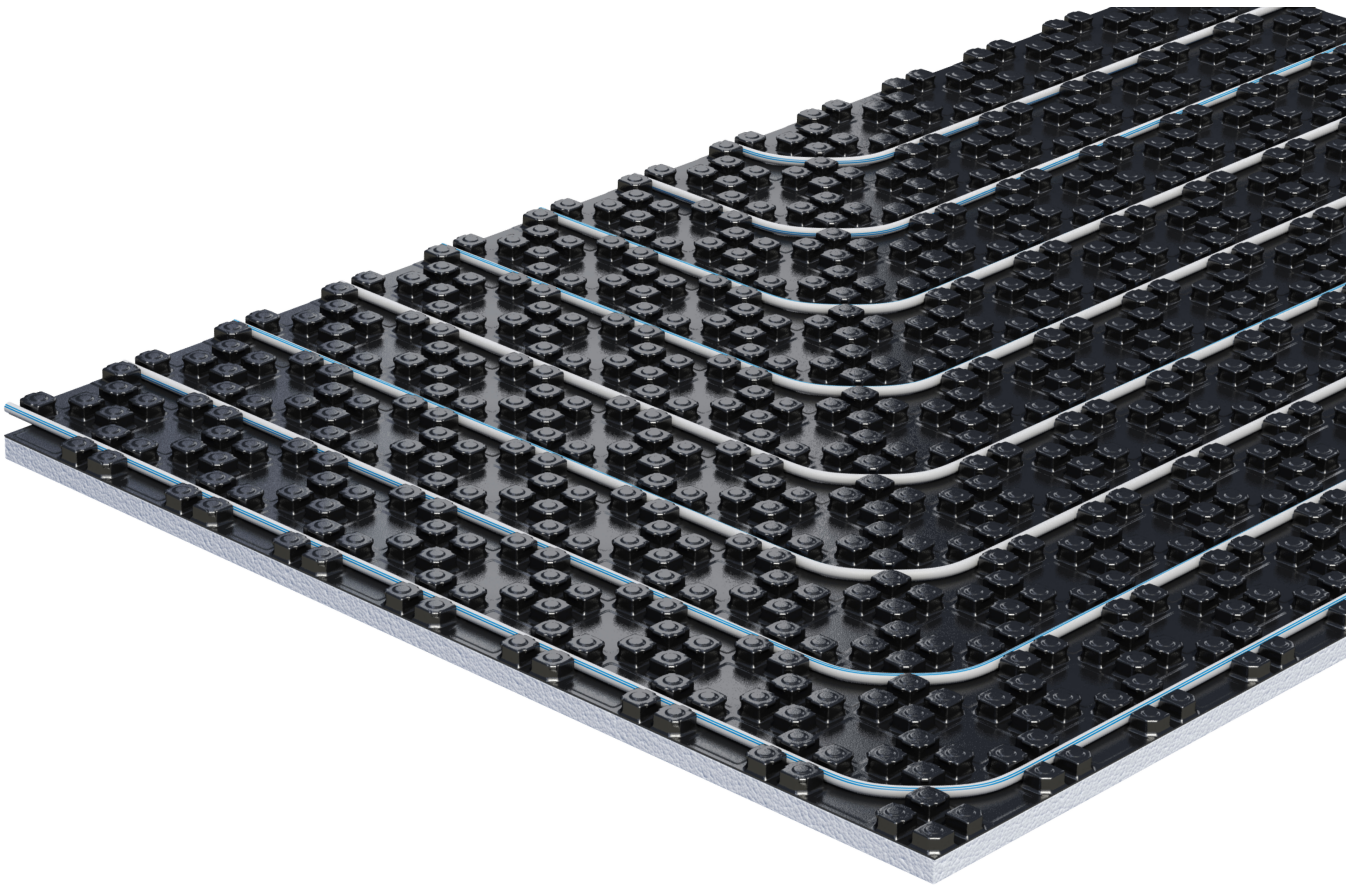
Uponor Nubos underfloor heating/ cooling system

EN Technical information



RP0000343

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1 System description

Uponor always focuses on fast and easy assembly or installation when developing its components and systems.

Uponor has incorporated three functions as a standard in the Uponor Nubos: the pipe holder, insulation layer cover and insulation. This means the system can be installed quickly on the construction site without special tools. The nubs keep the system pipes at a fixed height and variable distance in accordance with local standards and regulations. This ensures the complete transfer of the calculated thermal output and required screed thickness.

1.1 Benefits

- **Easy and flexible**: very few optimally matched system components
- **Reliable**: long-lifetime proven technology
- **Sustainable**: low-waste pipe installation
- **Compliant**: nub panels for a pipe fixation as per standards
- **Accessible**: back-foamed EPS insulation is available in thicknesses 30 mm and 11 mm, and Uponor Nubos foil for installation on existing insulations

1.2 Components

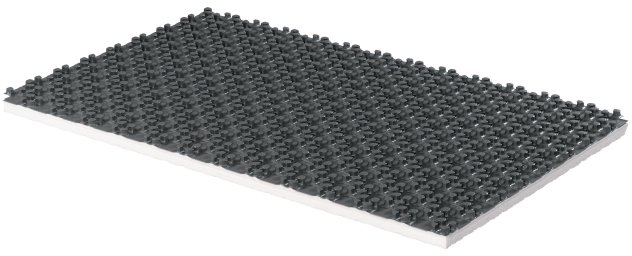
Note

For more detailed information, product range and documentation, please visit the Uponor website: www.uponor.com.

Note

For detailed information about the product range, dimensions and availability, please refer to the Uponor price list.

Uponor Nubos nub panel ND 30-2



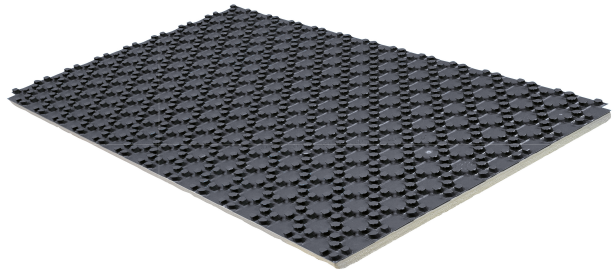
The Uponor Nubos panel EPS 30-2 is ideal for residential and commercial buildings, available with two-sided overlapping foil for a screed-tight connection.

It is integrated with thermal and impact sound insulation as per DIN EN 13163 and DIN 4108-10 (EPS 040 DES sg), and foil covers the insulation layer as per DIN 18560.

Live load up to 5 KN/m^2 can use this panel.

The installation grid is 5,5 x 7,5 cm.

Uponor Nubos nub panel ND 11



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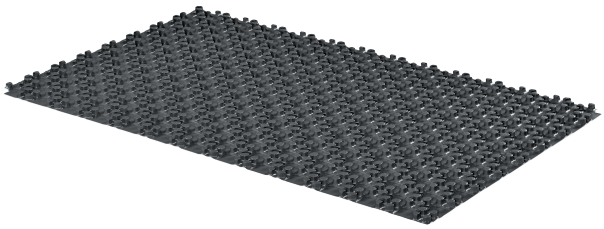
The Uponor Nubos panel EPS 11 is capable for rooms with a high live load up to 30 KN/m^2, available with two-sided overlapping foil (EPS 035 DEO dm) for a screed-tight connection.

The foil covers the insulation layer as per DIN 18560.

The installation grid is 5,5 x 7,5 cm.

Uponor Nubos foil

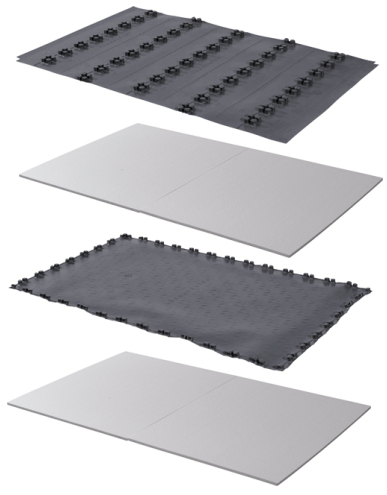


RP0000345

The Uponor Nubos foil can be installed on top of the existing insulation with a high live load up to 30 KN/m^2.

The installation grid is 5,5 x 7,5 cm.

Uponor Nubos set



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The Uponor Nubos set is simplifying the panel and pipe installation in doorways and the heating circuit distribution area, available in versions ND 30-2 and ND 11.

It consists of optimal numbers of nubs and easy-to-cut with a cutter.

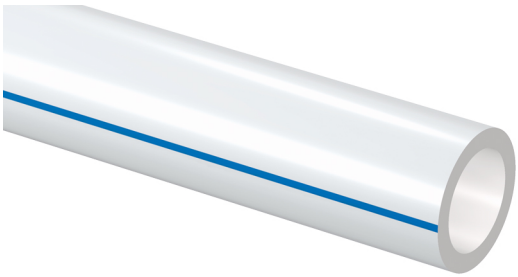
Uponor Comfort Pipe PLUS

RP0000302

Uponor Comfort Pipe PLUS is a highly flexible PE-Xa pipe spiral wound with hook tape with 5 layers in dimensions 14 x 2,0 mm and 16 x 2,0 mm.

The pipe fulfils the requirements for oxygen diffusion tightness as per DIN 4726.

Uponor Comfort Pipe



RP0000123

Uponor Comfort Pipe is a highly flexible PE-Xa pipe available in the dimension 16 x 1,8 mm.

The pipe fulfils the requirements for oxygen diffusion tightness as per DIN 4726.

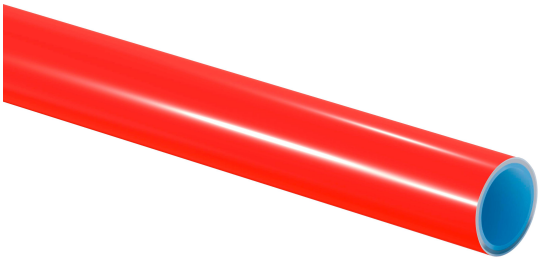
Uponor Smart UFH-pipe

RP0000347

Uponor Smart UFH-pipe is an economic system for underfloor heating available in the dimensions 14 x 2,0 mm and 16 x 2,0 mm.

The pipe fulfils the requirements for oxygen diffusion tightness as per DIN 4726.

Uponor MLCP RED



RP0000337

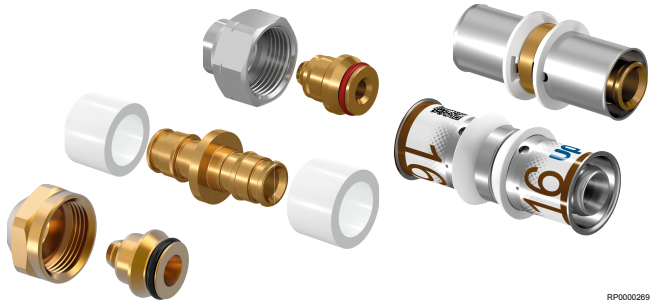
Uponor MLCP RED is a composite pipe which is stable and easy to install, available in the dimensions 14 x 1,6 mm and 16 x 2,0 mm.

The pipe fulfils the requirements for oxygen diffusion tightness as per DIN 4726.

Uponor jointing technology

Note

Only use fittings recommended by Uponor or its representatives.



RP0000269

Uponor Q&E fittings have been specially developed for use with Uponor pipes.

Compression fittings designed for these Uponor pipes are also available.

1.3 Copyright and disclaimer

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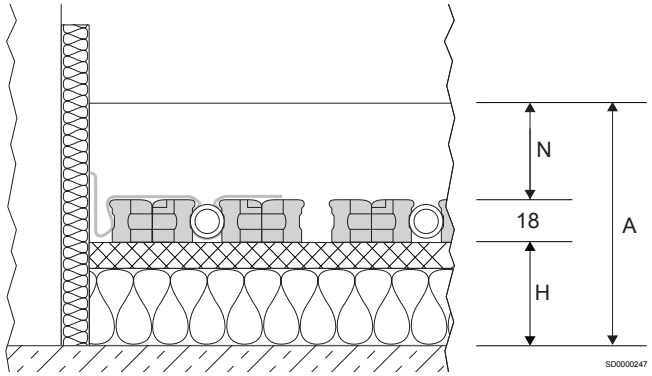
2 Planning/ design

2.1 Floor constructions



Item	Description
N	Minimum screed thickness
H	Insulation layer thickness (mm)
A	Structural height

As a result of combining insulations, the following constructions comply with the European minimum insulation requirements (refer to EN 1264-4 or EN 15377) for residential and non-residential buildings.

Additional planning information for special insulation requirements for non-residential buildings that deviate from this are described under “Thermal insulation requirements for radiant heating”.

The masses per unit area of the ceiling and the screed as well as the dynamic stiffness of the Uponor heat and impact sound insulation have to be considered in providing the proof of impact sound insulation. The rated impact sound improvement of the floorings is calculated from the weight per unit area of the screed and the dynamic stiffness of the insulation or indicated by an equivalent test report.

Floor construction tables

These abbreviations are used in the following construction tables:

Abbreviations	Description
CT	Cement screed
CAF	Anhydride liquid screed
ΔLw [dB]	Impact sound improvement factor of flooring
ΔLw,P [dB]	Impact sound improvement factor of tested flooring

Uponor Nubos ND 30-2

Thermal insulation requirements	Insulation layer thickness	Thermal resistance of insulation	Impact sound improvement factor of flooring ΔLw [dB]		Structural height A (2,0 kN/m²)[2]	
	H [mm]	$R_{\lambda, ins}$ [m² K/W]	CT N ≥ 45 [mm]	CAF[3] N ≥ 35 [mm]	CT N ≥ 45 [mm]	CAF[3] N ≥ 35 [mm]
Apartment ceiling separating heated rooms						
EN 1264-4	Nubos EPS 30-2 = 30	0,75	29	28	≥ 93	≥ 83
Floor slabs[1]), ceilings against unheated rooms in residential and non-residential buildings						
EN 1264-4	Nubos EPS 30-2 = 30 EPS 035 DEO dm 20 = 20 Total H = 50	1,32	29	28	≥ 113	≥ 103
Floor ceilings against outside air in residential and non-residential buildings (ϑi ≥ 19 °C)						
EN 1264-4	Nubos EPS 30-2 = 30 EPS 035 DEO dm 45 = 45 Total H = 75	2,04	29	28	≥ 138	≥ 128

Thermal insulation requirements	Insulation layer thickness	Thermal resistance of insulation	Impact sound improvement factor of flooring ΔLw [dB]		Structural height A (5,0 kN/m²)[2]	
	H [mm]	$R_{\lambda, ins}$ [m² K/W]	CT N ≥ 75 [mm]	CAF[3] N ≥ 65 [mm]	CT N ≥ 75 [mm]	CAF[3] N ≥ 65 [mm]
Apartment ceiling separating heated rooms						
EN 1264-4	Nubos EPS 30-2 = 30	0,75	31	31	≥ 123	≥ 113
Floor slabs[1], ceilings against unheated rooms in residential and non-residential buildings						
EN 1264-4	Nubos EPS 30-2 = 30 EPS 035 DEO dm 20 = 20 Total H = 50	1,32	31	31	≥ 143	≥ 133
Floor ceilings against outside air in residential and non-residential buildings (ϑi ≥ 19 °C)						
EN 1264-4	Nubos EPS 30-2 = 30 EPS 035 DEO dm 45 = 45 Total H = 75	2,04	31	31	≥ 168	≥ 158

[1] Observe additional construction height for structural waterproofing (refer to DIN 18533). Groundwater level ≥ 5 m.
[2] Observe dimensional tolerances at building site (refer to DIN 18202, Tab.2 and 3).
[3] Observe manufacturer's descriptions regarding the minimum screed thickness.

