Uponor Tecto technical guide

UNDERFLOOR HEATING AND COOLING

01 | 2013

The Tecto product line

The Uponor Tecto pipe positioning panel has been specially developed for the installation of underfloor heating/cooling systems in residential and non-residential buildings. The panels are installed in the floor below the cement or anhydrite screed load distribution layer. Uponor Tecto panels are available in two different thicknesses (ND 30-2 and ND 11), catering for various floor constructions and load-bearing requirements.

The large panel size of 1450 x 850 mm allows for fast installation. The protruding maxi naps of the cover foil can simply be placed over the mini naps of the adjacent element for proper overlap and tightness. The panels thus provide for best possible fixture of the Uponor pipes. Cut-offs can be joined butt to butt by means of Uponor Tecto double-sided strips. The 11 mm elements are particularly suitable for installation in industrial buildings, as they can carry loads of up to 3.0 t/m². The double-layer design of the panels also allow for the safe installation of drinking water pipes and electrical cables, which are installed in the lower layer.

The special compensation elements for movement and wall joints are also available in ND 11 and ND 30-2 thickness. The cover foil and insulating material are packaged separately to allow for maximum installation flexibility.

Panels can be laid and connected by one man without the need for special tools

Example of floor constructions with ND 11 pipe positioning panels

7 F 010 -F
PE-Xa 14x2

7F 037 -F
PE-Xa 17x2

13-903776

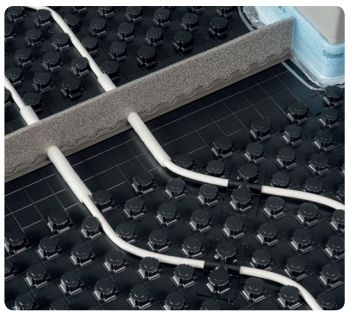
Tecto components

Two different pipe positioning panels

Uponor Tecto panels are available in two different thicknesses which both withstand heavy loads: 500 kg/m² in a nominal thickness of 38/35 mm and up to 7.5 t/m² in a nominal thickness of 11 mm.

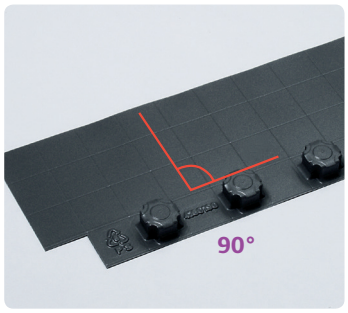
Joining two panels with a double-sided strip

The double-sided strip allows element off-cuts to be laid using butt joints, thus saving on time and materials: all you do is press them onto the maxi studs. Any off-cuts can be butt-joined in this way.



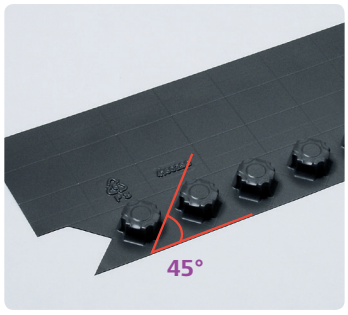
Movement joint profile

The movement joint profile ensures correct pipe routing and the necessary movement clearance between heating screeds. It is self-adhesive and can be quickly attached by pulling off the protective laminate on the bottom.



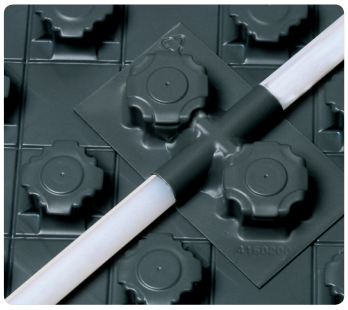
Uponor Tecto 90° compensation element

With the Uponor compensation elements, door openings and other passages between rooms can be bridged in a most simple manner, as a single row of studs is sufficient to provide a strong and proper connection to the adjacent element.



Uponor Tecto 45° compensation element

Connecting lines that must cross under door saddles can be installed without protruding studs at angles of both 90° and 45°. The compensation elements ensure that pipes can be quickly and properly laid at the correct distances even at door openings that require 45° angles.



Uponor Tecto diagonal pipe fixing element

With the Uponor Tecto diagonal pipe fixing element, installation at 45° angles is made easy even where little room space is available. The diagonal pipe fixing foil is simply mounted on the studs for properly aligned pipe installation.

