baths, showers and toilets not included.
The limit curves must not be exceeded.
The design supply water temperature must maximum be: $\theta_{V, des} = \Delta\theta_{H, g} + \theta_i + 2.5$ K
$\Delta\theta_{H, g}$ is found by the limit curve for the occupied zone with the smallest pipe spacing.
At cooling the supply temperature to be controled by dew point temperature, humidity sensor to be included.

Design diagram heating/cooling for Uponor Siccus 14 x 2 mm with cement screed load distribution layer including KB 650N
($s_ü$ = 30 mm with $l_ü$ = 0.28 W/mK)



T	q_H	$\Delta\theta_{H,N}$
cm	W/m²	K
15	93.1	14.3
22.5	81.8	16.1
30	69.5	19.8

T	q_C	$\Delta\theta_{C,N}$
cm	W/m²	K
15	35.5	8



14 x 2 PE-Xa

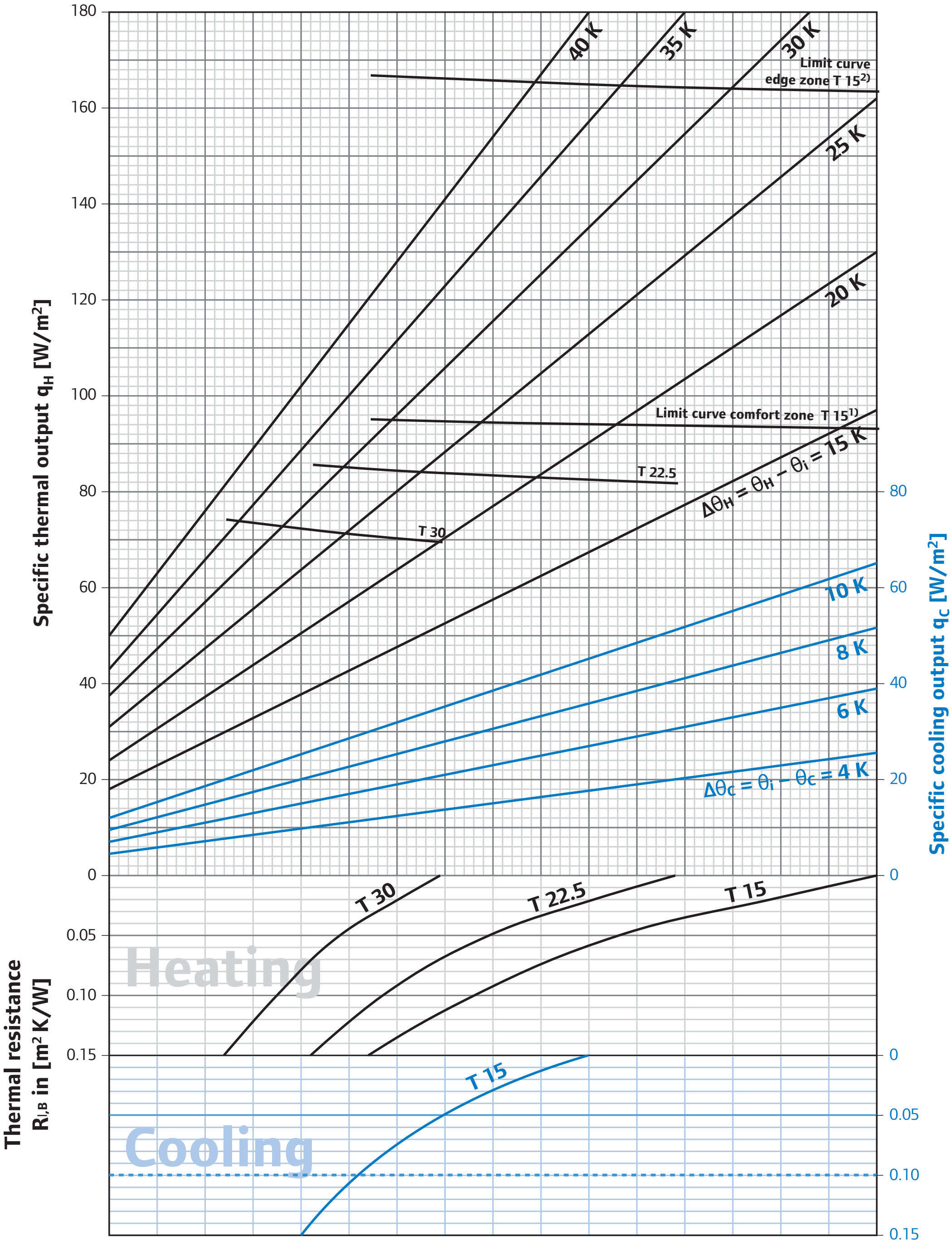
Geprüft

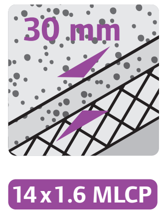
7F 008 -F

1) Limit curve valid for θ_i 20 °C and $\theta_{F,\,max}$ 29 °C or θ_i 24 °C and $\theta_{F,\,max}$ 33 °C