Uponor Nubos ND 11

Thermal insulation requirements	Insulation layer thickness	Thermal resistance of insulation	Impact sound improvement factor of flooring	Structural height A (2,0 kN/m²)[2]		Structural height A (5,0 kN/m²)[2]	
	H [mm]	$R_{\lambda, ins}$ [m² K/W]	ΔLw [dB]	CT N ≥ 45 [mm]	CAF[3] N ≥ 35 [mm]	CT N ≥ 75 [mm]	CAF[3] N ≥ 65 [mm]
	Apartment ceiling separating heated rooms						
EN 1264-4	Nubos EPS 11 = 11 EPS 035 DEO dm 20 = 20 Total H = 31	0,87	-	≥ 94	≥ 84	≥ 124	≥ 114
	Floor slabs[1], ceilings against unheated rooms in residential and non-residential buildings						
EN 1264-4	Nubos EPS 11 = 11 EPS 035 DEO dm 35 = 35 Total H = 46	1,30	-	≥ 109	≥ 99	≥ 139	≥ 129
	Floor ceilings against outside air in residential and non-residential buildings (ϑi ≥ 19 °C)						
EN 1264-4	Nubos EPS 11 = 11 EPS 035 DEO dm 60 = 60 Total H = 71	2,01	-	≥ 134	≥ 124	≥ 164	≥ 154

[1] Observe additional construction height for structural waterproofing (refer to DIN 18533). Groundwater level ≥ 5 m.
[2] Observe dimensional tolerances at building site (refer to DIN 18202, Tab.2 and 3).
[3] Observe manufacturer's descriptions regarding the minimum screed thickness.

Uponor Nubos foil

Thermal insulation requirements	Insulation layer thickness	Thermal resistance of insulation	Impact sound improvement factor of flooring ΔLw [dB]		Structural height A (2,0 kN/m²)[2]	
	H [mm]	$R_{\lambda, ins}$ [m² K/W]	CT N ≥ 45 [mm]	CAF[3] N ≥ 35 [mm]	CT N ≥ 45 [mm]	CAF[3] N ≥ 35 [mm]
Apartment ceiling separating heated rooms						
EN 1264-4	EPS 040 DES sg 30-2 = 30	0,75	29	28	≥ 93	≥ 83
Floor slabs[1]), ceilings against unheated rooms in residential and non-residential buildings						
EN 1264-4	EPS 040 DES sg 30-2 = 30 EPS 035 DEO dm 20 = 20 Total H = 50	1,32	29	28	≥ 113	≥ 103
Floor ceilings against outside air in residential and non-residential buildings (ϑi ≥ 19 °C)						
EN 1264-4	EPS 040 DES sg 30-2 = 30 EPS 035 DEO dm 45 = 45 Total H = 75	2,04	29	28	≥ 138	≥ 128

Thermal insulation requirements	Insulation layer thickness	Thermal resistance of insulation	Impact sound improvement factor of flooring ΔLw [dB]		Structural height A (5,0 kN/m²)[2]	
	H [mm]	$R_{\lambda, ins}$ [m² K/W]	CT N ≥ 75 [mm]	CAF[3] N ≥ 65 [mm]	CT N ≥ 75 [mm]	CAF[3] N ≥ 65 [mm]
Apartment ceiling separating heated rooms						
EN 1264-4	EPS 040 DES sg 30-2 = 30	0,75	31	31	≥ 123	≥ 113
Floor slabs[1]), ceilings against unheated rooms in residential and non-residential buildings						
EN 1264-4	EPS 040 DES sg 30-2 = 30 EPS 035 DEO dm 20 = 20 Total H = 50	1,32	31	31	≥ 143	≥ 133
Floor ceilings against outside air in residential and non-residential buildings (ϑi ≥ 19 °C)						
EN 1264-4	EPS 040 DES sg 30-2 = 30 EPS 035 DEO dm 45 = 45 Total H = 75	2,04	31	31	≥ 168	≥ 158

[1] Observe additional construction height for structural waterproofing (refer to DIN 18533). Groundwater level ≥ 5 m.
[2] Observe dimensional tolerances at building site (refer to DIN 18202, Tab.2 and 3).
[3] Observe manufacturer's descriptions regarding the minimum screed thickness.

2.2 Dimensioning diagrams

Bathrooms, showers, toilets and the like are excluded when determining the design flow temperature.

The limit curves must not be exceeded.

$\triangle\vartheta_{H,G}$ is found through the limit curve for the occupied zone with the smallest pipe spacing.

The design supply water temperature maximum must be:
$\triangle\vartheta_{V,des} = \triangle\vartheta_{H,G} + \triangle\vartheta_i + 2.5$ K.

In cooling mode the supply water temperature depends on the dew point temperature, therefore a humidity sensor has to be installed.

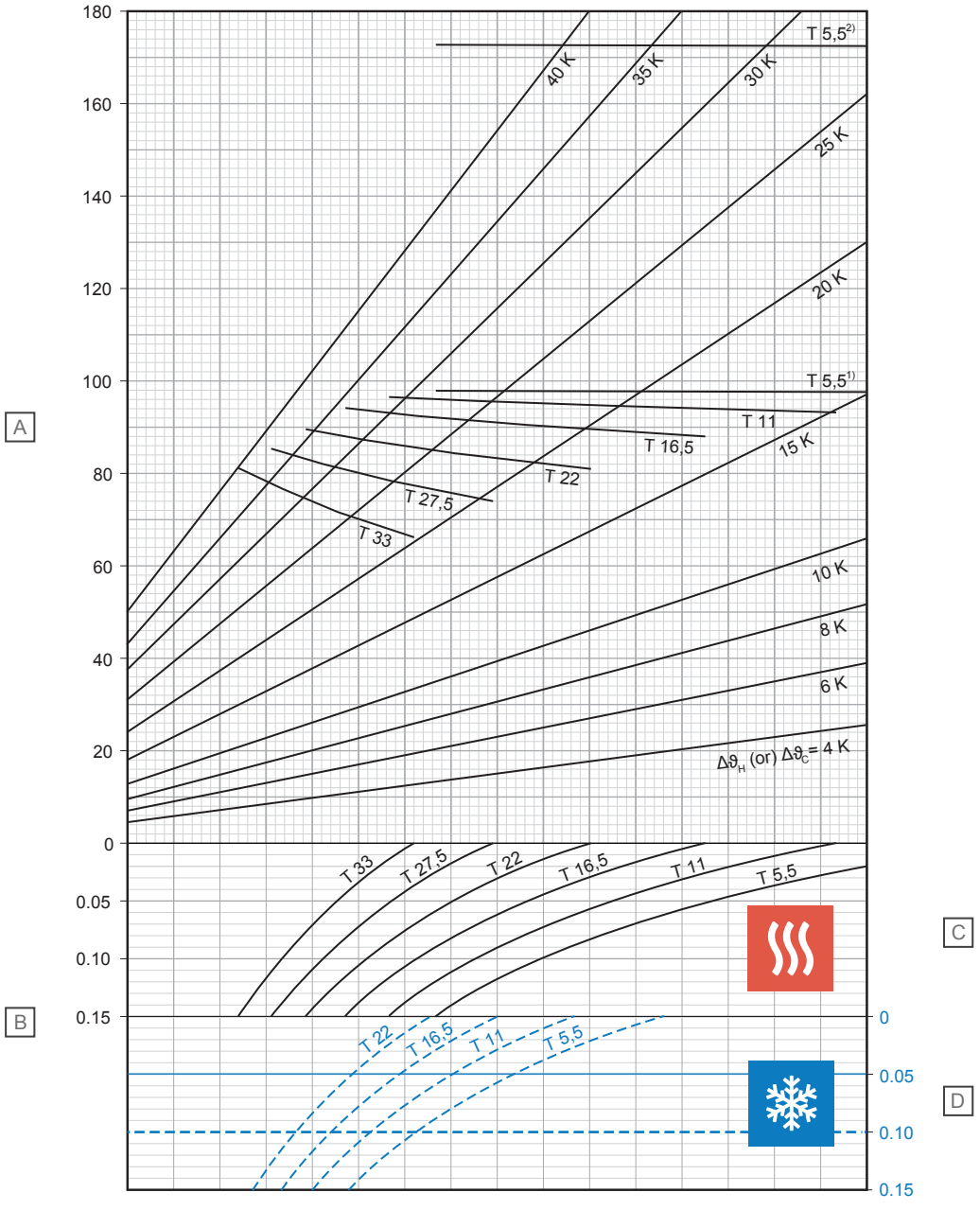
The following diagrams results are accurate and in accordance with EN 1264.

Abbreviations

These abbreviations are used in the following diagrams:

Abbreviations	Unit	Description
$A_{F,max}$	m^2	Maximum surface area of the heating/ cooling area
q_c	W/m^2	Specific thermal output of embedded cooling systems
q_{des}	W/m^2	Design specific thermal output of floor heating systems
$q_{G,max}$	W/m^2	Maximum limit of specific thermal output of floor heating systems
q_H	W/m^2	Specific thermal output of embedded heating systems, excluding floor heating
q_N	W/m^2	Standard thermal output of floor heating systems
$R_{\lambda,B}$	m^2 K/W	Thermal resistance of floor covering effective thermal resistance of carped covering
$R_{\lambda,ins}$	m^2 K/W	Thermal resistance of thermal insulation
s_u	mm	Thickness of the layer above the pipe
T	cm	Pipe spacing
$\vartheta_{F,max}$	°C	Maximum floor surface temperature
ϑ_H	°C	Average temperature of the heating medium
ϑ_i	°C	Standard indoor room temperature
$\Delta\vartheta_c$	K	Temperature difference between room and cooling medium for cooling systems
$\Delta\vartheta_{C,N}$	K	Standard temperature difference between room and cooling medium for cooling systems
$\Delta\vartheta_H$	K	Temperature difference between heating medium and room
$\Delta\vartheta_{H,G}$	K	Limit temperature difference between heating medium and room for floor heating systems
$\Delta\vartheta_{H,N}$	K	Standard temperature difference between heating medium and room for heating systems, with the exception of floor heating
$\Delta\vartheta_{V,des}$	K	Design temperature difference between flow of heating medium and room of floor heating systems, determined by room with q_{max}
λ_u	W/mK	Thermal conductivity

Uponor Comfort Pipe PLUS 14 x 2,0 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,8
11	93,3	14,7
16,5	88,0	16,5
22	81,0	17,9
27,5	73,9	19,3
33	66,0	20,2

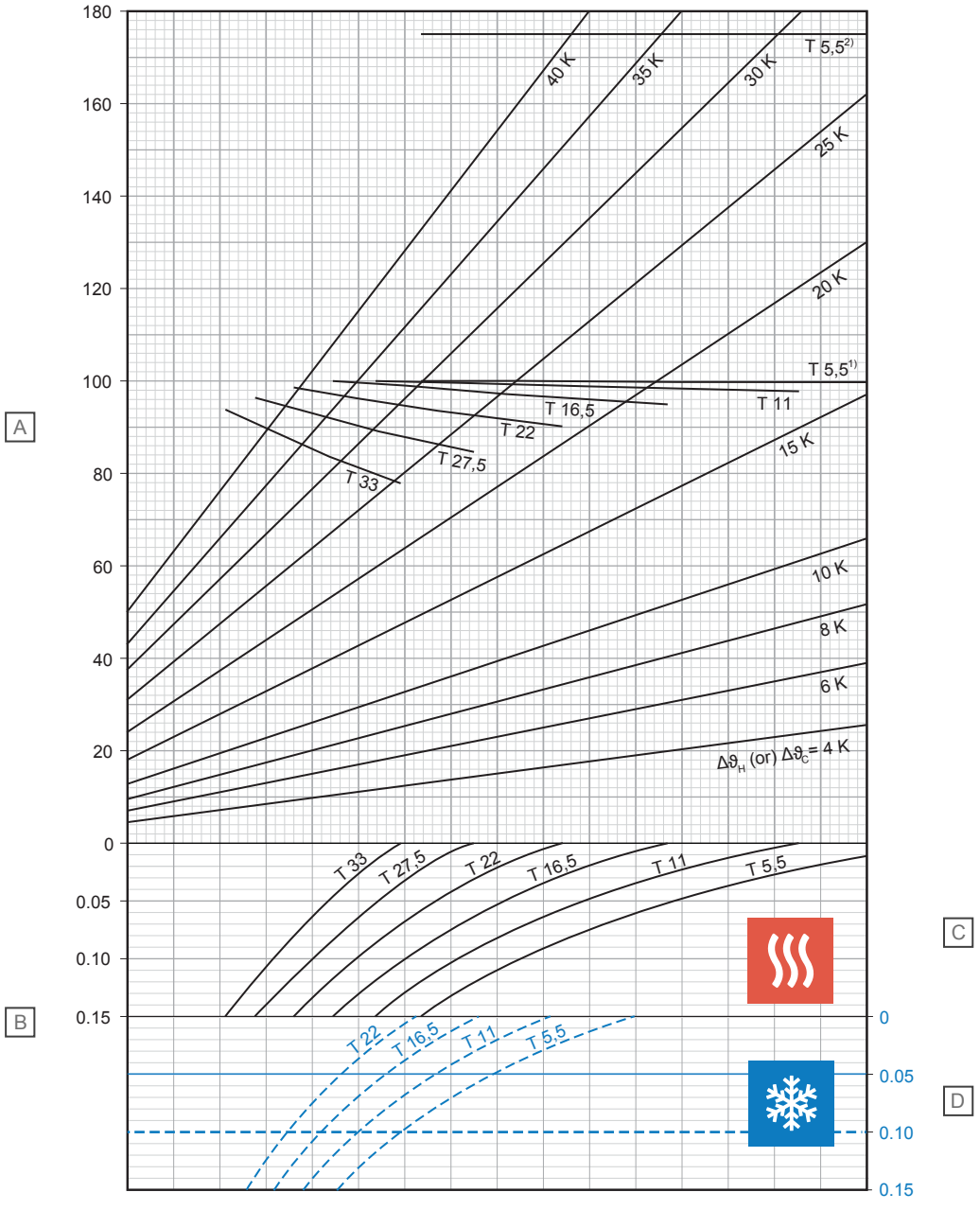
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	40,6	8
11	35,4	8
16,5	31,0	8
22	27,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 14 x 2,0 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,9
11	97,9	22,0
16,5	95,0	18,7
22	90,2	20,8
27,5	84,6	22,9
33	77,8	24,5