Applicable pipe types

The following system pipes can be installed in the pipe fixing panels:

- Uponor PE-Xa pipe (14 x 2mm)
- Uponor PE-Xa pipe (17 x 2mm)
- Uponor MLCP RED composite pipe (14 x 1.6 mm)
- Uponor MLCP RED composite pipe (16 x 2 mm)

The composite pipes of the Uponor installation system range listed below are also compatible with the pipe fixing panels:

- Uponor MLCP composite pipe (14 x 2 mm)
- Uponor MLCP composite pipe (16 x 2 mm)

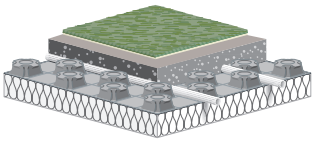
Design data

Uponor Tecto design tables (heating)

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

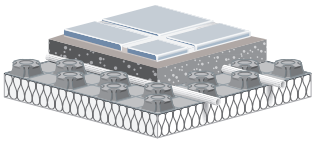
Uponor Tecto load area 14 for cement screed load distribution layer: nominal thickness 45 mm, heat conductivity 1.2 W/mK

14 x 2



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

		$\theta_{V,des}$ = 55.5 °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	100	10	5				
28.6	95	10	7.5				
28.2	90	10	10				
27.8	85	15	10	10	5		
27.3	80	15	13	10	7,5		
26.9	75	20	13.5	10	10.5		
26.5	70	25	14	15	11.5	10	5.5
26.1	65	25	19	20	12.5	10	9
25.7	60	30	20.5	25	13	15	10
25.2	55	30	26.5	25	18.5	15	14
24.8	50	30	32	30	22	20	17
24.4	45	30	38	30	28.5	25	19.5
≤ 23.9	≤ 40	30	42	30	35	30	24.5