2) Limit curve valid for θ_i 20 °C and $\theta_{F,\,max}$ 35 °C

Note: According to DIN EN 1264 are baths, showers and toilets not included.
The limit curves must not be exceeded.
The design supply water temperature must maximum be: $\theta_{V,\,des} = \Delta\theta_{H,\,g} + \theta_i + 2.5$ K
$\Delta\theta_{H,\,g}$ is found by the limit curve for the occupied zone with the smallest pipe spacing.
At cooling the supply temperature to be controled by dew point temperature, humidity sensor to be included.

Design diagram heating/cooling for Uponor Siccus 14 x 1.6mm MLCP Pipe with cement screed load distribution layer including KB 650N
($s_{ü}$ = 30 mm mit $l_{ü}$ = 1.2 W/mK)



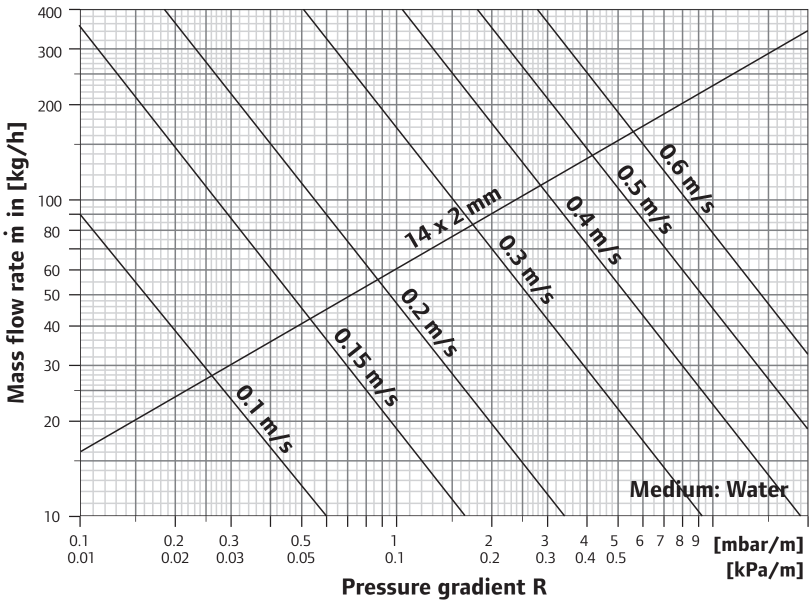


1) Limit curve valid for θ_i 20 °C and $\theta_{F,\,max}$ 29 °C or θ_i 24 °C and $\theta_{F,\,max}$ 33 °C
2) Limit curve valid for θ_i 20 °C and $\theta_{F,\,max}$ 35 °C