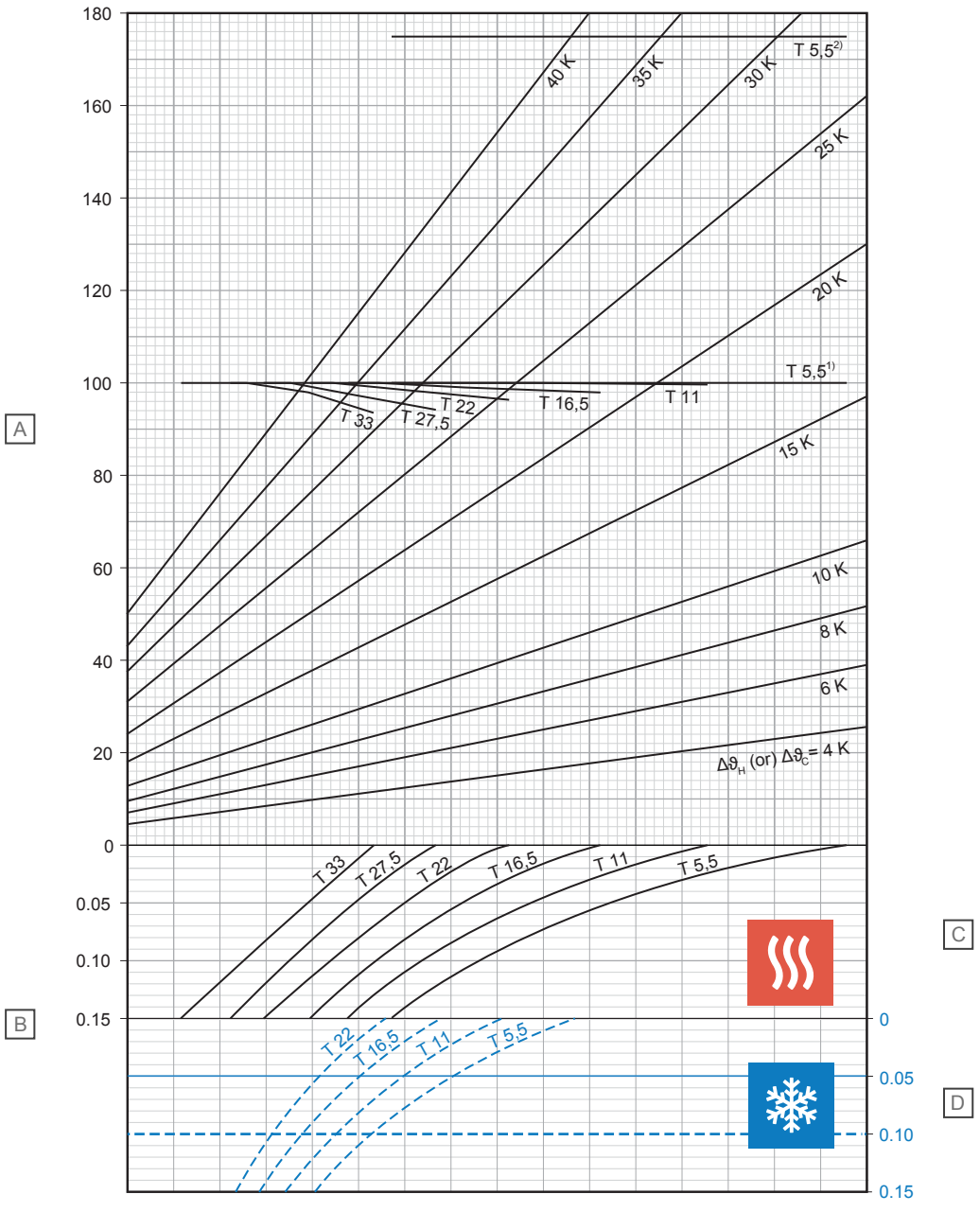
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	38,9	8
11	34,0	8
16,5	29,9	8
22	26,3	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 14 x 2,0 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,8
11	99,8	18,6
16,5	98,1	21,3
22	96,5	24,4
27,5	94,3	27,5
33	93,6	31,5

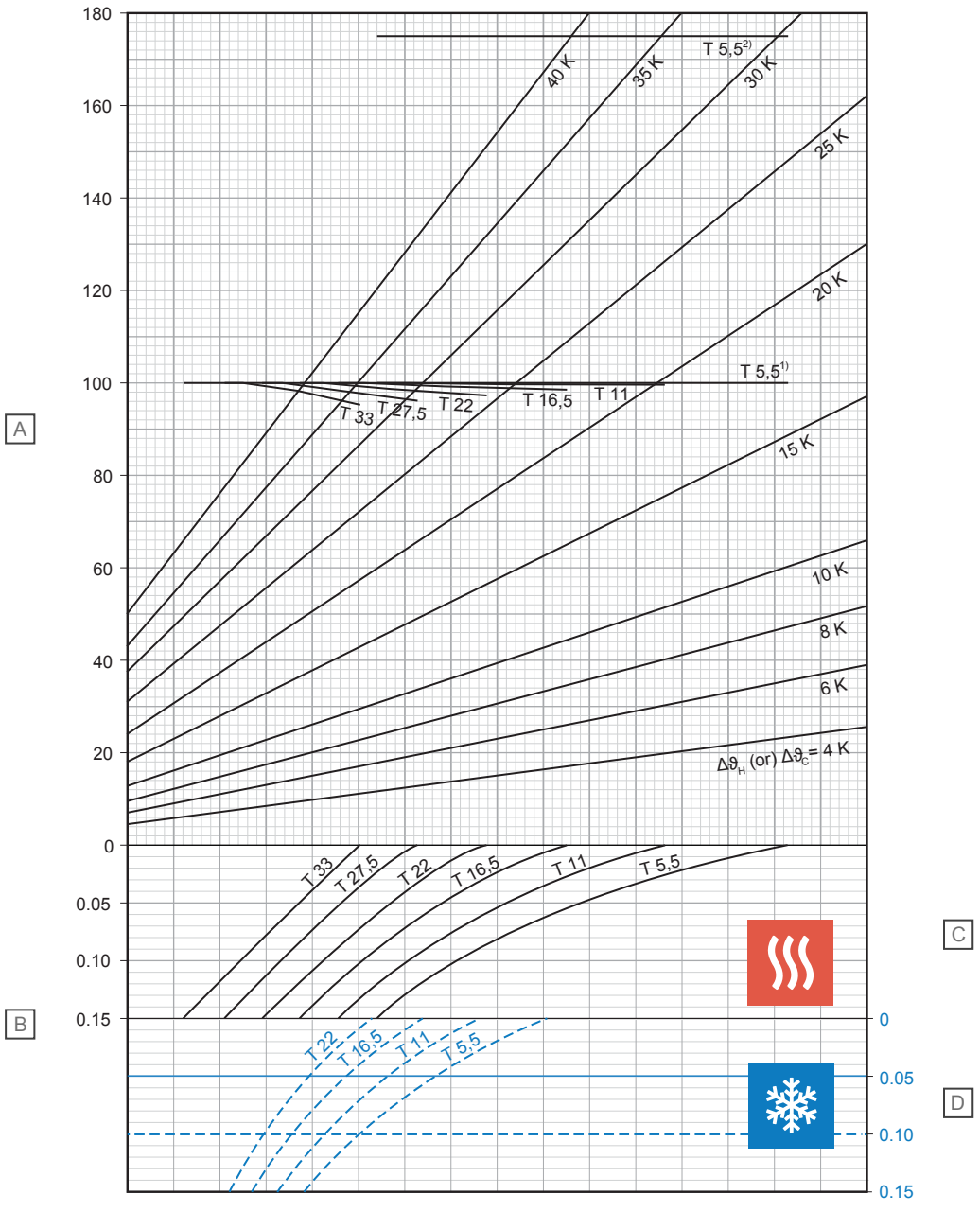
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,4	8
11	31,3	8
16,5	27,7	8
22	24,6	8

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

2) Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 14 x 2,0 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,9
11	99,8	19,7
16,5	98,7	22,6
22	97,4	25,7
27,5	96,2	29,2
33	95,4	33,2

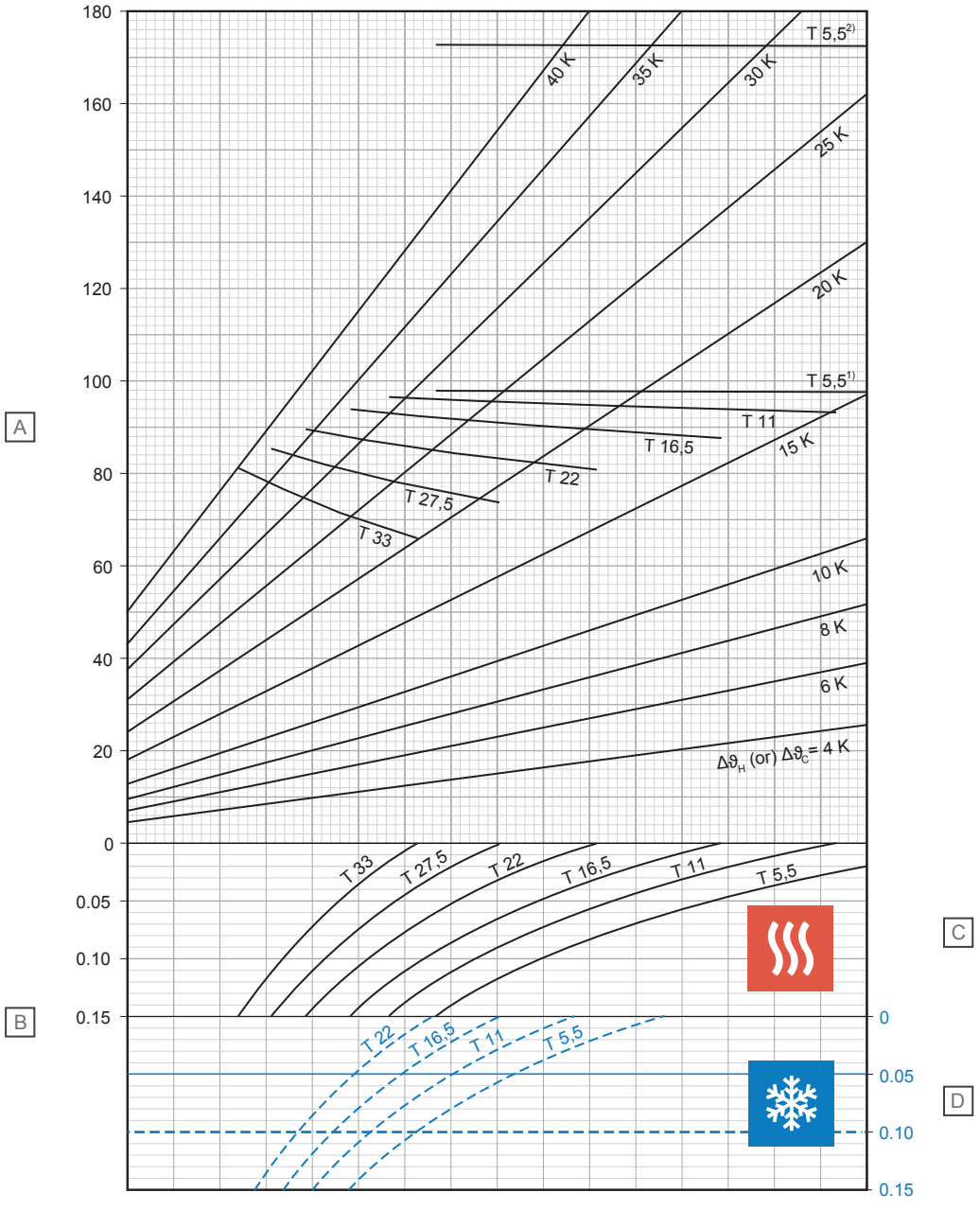
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	33,8	8
11	30,0	8
16,5	26,6	8
22	23,7	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 16 x 2,0 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,7
11	93,2	14,4
16,5	87,7	16,1
22	80,5	17,4
27,5	73,2	18,6
33	65,0	19,4

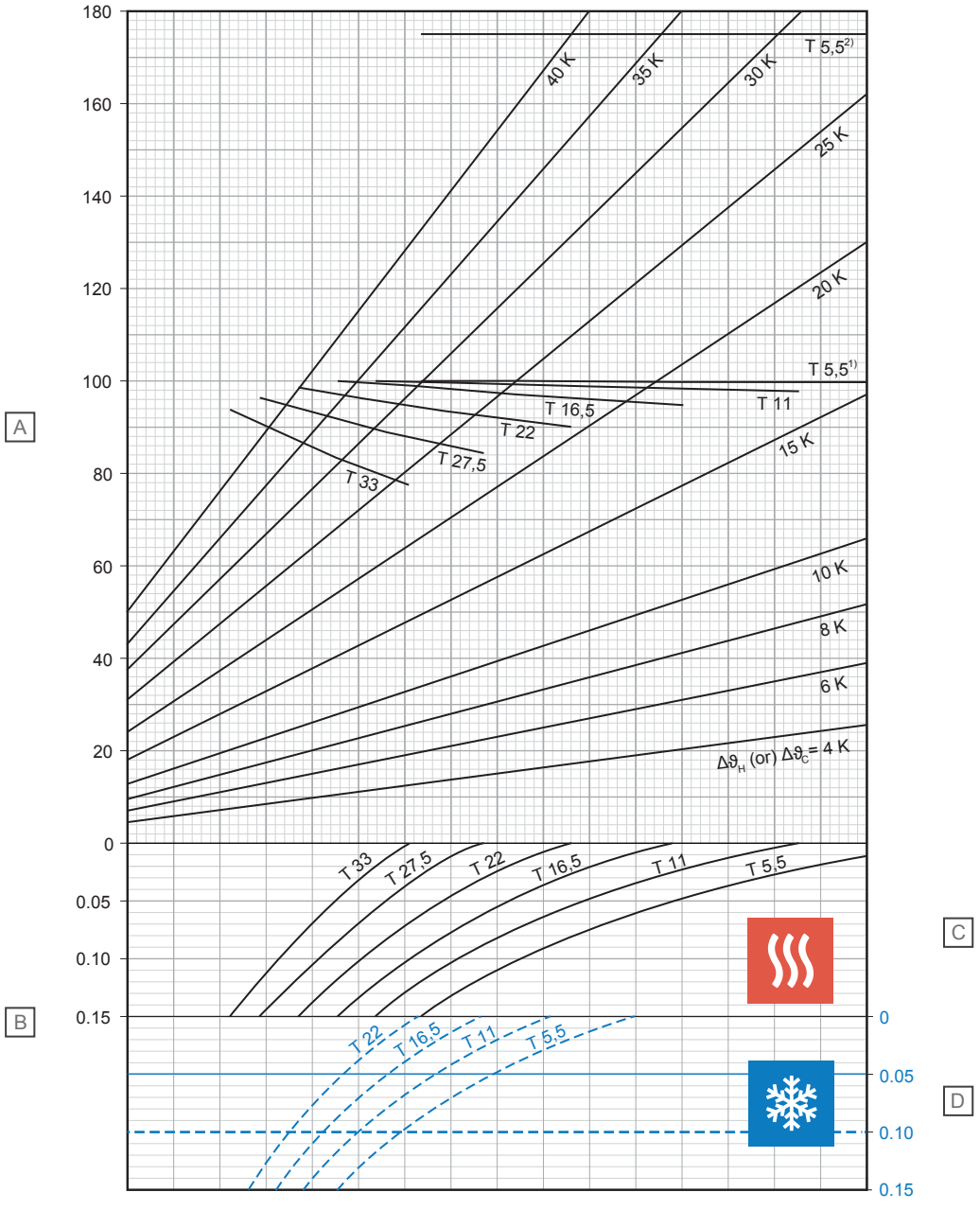
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	40,9	8
11	35,9	8
16,5	31,5	8
22	27,7	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 16 x 2,0 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,8
11	97,9	16,0
16,5	94,8	18,3
22	89,8	20,3
27,5	84,0	22,1
33	76,8	23,6