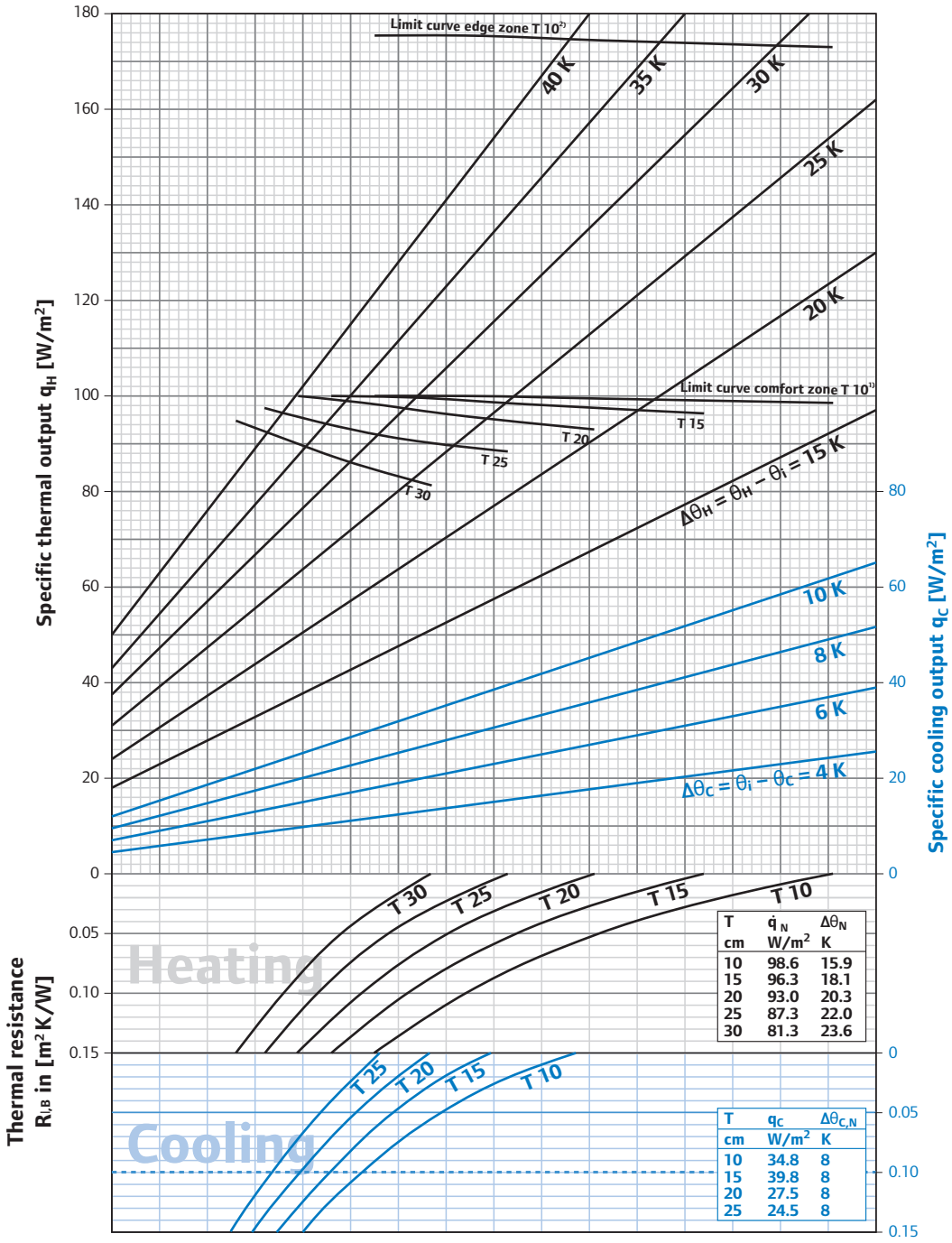


Design table for bathrooms θ_i = 24 °C , $R_{\lambda,B}$ = 0.02 m²K/W

		$\theta_{V,des}$ = 55.5 °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	100	10	14	10	11.5	10	6
32.6	95	10	14	10	12.5	10	7.5
32.2	90	10	14	10	14	10	8.5
31.8	85	10	14	10	14	10	10
31.3	80	10	14	10	14	10	11.5
30.9	75	10	14	10	14	10	13
30.5	70	10	14	10	14	10	14
≤ 30.1	≤ 65	10	14	10	14	10	14

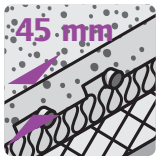
The values in the design tables are based on the following key figures:
$R_{\lambda,ins}$ = 0.75 m²K/W, θ_u = 20 °C, 130 mm concrete floor, spread = 3-30 K, max. heating circuit length = 150 m
max. pressure drop per heating circuit including 2 x 5 m connecting line Δp_{max} = 250 mbar
For other flow temperatures, thermal resistance values, etc. please refer to the design diagrams.
[1] At $\theta_{V,des}$ > 55.5 °C the limit heat flow density and thus the max. floor surface temperature of 29 °C (33 °C for bathrooms) are exceeded.

Design diagram heating/cooling for Uponor Tecto 14 x 2 mm pipe fixing system with cement screed load distribution layer including VD 450/450N/550N
($s_ü$ = 45 mm with $l_ü$ = 1.2 W/mK)



T cm	$\dot{q}_N$ W/m²	$\Delta\theta_N$ K
10	98.6	15.9
15	96.3	18.1
20	93.0	20.3
25	87.3	22.0
30	81.3	23.6

T cm	q_C W/m²	$\Delta\theta_{C,N}$ K
10	34.8	8
15	39.8	8
20	27.5	8
25	24.5	8



14 x 2 PE-Xa

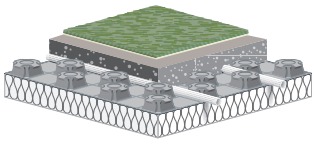
DIN Geprüft
7F 010 -F

[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.

Uponor Tecto load area 17 for cement screed load distribution layer: nominal thickness 45 mm, heat conductivity 1.2 W/mK

17 x 2



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		$\theta_{V,des}$ = 54.9 °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	100	10	9				
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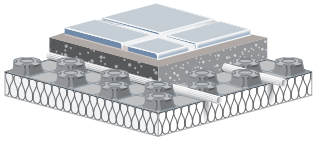
26.9	75	20	21	15	15.5		
26.5	70	25	27	20	16	10	11
26.1	65	25	35	20	23.5	10	14
25.7	60	30	36	25	27.5	15	19
25.2	55	30	42	25	35	20	22
24.8	50	30	42	30	39.5	20	28
24.4	45	30	42	30	42	25	35
≤ 23.9	≤ 40	30	42	30	42	30	40.5



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

		$\theta_{V,des}$ = 54.9 °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	100	10	14	10	14	10	12
32.6	95	10	14	10	14	10	14
32.2	90	10	14	10	14	10	14
31.8	85	10	14	10	14	10	14
31.3	80	10	14	10	14	10	14
30.9	75	10	14	10	14	10	14
30.5	70	10	14	10	14	10	14
≤ 30.1	≤ 65	10	14	10	14	10	14