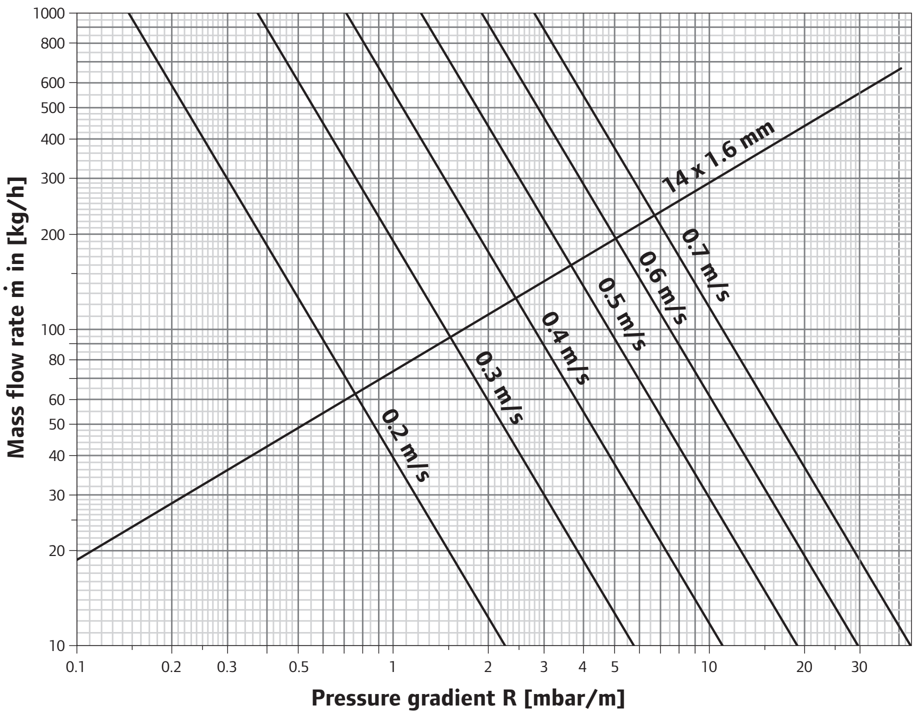
Note: According to DIN EN 1264 are baths, showers and toilets not included.
The limit curves must not be exceeded.
The design supply water temperature must maximum be: $\theta_{V,\,des} = \Delta\theta_{H,\,g} + \theta_i + 2.5$ K
$\Delta\theta_{H,\,g}$ is found by the limit curve for the occupied zone with the smallest pipe spacing.
At cooling the supply temperature to be controled by dew point temperature, humidity sensor to be included.

Pressure drop diagram

The pressure losses in the Uponor PE-Xa pipes can be determined with the aid of the diagram



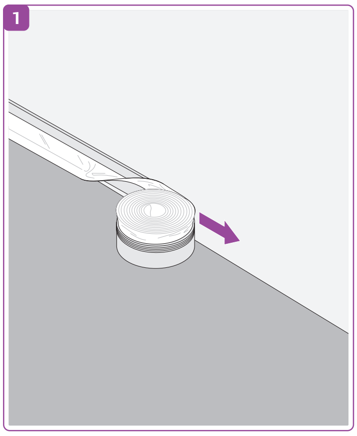
The pressure losses in the Uponor multi-layer composite pipes can be determined with the aid of the diagram



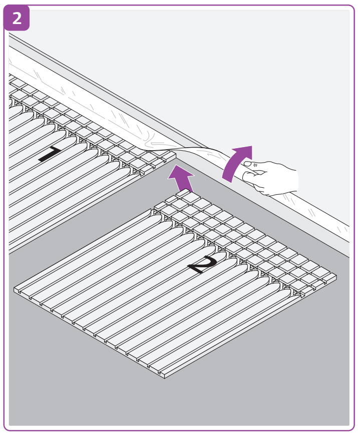
Installation

General

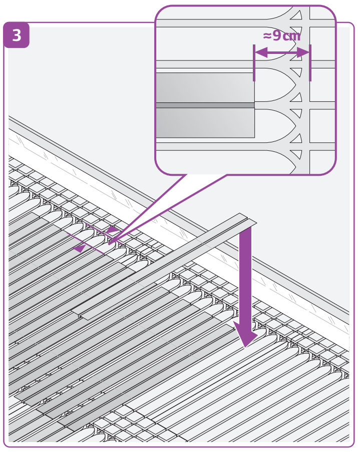
Uponor Siccus must be installed by expert installers only. Observe the following assembly instructions and additional instructions which are provided with the components and tools or which can be downloaded from www.uponor.com