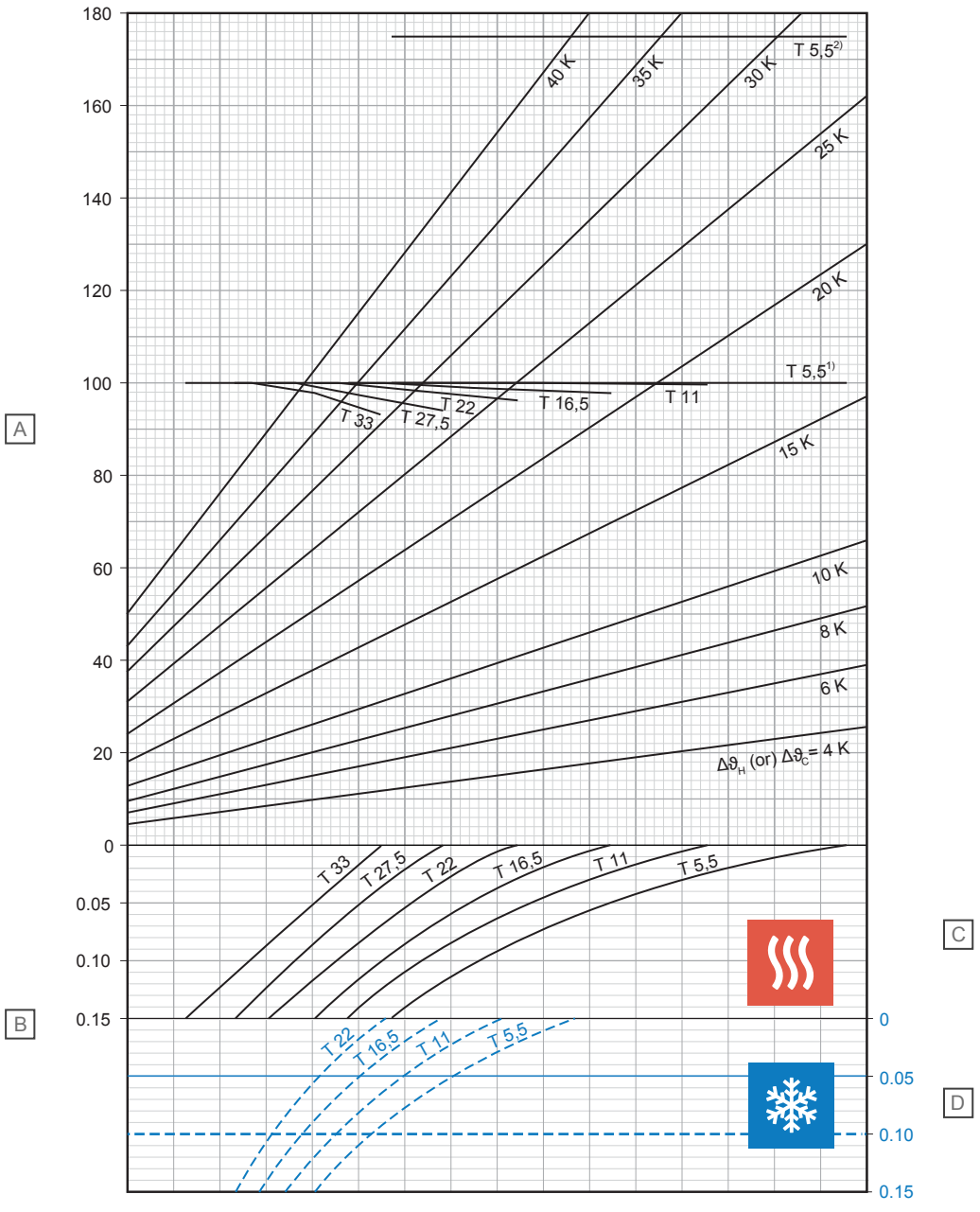
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	39,1	8
11	34,4	8
16,5	30,4	8
22	26,8	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 16 x 2,0 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,7
11	99,8	18,3
16,5	98,0	20,9
22	96,2	23,7
27,5	93,9	26,7
33	92,8	30,4

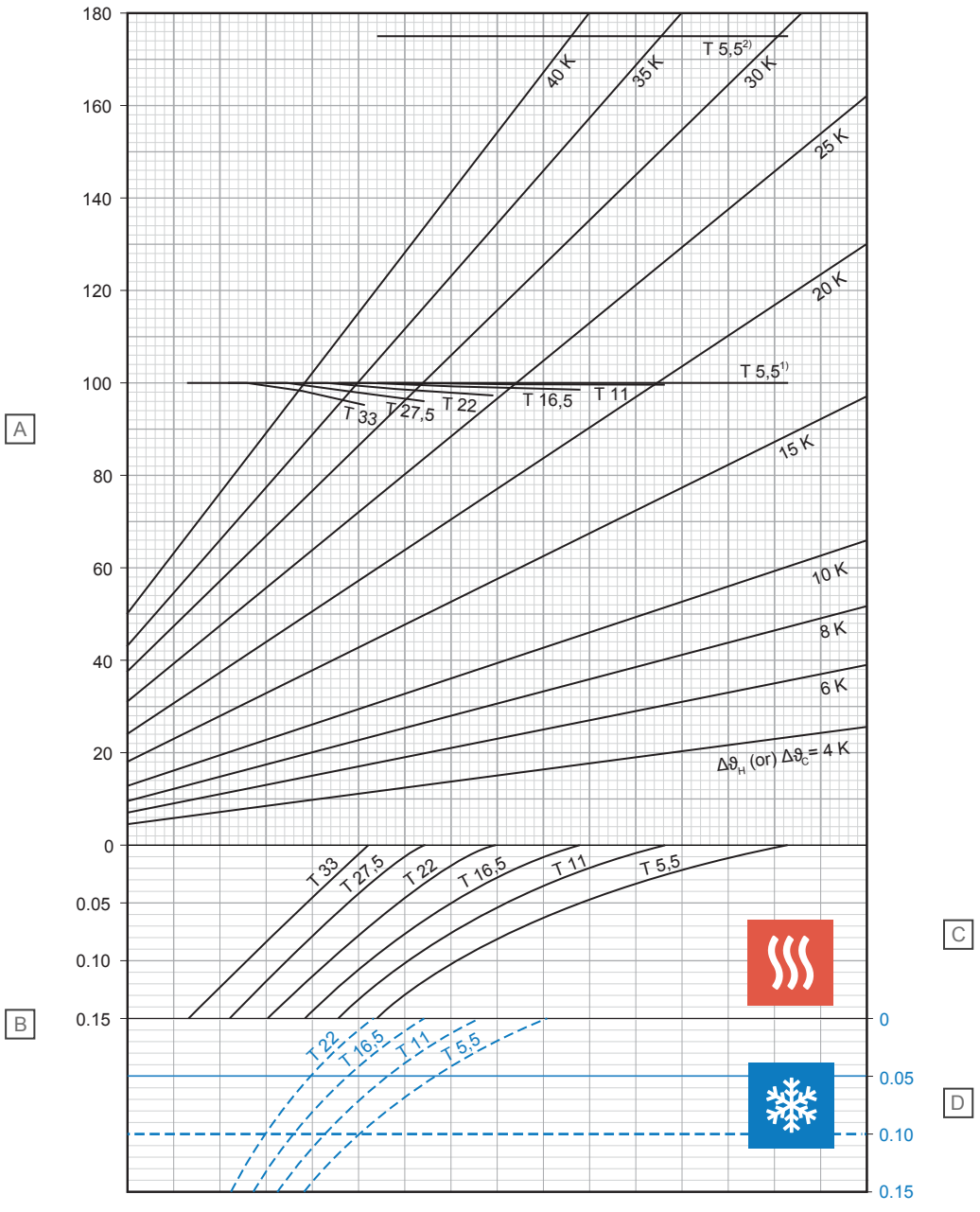
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,7	8
11	31,7	8
16,5	28,2	8
22	25,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe PLUS 16 x 2,0 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,7
11	99,8	19,4
16,5	98,7	22,1
22	97,2	25,1
27,5	95,9	28,4
33	94,9	32,1

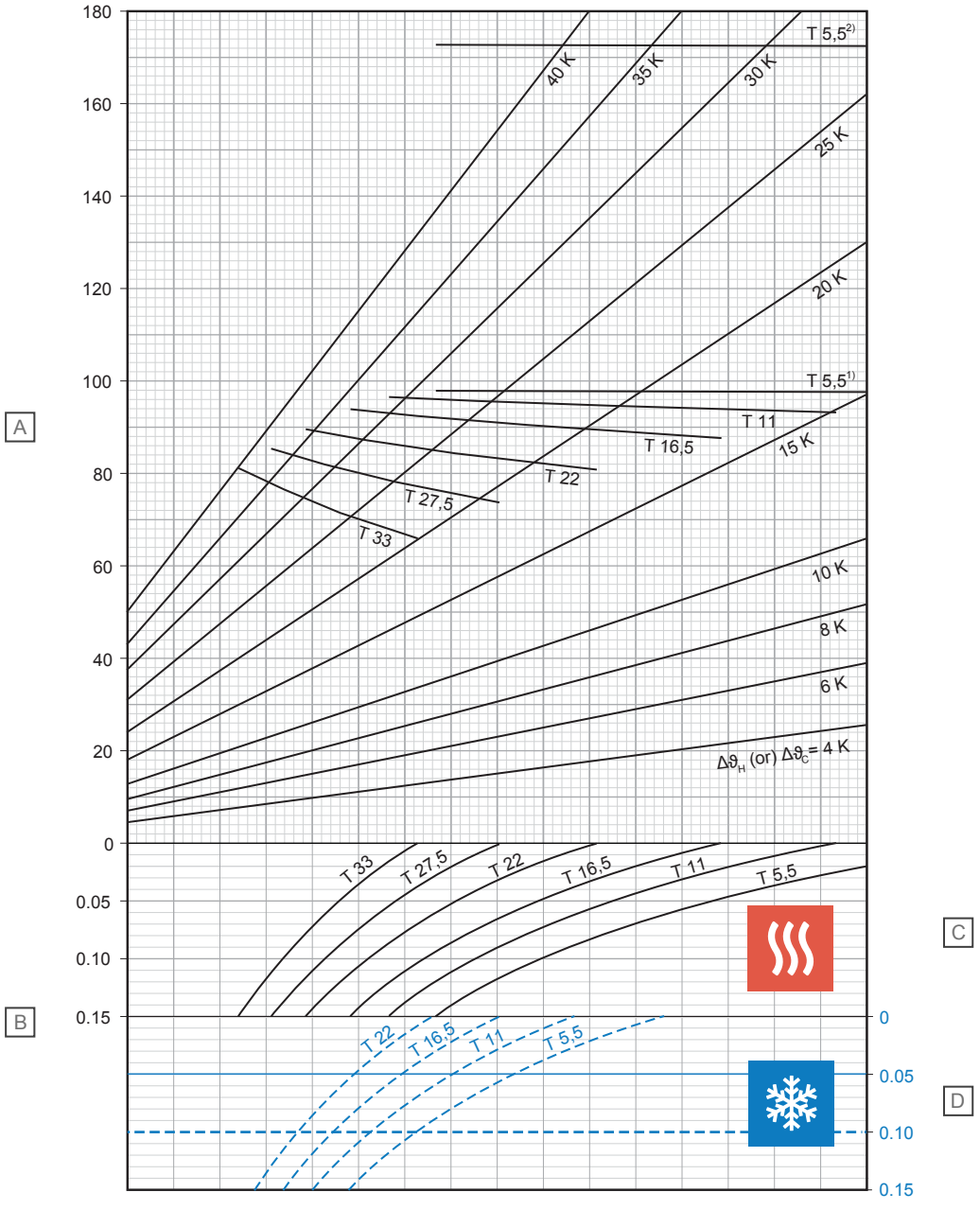
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	34,0	8
11	30,3	8
16,5	27,1	8
22	24,2	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe 16 x 1,8 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,6
11	93,1	14,3
16,5	87,6	15,8
22	80,2	17,0
27,5	72,9	18,2
33	64,5	18,9