The values in the design tables are based on the following key figures:
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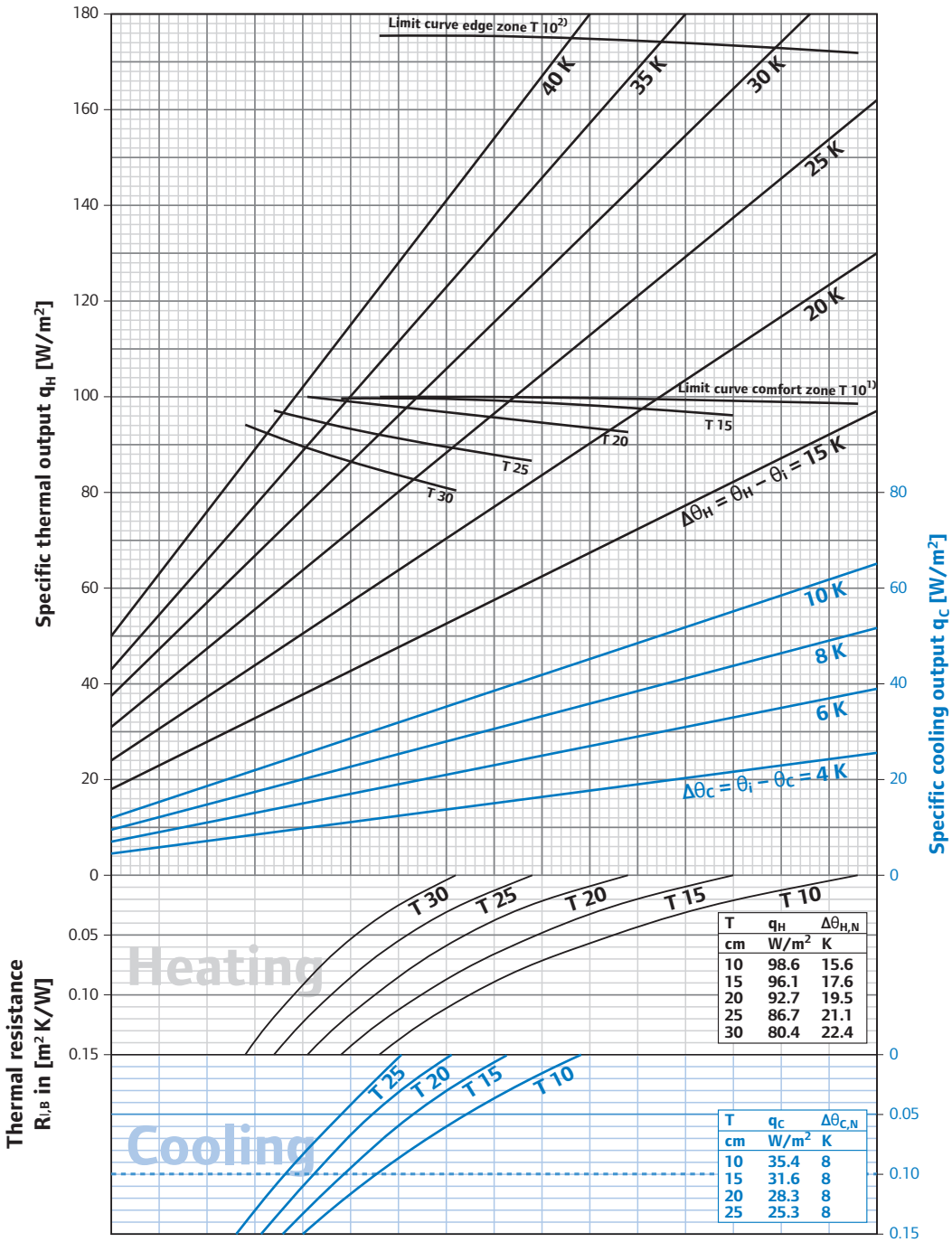
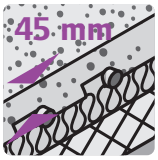
Design diagram heating/cooling for Uponor Tecto 17 x 2 mm pipe fixing system with cement screed load distribution layer including VD 450/450N/550N
($s_ü$ = 45 mm with $l_ü$ = 1.2 W/mK)