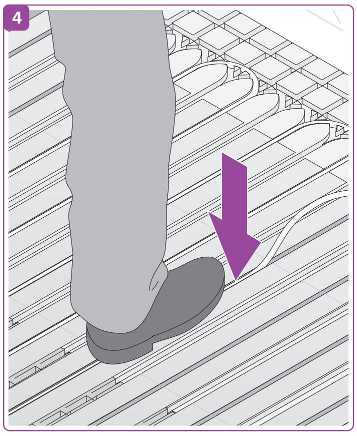
Uponor edging strip installation



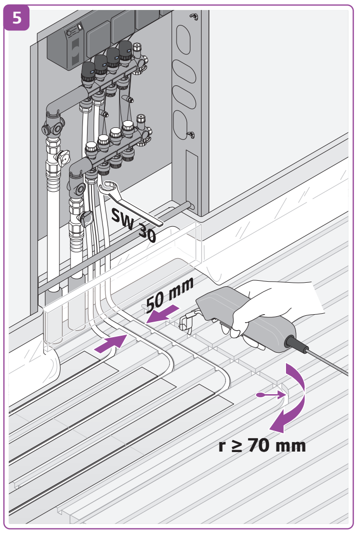
Uponor Siccus panel installation



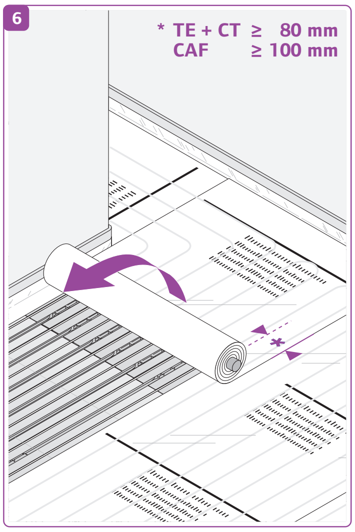
Uponor heat emissions plate installation



Uponor pipe installation



Connecting the pipe with the manifold



Uponor PE foil installation

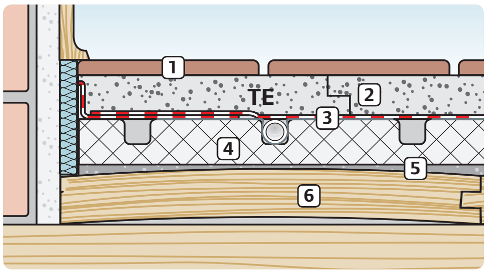
Get to know more about Uponor Underfloor Heating

This QR code leads you to the film.

Notes regarding floor construction

Load-bearing base

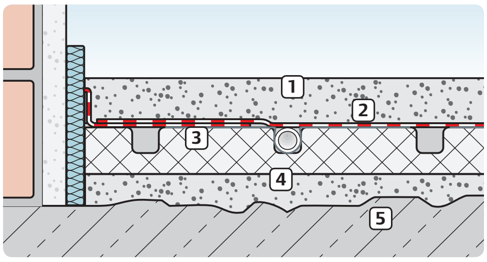
For installation on suspended timber beam floors or existing floor coverings, ensure that the base is level. This is particularly important in connection with dry screed panels.
If necessary, install a levelling layer. If in doubt, contact the manufacturer of the dry screed panels for advice. When designing the floor construction, take into account the thermal and impact noise insulation requirements.



Examples:

Suspended timber joist floor with levelling compound

1. Covering layer
2. Load distribution layer
3. Covering
4. Siccus
5. Self-levelling compound
6. Repair timber floor



Bare concrete floor with levelling screed

1. Load distribution layer
2. Cover foil
3. Siccus
4. Levelling screed
5. Bare concrete floor

Load distribution layers

In principle, Uponor Siccus can be combined with load distribution layers consisting of a dry screeds or a synthetic resin cement screed. Alternatively, it can be installed with suitably thick standard cement or self-levelling screeds that meet the requirements of DIN 18560. The choice of load distribution layer must be based on the actual structural conditions of the building. As Uponor Siccus must always be covered with a PE type 200 cover foil, it is actually separated from the load distribution layer. When planning the construction, observe the maximum thermal load capacity of the distribution layer.