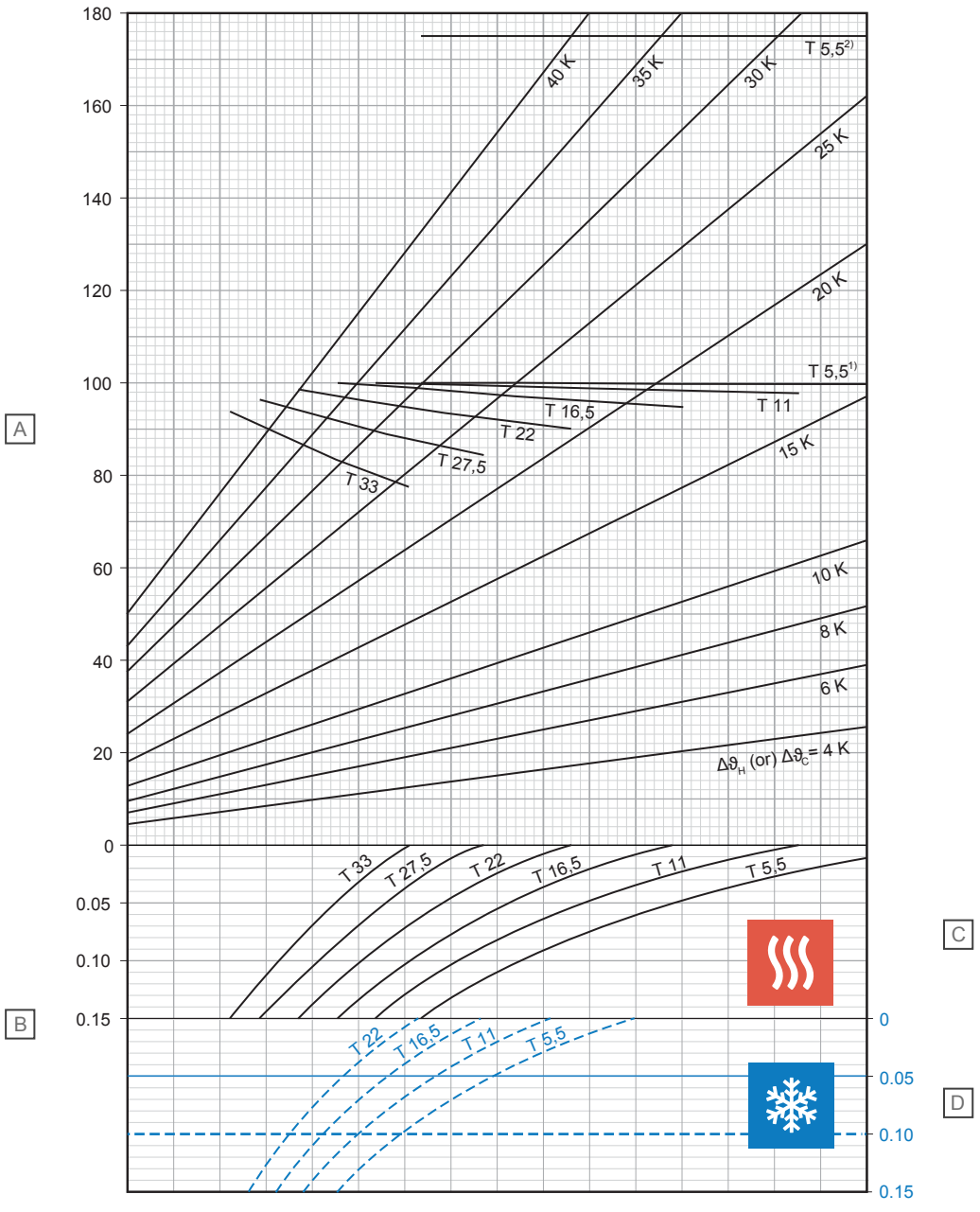
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	41,1	8
11	36,2	8
16,5	31,8	8
22	28,0	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe 16 x 1,8 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,7
11	97,8	15,8
16,5	94,7	18,0
22	89,6	19,9
27,5	83,6	21,6
33	76,2	23,0

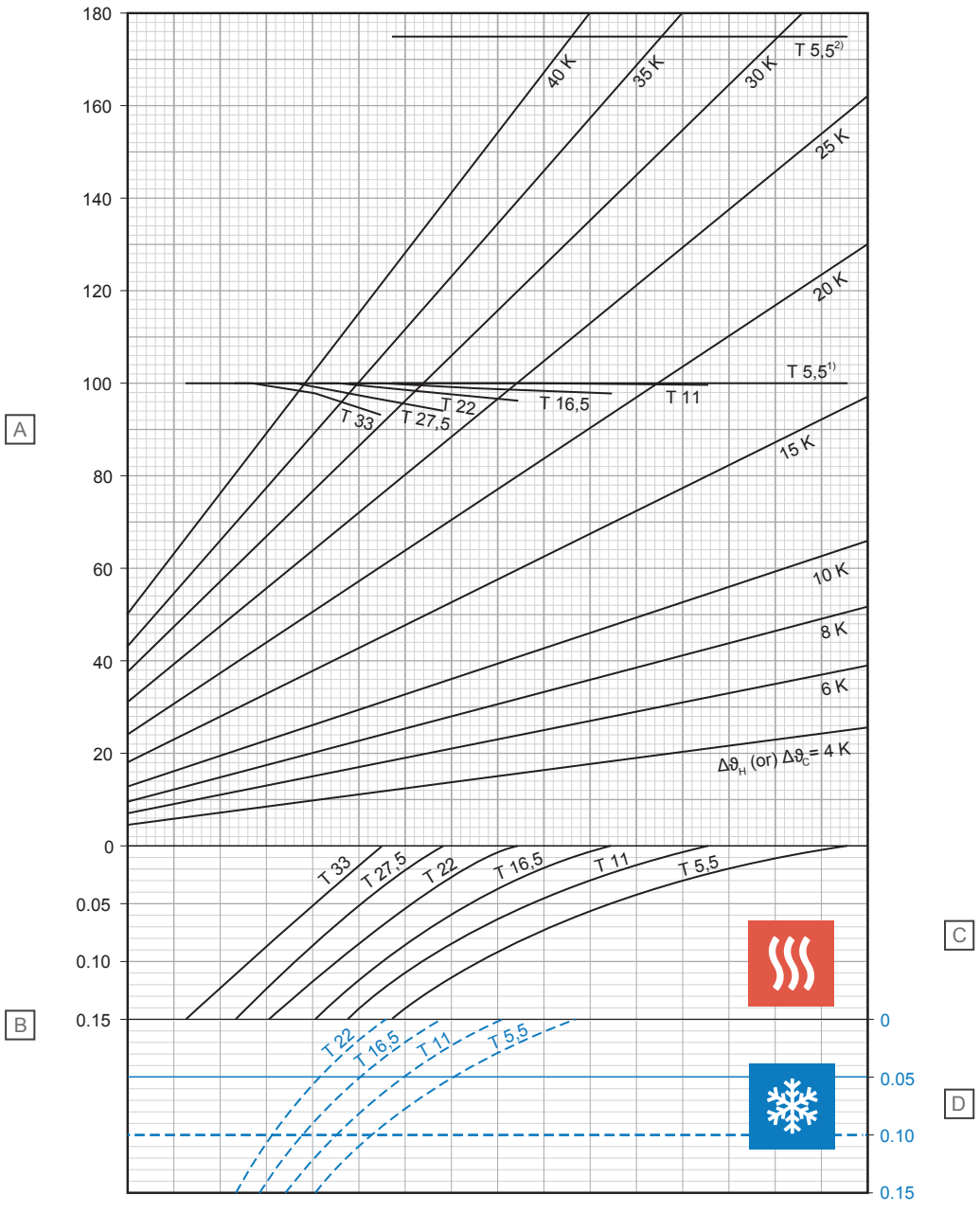
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	39,3	8
11	34,7	8
16,5	30,7	8
22	27,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe 16 x 1,8 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,6
11	99,8	18,1
16,5	97,9	20,6
22	96,1	23,3
27,5	93,6	26,2
33	92,4	29,8

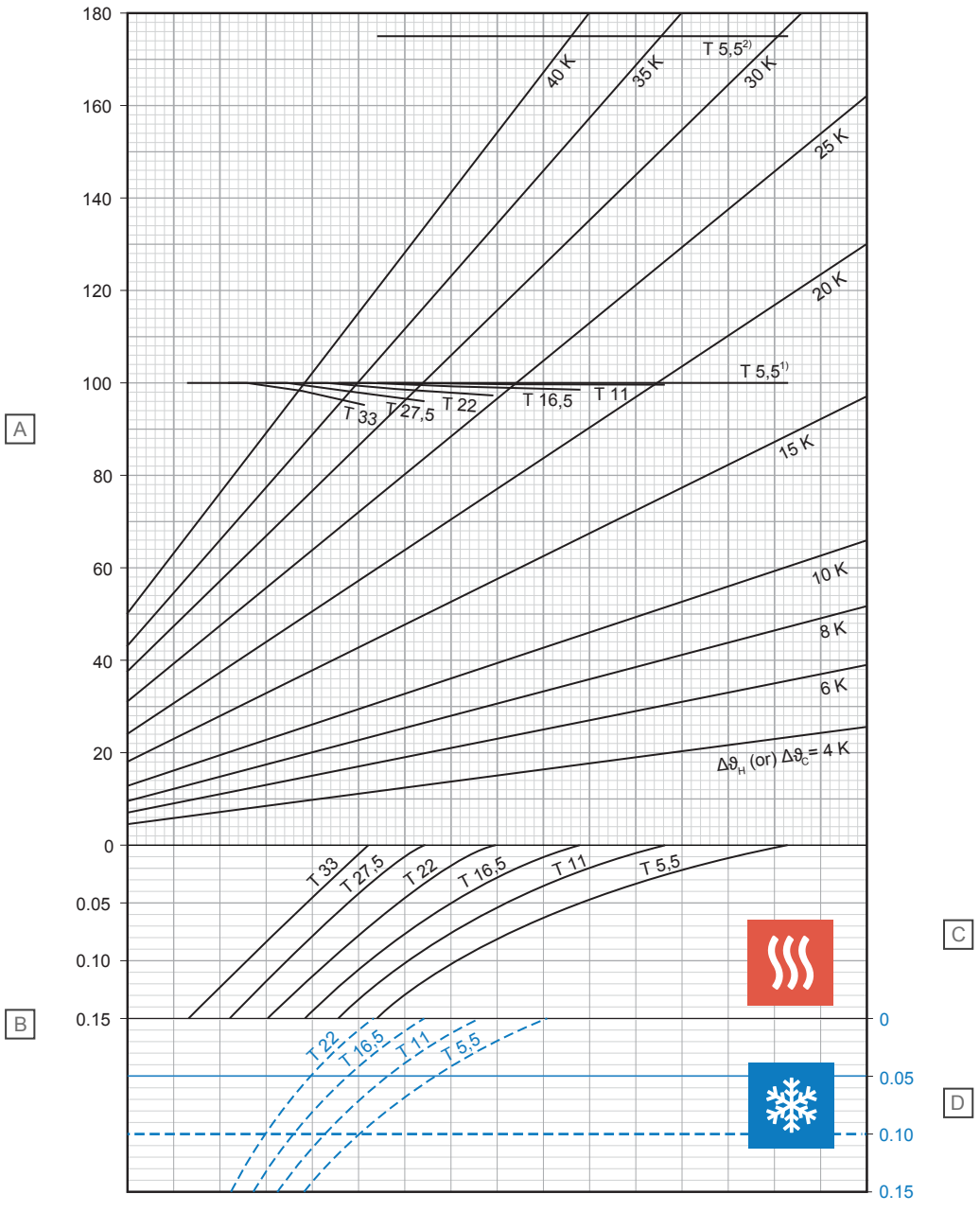
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,8	8
11	31,9	8
16,5	28,4	8
22	25,4	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Comfort Pipe 16 x 1,8 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,7
11	99,8	19,2
16,5	98,6	21,9
22	97,1	24,7
27,5	95,7	27,9
33	94,6	31,5

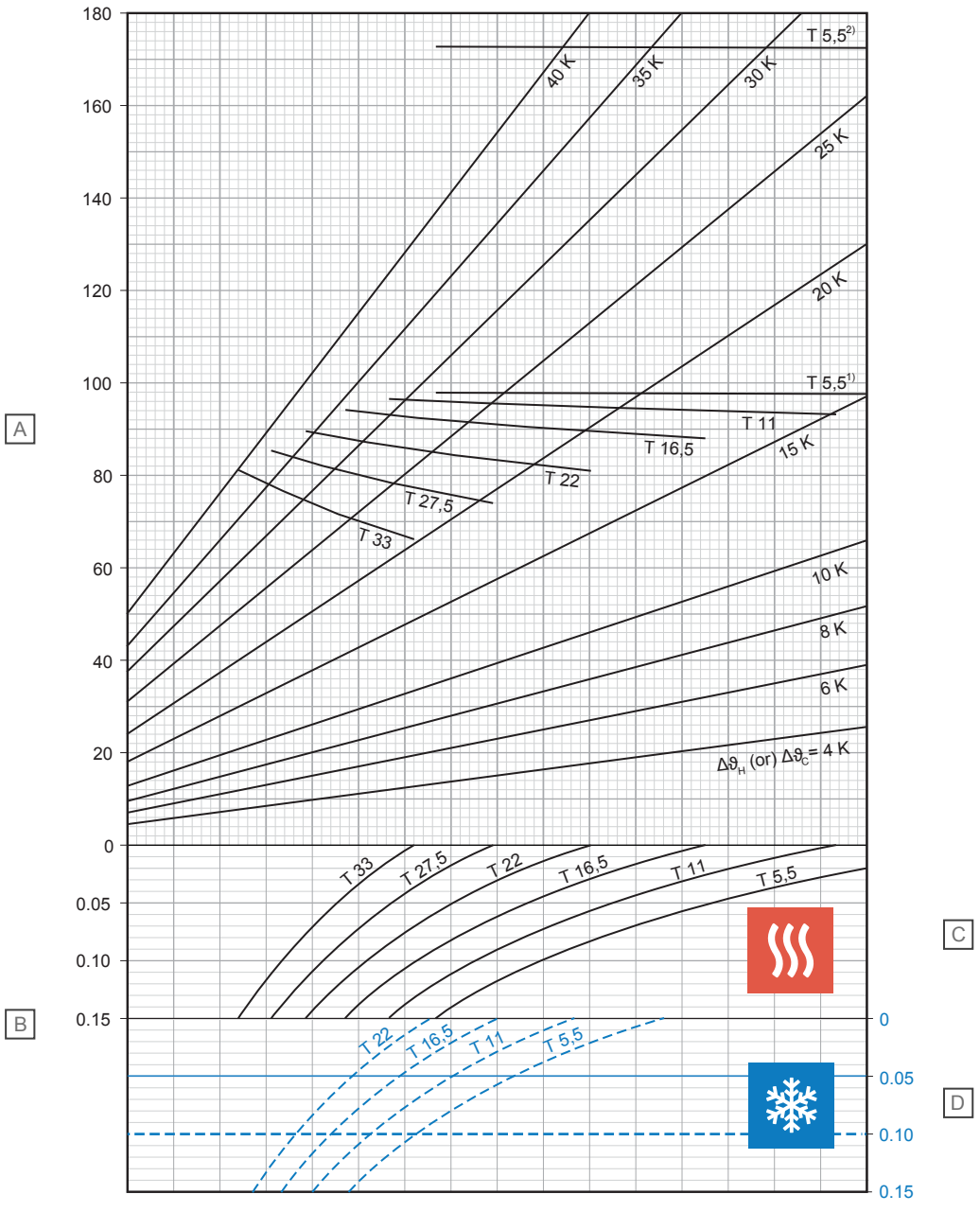
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	34,2	8
11	30,5	8
16,5	27,3	8
22	24,5	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 14 x 2,0 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,8
11	93,3	14,7
16,5	88,0	16,5
22	81,0	17,9
27,5	73,9	19,3
33	66,0	20,2