17 x 2 PE-Xa

DIN Geprüft
7F 037 -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

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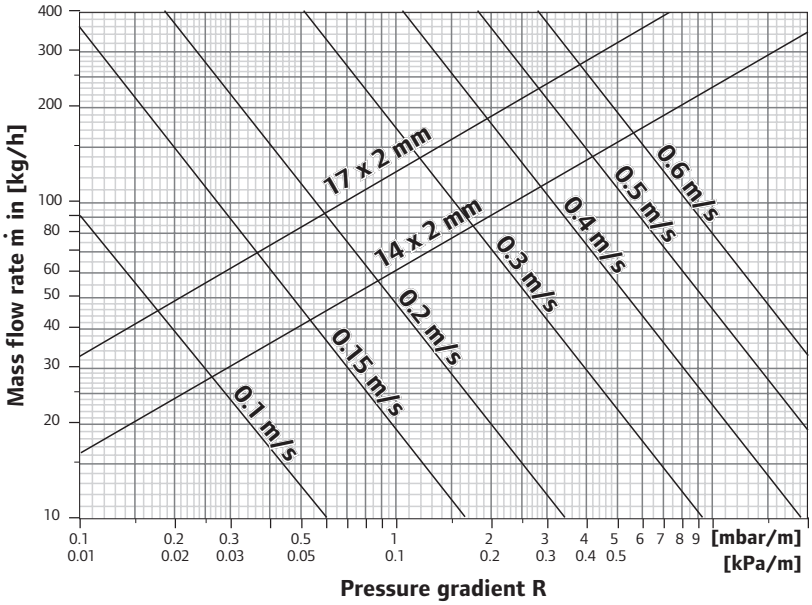
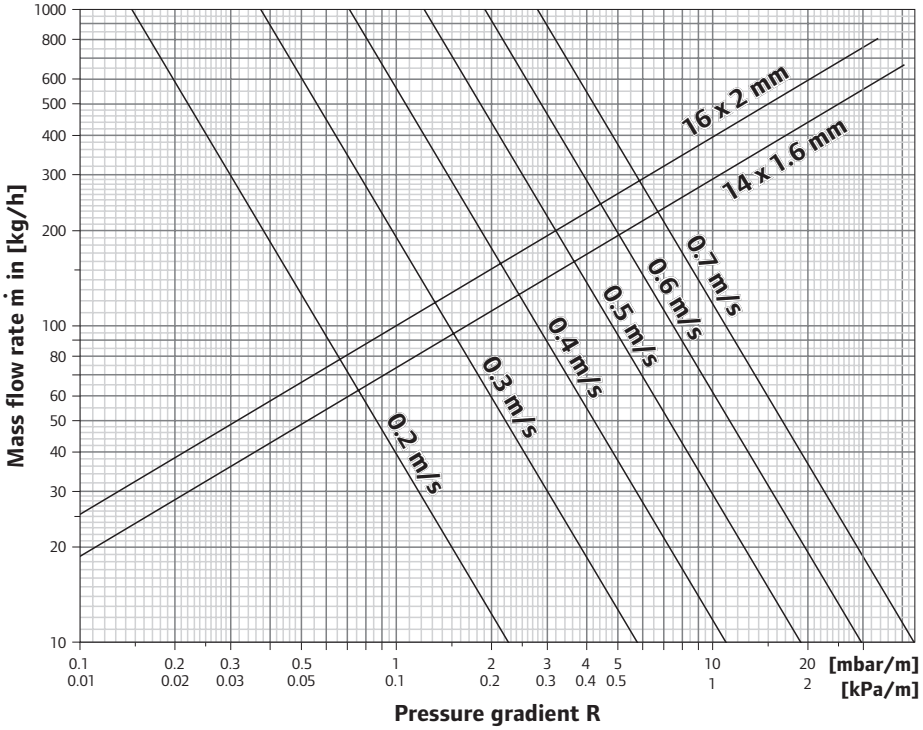
The design supply water temperature must maximum be: $\theta_{V,des} = \Delta\theta_{H,g} + \theta_i + 2.5$ K
$\Delta\theta_{H,g}$ is found by the limit curve for the occupied zone with the smallest pipe spacing.
At cooling the supply temperature to be controled by dew point temperature, humidity sensor to be included.