For standard constructions, the maximum payload is 2.0 kN/m². The Siccus installation panel is made in PS 30 polystyrene and can thus be used for payloads up to 7.5 kN/m², provided that the load distribution layer, the additional insulation and the load-bearing base are adequately dimensioned.

Floor covering

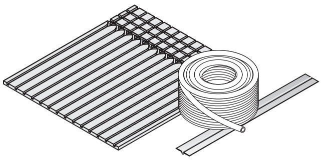
Different floor coverings can be installed on Uponor Siccus, provided that they meet a thermal resistance of $R_{\lambda, B} \leq 0.15$ m²K/W and are approved by the manufacturer (see labelling) for use with underfloor heating installations.

Technical characteristics of various load distribution layers

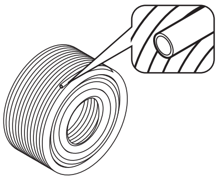
Load distribution layer	Nominal thickness	Min. static weight	Max. Supply temperature	Min. curing and initial heating time
Dry screed plates	25 mm	ca. 25 kg/m²	45 to 55 °C (depending on product)	3 days
CT + KB 650 N	30 mm	ca. 61 kg/m²	55 °C	28 days
CT (DIN 18560)	45 mm	ca. 91 kg/m²	55 °C	28 days
CAF (DIN 18560)	45 mm	ca. 91 kg/m²	55 °C (depending on product)	14 days (depending on product)

High temperature fluctuations might result in expansion noises.

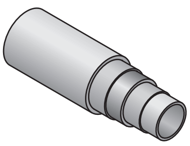
Technical data



Uponor Siccus Element	
Material (lightweight panel, heat emmission plate, pipe)	Polystyrene, Aluminium, PE-Xa
max. payload	7,5 kN/m^2
Thermal resistance	0,622 m^{2}K/W
Pipe spacing	T 15, T 22,5, T 30
min. height	50 mm
System type	drysystem
Load distributino layer	dry - or wet screed
DIN reg. no.	7F008 wetscreed, 7F009 dryscreed 7F148 sportsfloor, 7F199 Siccus ST



Uponor PE-Xa pipe 14x2 mm	
Pipe dimensions	14 x 2 mm
Material	PE-Xa
Colour	White with black and red longitudinal stripes
Production	According to DIN EN ISO 15875
Oxygen tightness	According to gem. DIN 4726
Density	0.938 g/cm^3
Thermal conductivity	0.35 W/mK
Linear expansion coefficient	At 20 °C 1,4 x 10^{-4} 1/K, At 100 °C 2.05 x 10^{-4} 1/K
Crystallite melting temperature	133 °C
Building material class	B2
Min. bending radius	70 mm
Pipe roughness	0.007 mm
Water volume	0.079 l/m
Pipe marking	[length] m < Uponor PE-Xa 14x2.0 C oxygen-tight according to DIN 4726 EN ISO 15875 class 4/5 / 10 bar [DIN approval mark] 3V210 PE-X KOMO vloerverw en KOMO CV 6 bar ATG 2399 ONORM B 5153 APPROVED [manufacturer logo] [material/machine/production/date code]
Max. continuous operating pressure (Water 20 °C)	20.4 bar (safety factor ≥ 1.5)
Max. operating pressure (Water 70 °C)	11.8 bar (safety factor ≥ 1.5)
For heating	90 °C/6 bar
Peak operating temperature	110 °C
DIN reg. no.	3V210 PE-X
Pipe fittings	Pipe couplings and type Uponor 14x2 press-fittings
Optimum installation temperature	≥ 0 °C
Approved additive	Uponor anti-freeze GNF, substance class 3 according to DIN 1988, part 4
UV protection	Lightproof cardboard box (unused piping must be stored in cardboard box!)



Uponor MLCP RED composite pipes	
Supplied in reels for use as radiant heating pipe, connected with press-fittings or compression fittings.	
Material	Multi-layer composite pipe (PE-RT - adhesive – aluminium with longitudinal safety overlap - adhesive -PE-RT), SKZ controlled, oxygen-tight conforming to DIN 4726.
Max. operating temperature	60 °C
Max. operating pressure	4 bar

04_2013_EN Production: Uponor GmbH, IC/WS, Hamburg; Germany

Uponor Corporation
www.uponor.com