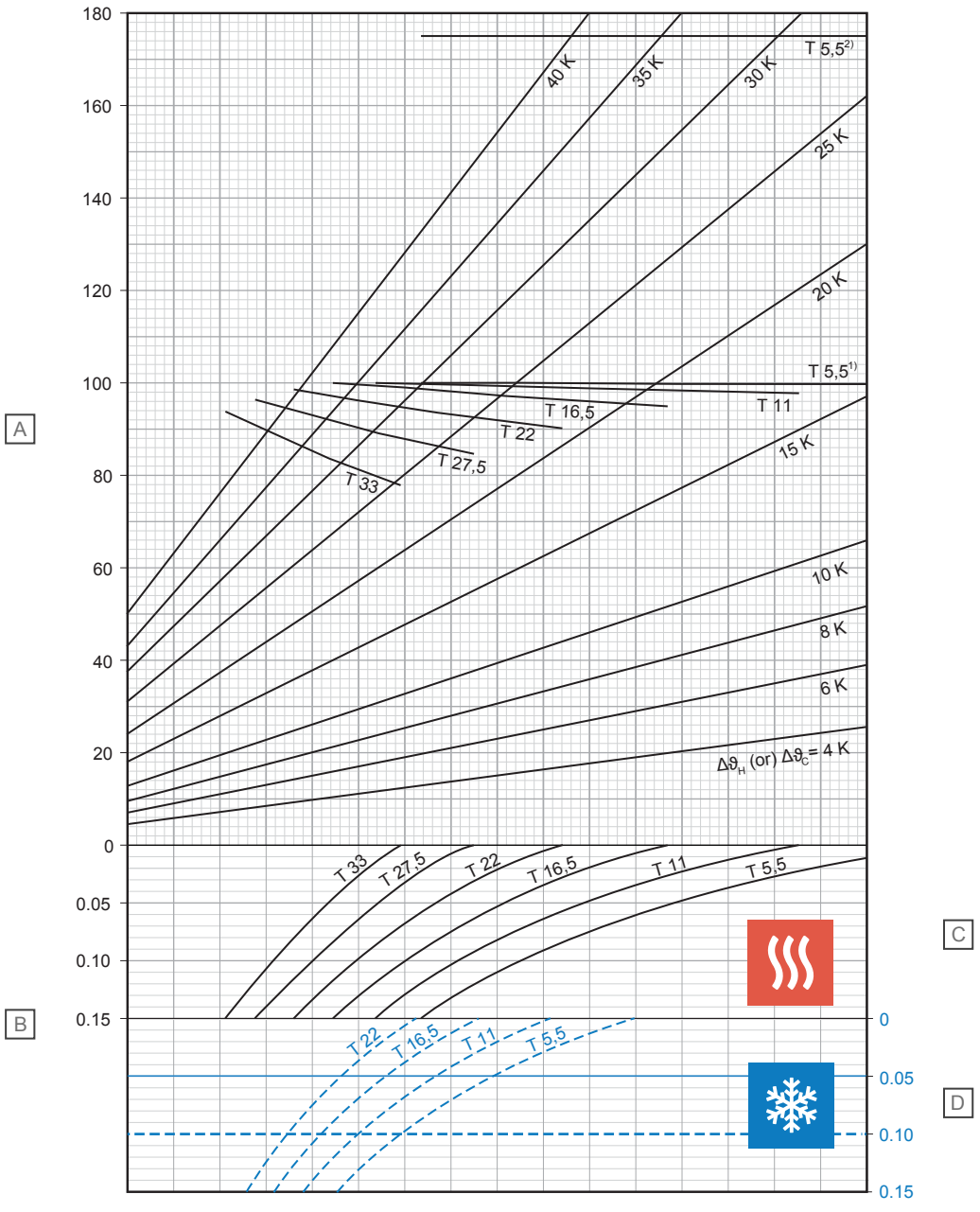
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	40,6	8
11	35,4	8
16,5	31,0	8
22	27,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 14 x 2,0 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,9
11	97,9	22,0
16,5	95,0	18,7
22	90,2	20,8
27,5	84,6	22,9
33	77,8	24,5

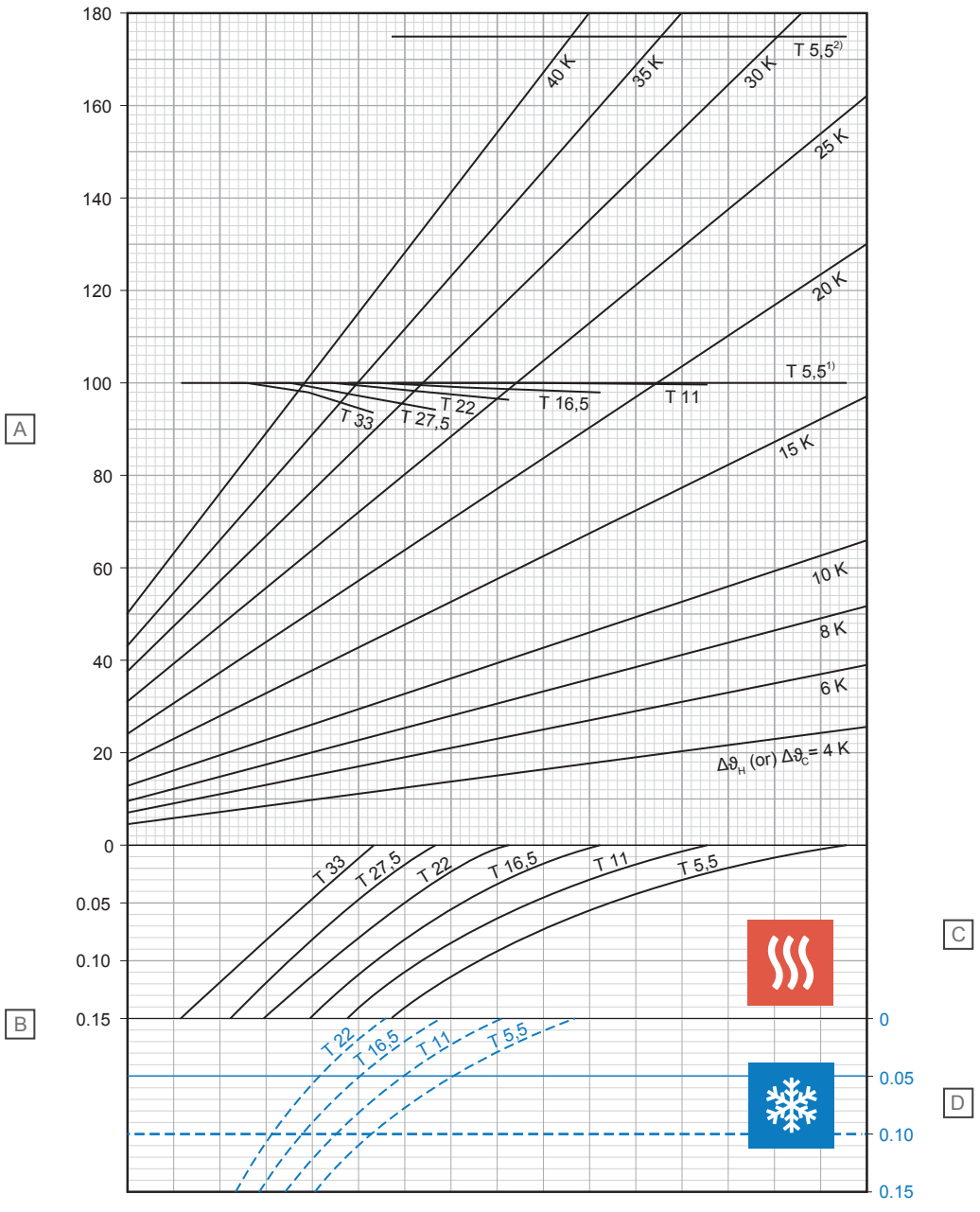
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	38,9	8
11	34,0	8
16,5	29,9	8
22	26,3	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 14 x 2,0 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,8
11	99,8	18,6
16,5	98,1	21,3
22	96,5	24,4
27,5	94,3	27,5
33	93,6	31,5

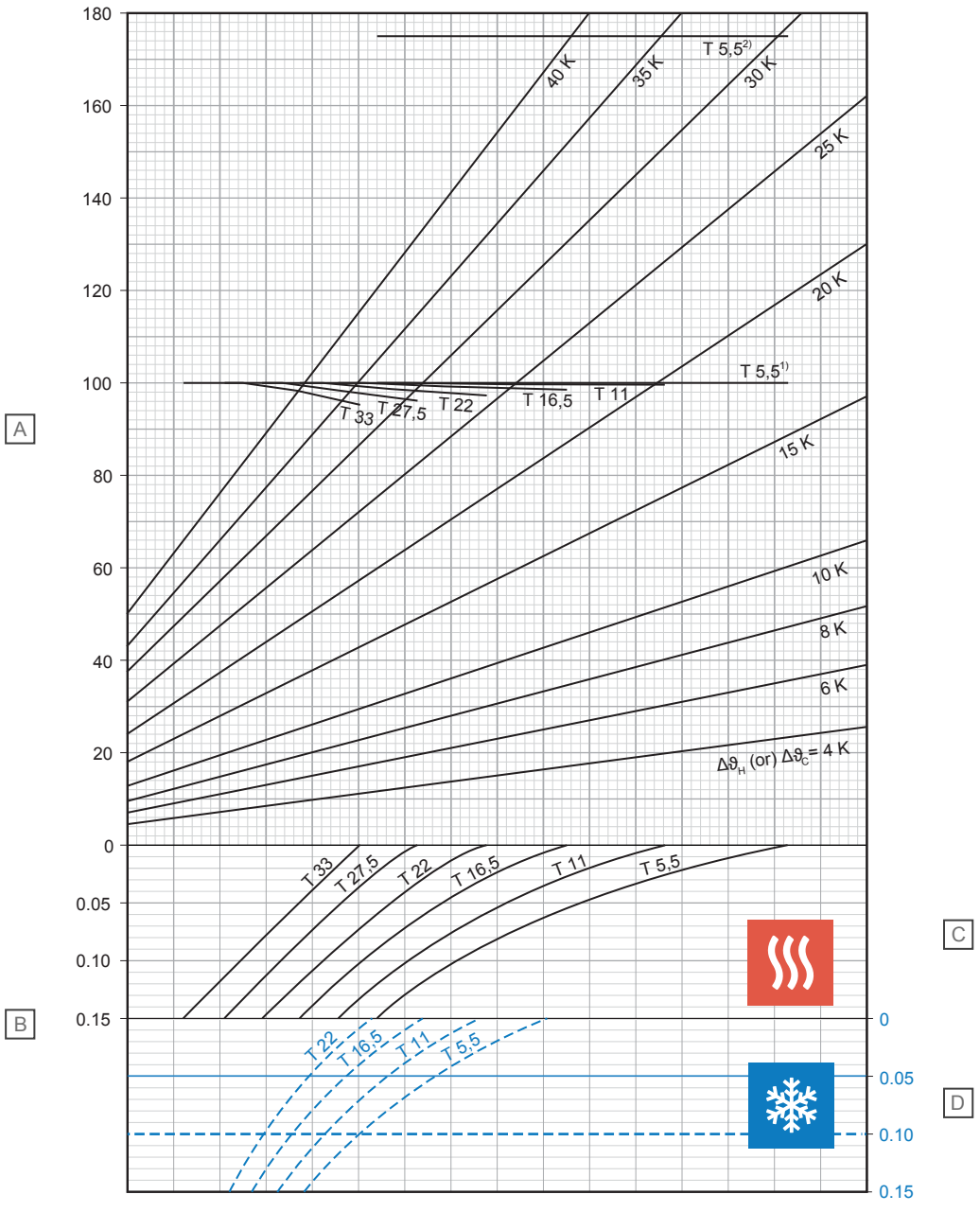
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,4	8
11	31,3	8
16,5	27,7	8
22	24,6	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 14 x 2,0 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,9
11	99,8	19,7
16,5	98,7	22,6
22	97,4	25,7
27,5	96,2	29,2
33	95,4	33,2

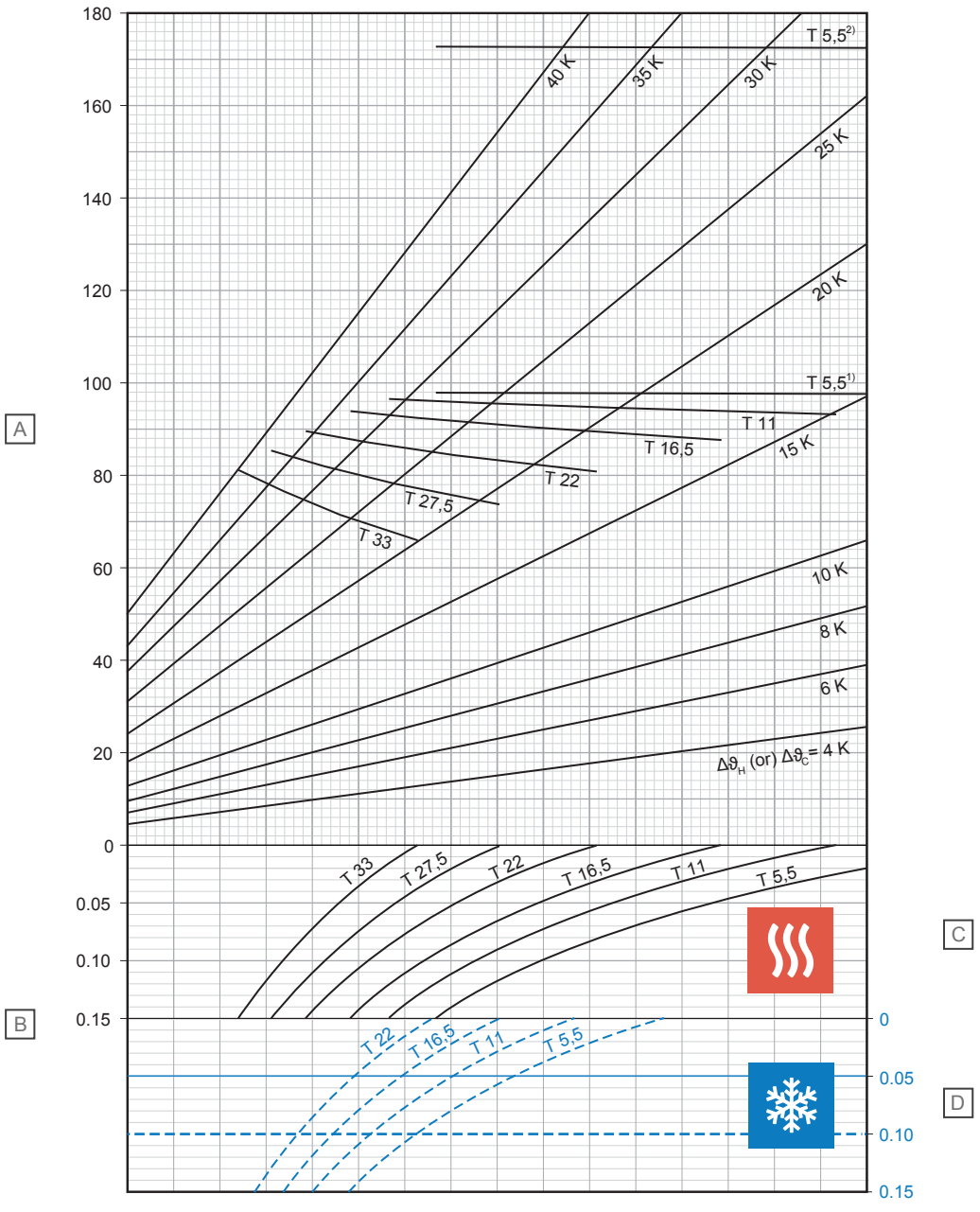
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	33,8	8
11	30,0	8
16,5	26,6	8
22	23,7	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 16 x 2,0 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,7
11	93,2	14,4
16,5	87,7	16,1
22	80,5	17,4
27,5	73,2	18,6
33	65,0	19,4