Pressure drop diagrams

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

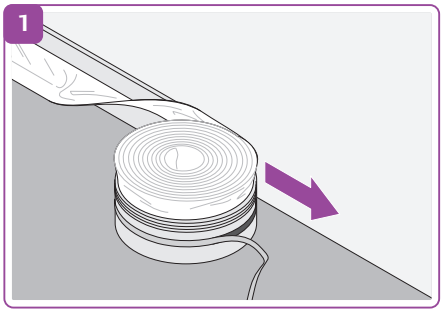


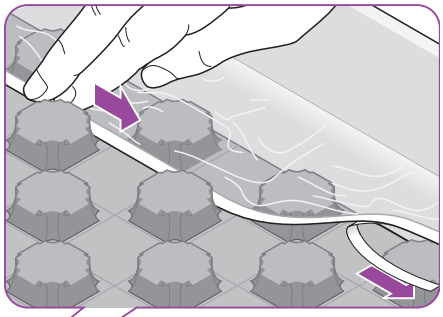
Installation

General

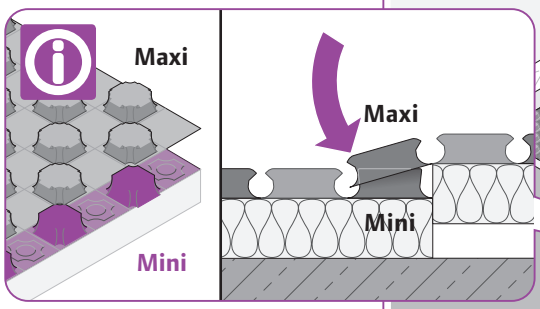
Uponor Tecto must be installed by expert installers only. Observe the following assembly instructions and additional instructions which are provided with the components and tools or which can be downloaded from www.uponor.com

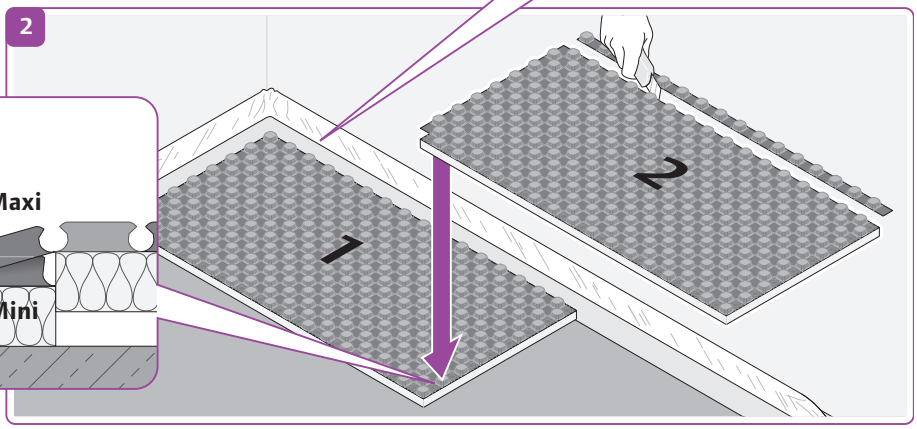
Overview of the installation steps



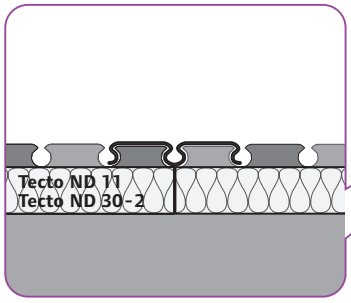


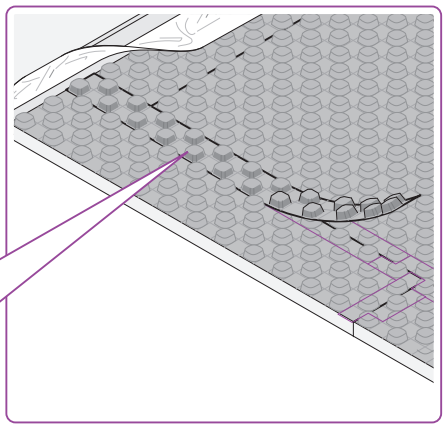
Uponor edging strip installation



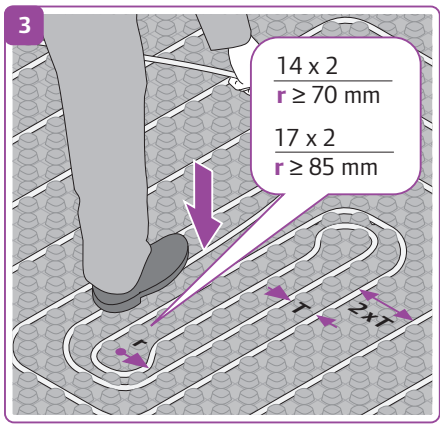


Tecto pipe positioning panel installation





Option: Uponor double-sided strip for connection

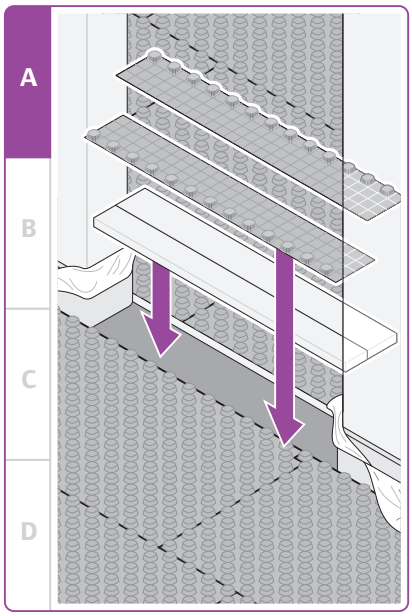


Uponor PE-Xa pipe installation

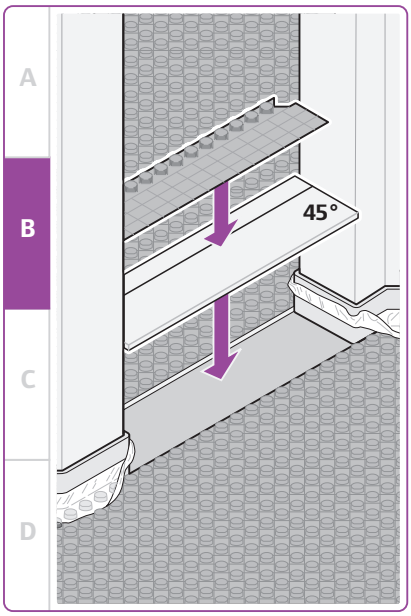
Get to know more about Uponor Underfloor Heating

This QR code leads you to the film:

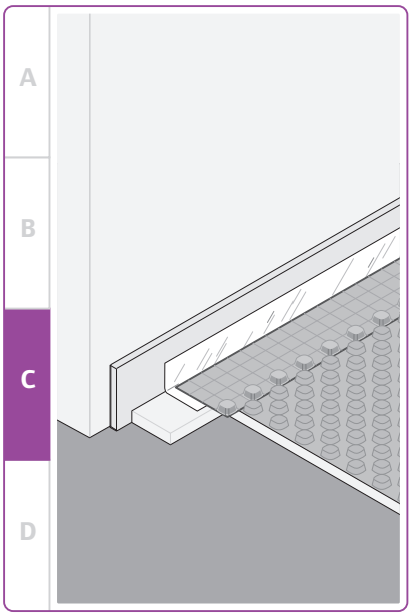
Overview additional installations



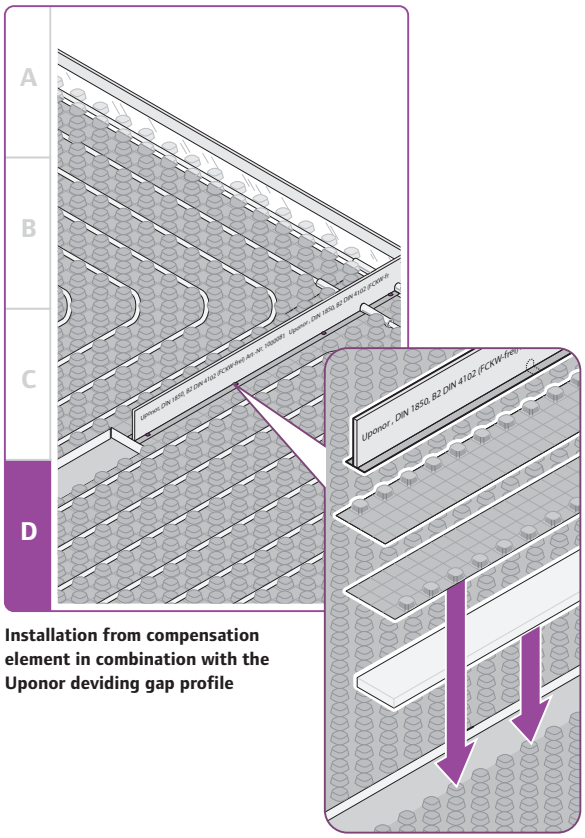
Installation from compensation element in door areas (overlapping taped)