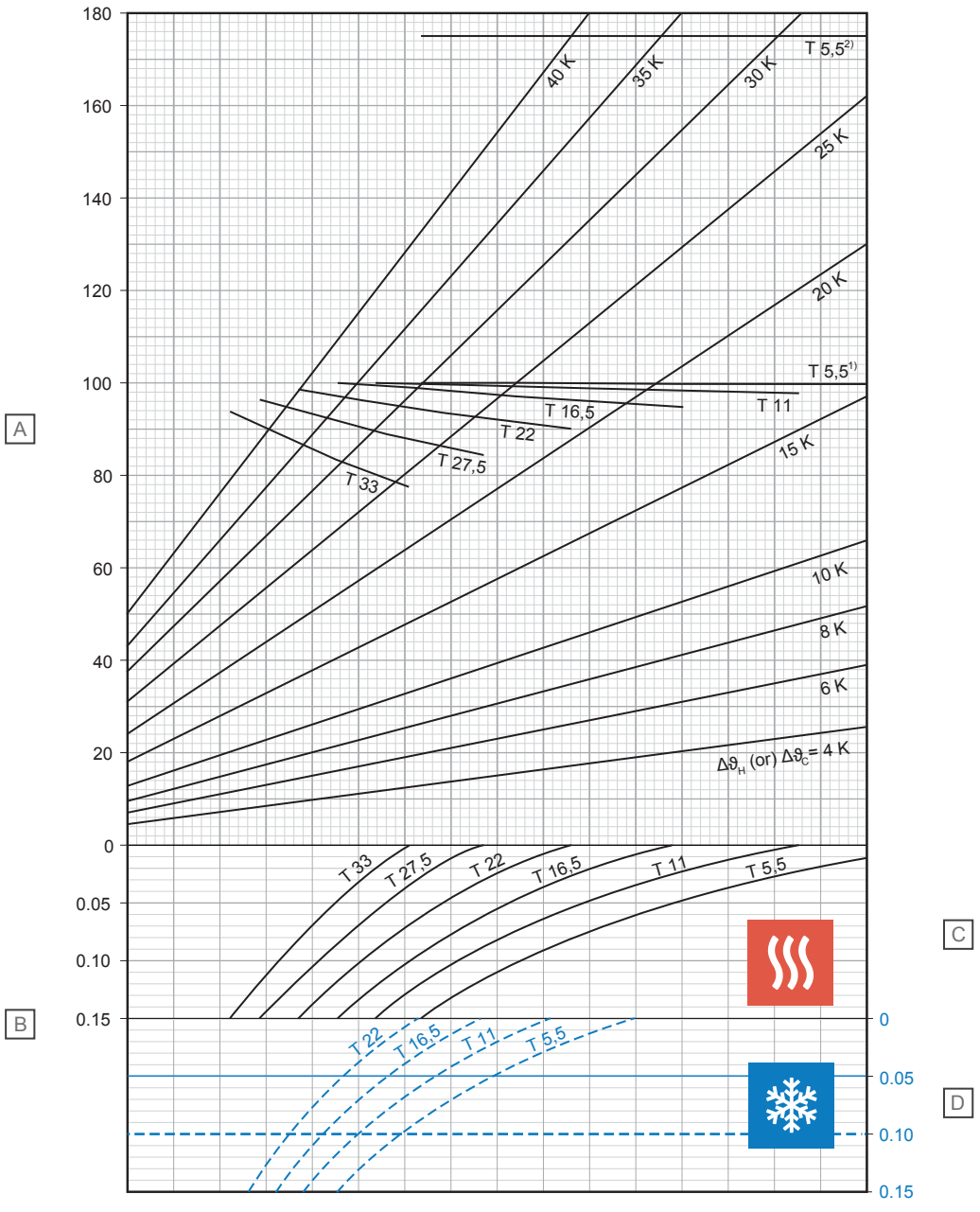
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	40,9	8
11	35,9	8
16,5	31,5	8
22	27,7	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 16 x 2,0 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,8
11	97,9	16,0
16,5	94,8	18,3
22	89,8	20,3
27,5	84,0	22,1
33	76,8	23,6

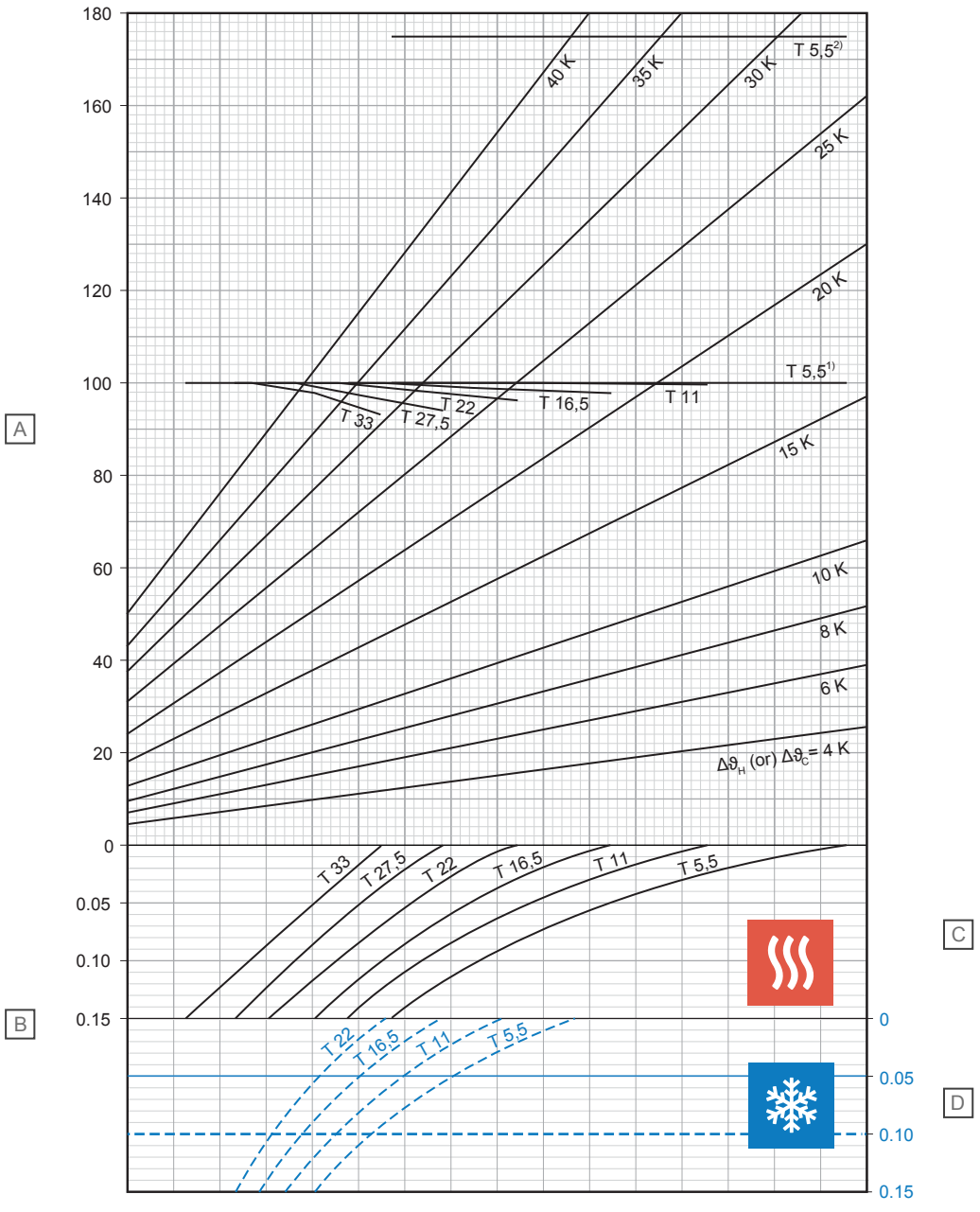
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	39,1	8
11	34,4	8
16,5	30,4	8
22	26,8	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 16 x 2,0 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,7
11	99,8	18,3
16,5	98,0	20,9
22	96,2	23,7
27,5	93,9	26,7
33	92,8	30,4

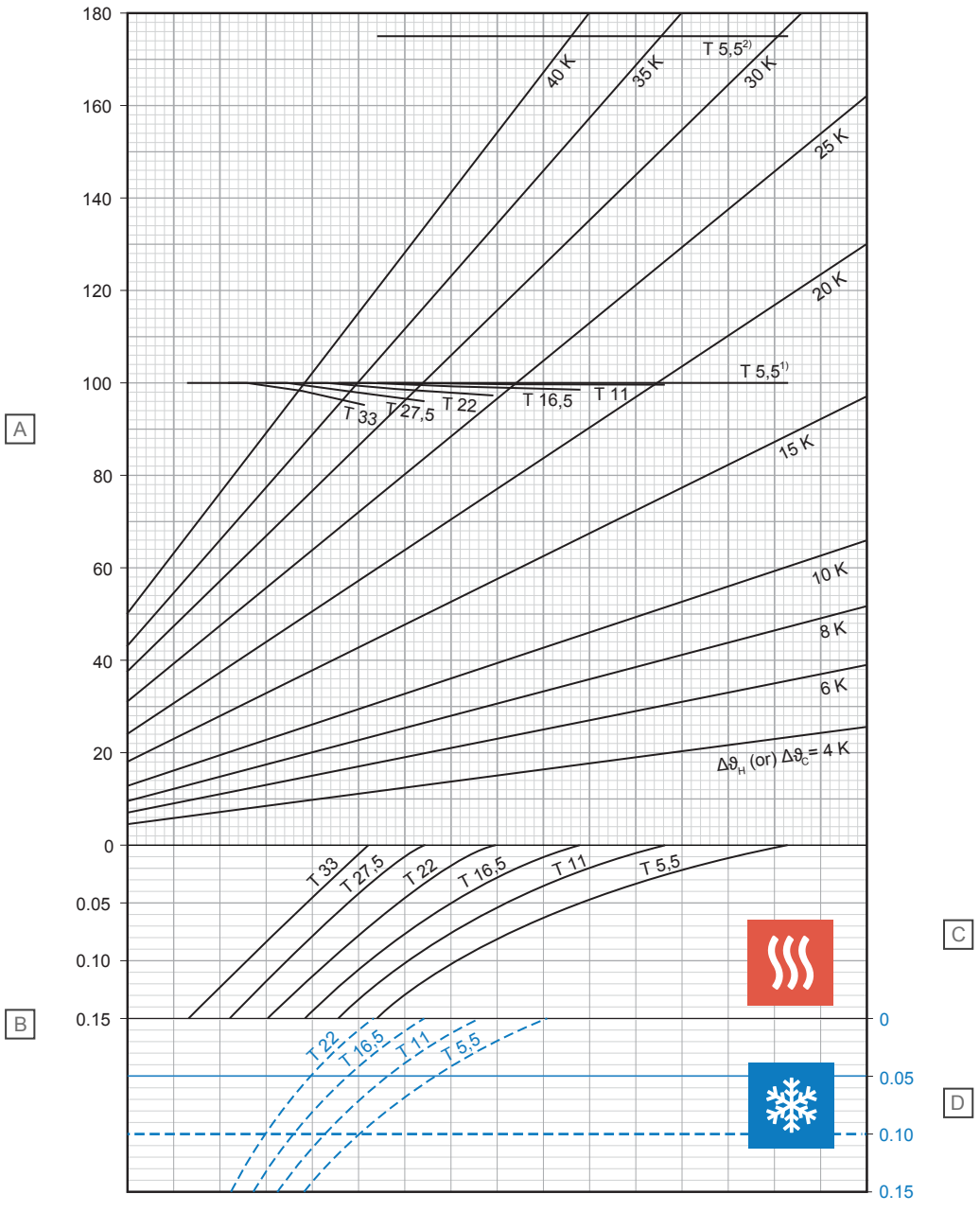
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,7	8
11	31,7	8
16,5	28,2	8
22	25,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor Smart UFH-pipe 16 x 2,0 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,7
11	99,8	19,4
16,5	98,7	22,1
22	97,2	25,1
27,5	95,9	28,4
33	94,9	32,1