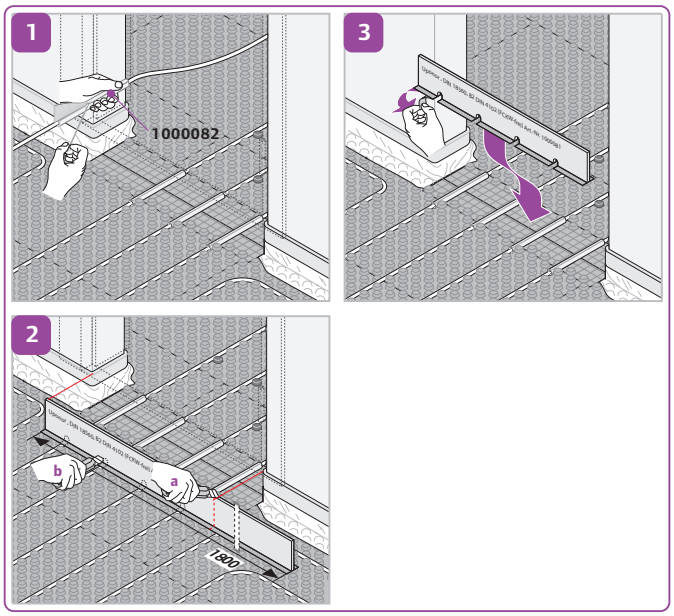
Installation from 45° compensation element in door areas



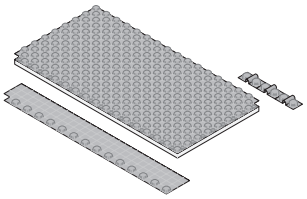
Installation from compensation element in edge zone



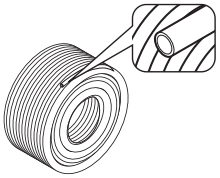
Installation from compensation element in combination with the Uponor deviding gap profile



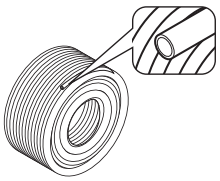
Technical data



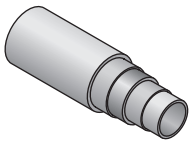
Uponor Tecto pipe positioning panels	ND 11	ND 30-2
Material (insulation, cover foil)	EPS, PS	EPS, PS
Max. payload	30 kN/m²	5.0 kN/m²
Thermal resistance	0.275 m²K/W	0.75 m²K/W
Dynamic stiffness	/	20 MN/m³
Compressive strength	≥ 100 kPa	/
Pipe spacing	T 10, 15, 20, 25, 30	T 10, 15, 20, 25, 30
Total element height	33 mm	52 mm
System type	Wet system	Wet system
Load distribution layer	Cement or anhydrite screed	Cement or anhydrite screed
Screed between naps	ca. 18.5 l/m²	ca. 18.5 l/m²



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/cm³
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 PE-Xa pipe 17x2 mm	
Pipe dimensions	17 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 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	85 mm
Pipe roughness	0.007 mm
Water volume	0.13 l/m
Pipe identification	[length] m < Uponor PE-Xa 17x2.0 C oxygen-tight according to DIN 4726 EN ISO 15875 class 4/5 / 8 bar [DIN approval mark] 3V208 PE-X Komo vloerverw. ATG 2399 ONORM B5153 APPROVED [manufacturer logo] [material/machine/production/date code]
Max. operating pressure (water 20 °C)	16.3 bar (safety factor ≥ 1.5)
Max. operating pressure (water 70 °C)	9.4 bar (safety factor ≥ 1.5)
For heating	70 °C/9.4 bar
DIN reg. no.	3V208 PE-X
Pipe fittings	Pipe couplings and Uponor plus 17x2 type press-fittings
Optimum installation temperature	≥ 0 °C
Approved additive	Uponor GNF anti-freeze agent substance class 3 according to DIN 1988, part 4
UV protection	Light-proof cardboard box (unused piping must be stored in cardboard box!)



Uponor MLCP RED composite pipe 14 x 1.6 mm / 16 x 2 mm	
Supplied in reels for use as radiant heating pipe, connected with press-fittings or compression fittings.	
Material	Multi-layer composite pipe (PE-RT – adhesive - welded 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

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