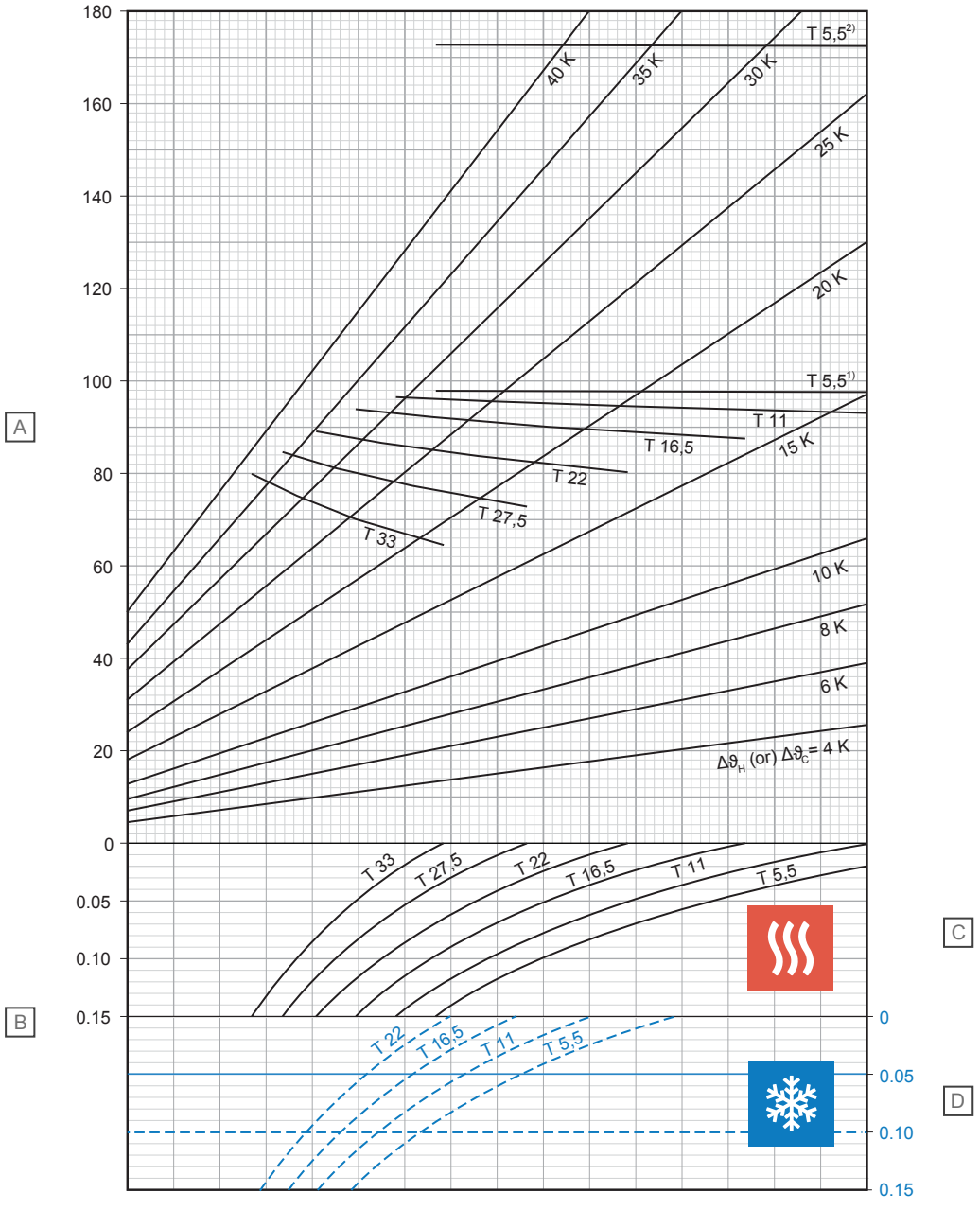
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	34,0	8
11	30,3	8
16,5	27,1	8
22	24,2	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 14 x 1,6 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,5
11	93,1	14,1
16,5	87,6	15,6
22	80,2	16,8
27,5	72,7	17,9
33	64,3	18,5

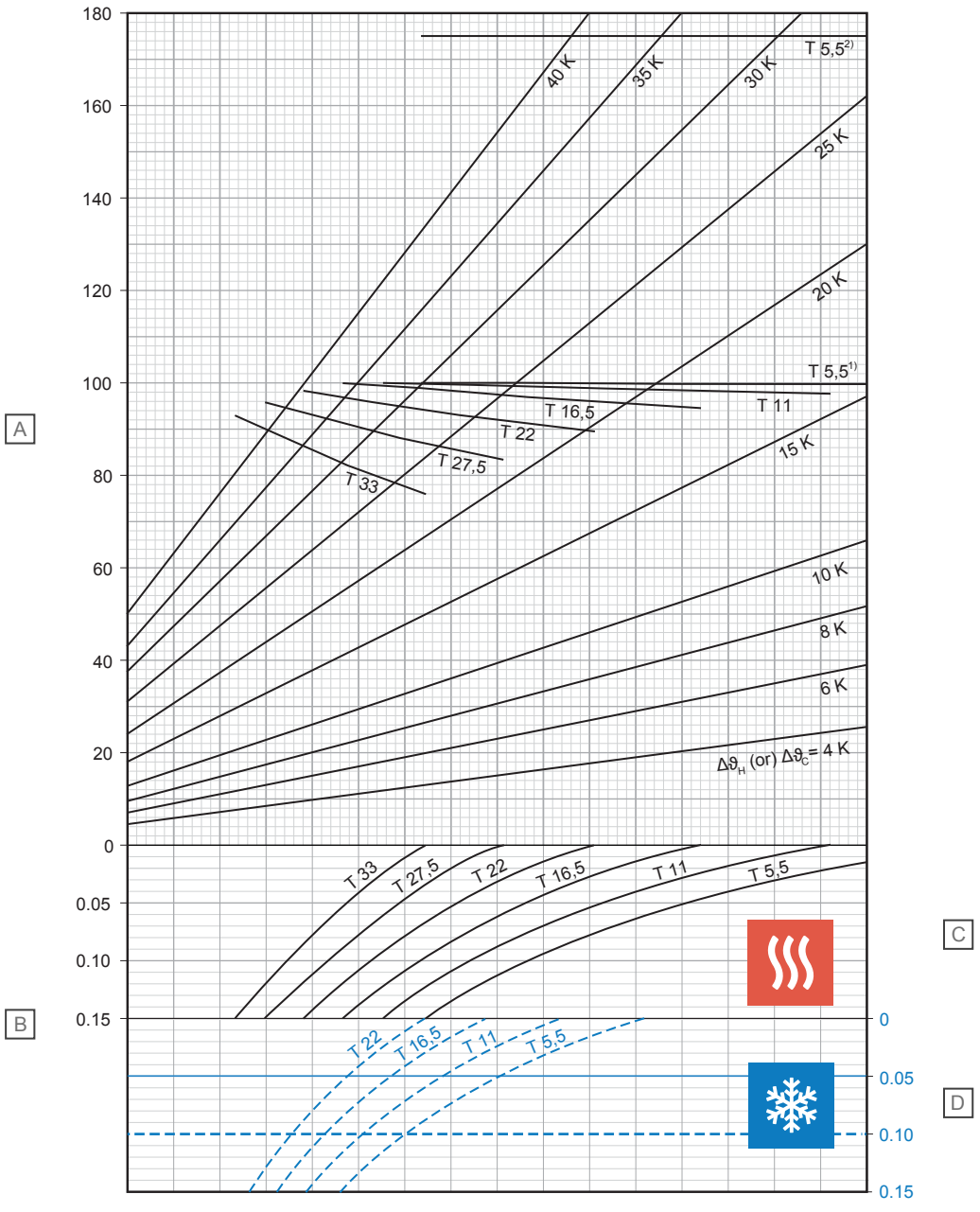
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	41,3	8
11	36,4	8
16,5	32,1	8
22	28,3	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 14 x 1,6 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,6
11	97,8	15,7
16,5	94,6	17,8
22	89,5	19,6
27,5	83,4	21,3
33	75,9	22,6

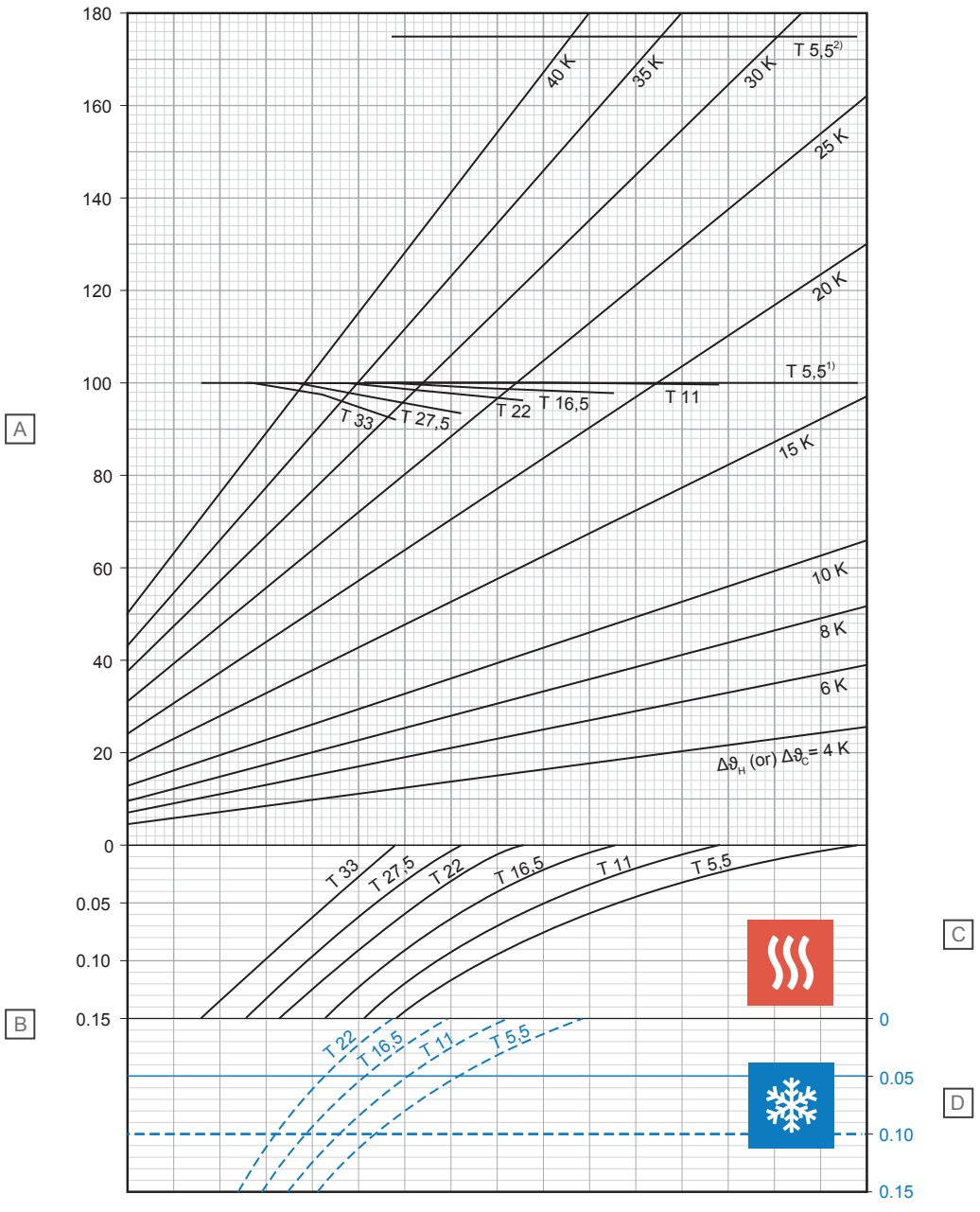
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	39,4	8
11	34,9	8
16,5	30,9	8
22	27,4	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 14 x 1,6 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,5
11	99,8	18,0
16,5	97,9	20,4
22	96,0	23,1
27,5	93,5	25,9
33	92,1	29,3

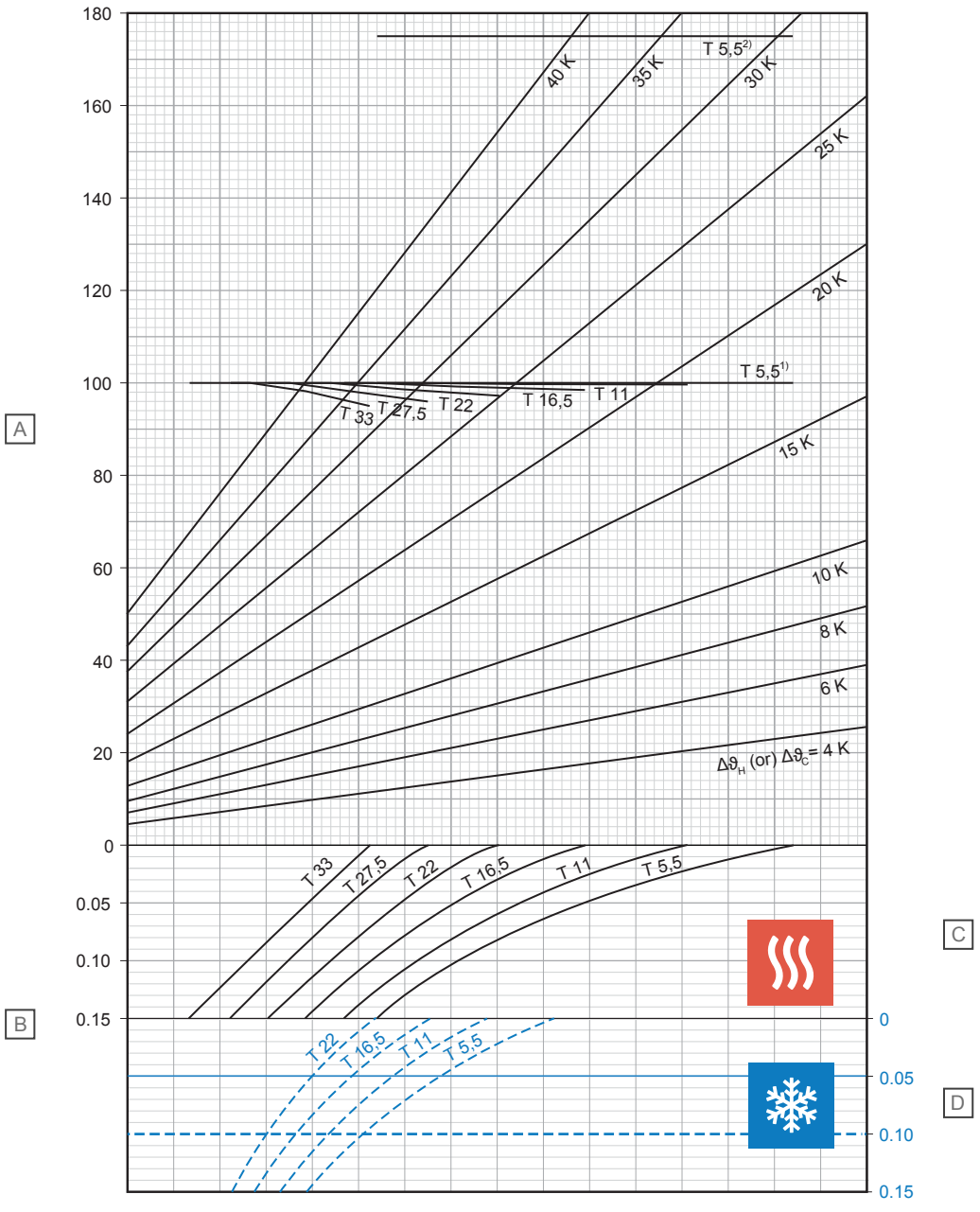
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,9	8
11	32,0	8
16,5	28,6	8
22	25,5	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 14 x 1,6 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,6
11	99,8	19,1
16,5	98,6	21,7
22	97,1	24,5
27,5	95,6	27,6
33	94,4	31,1

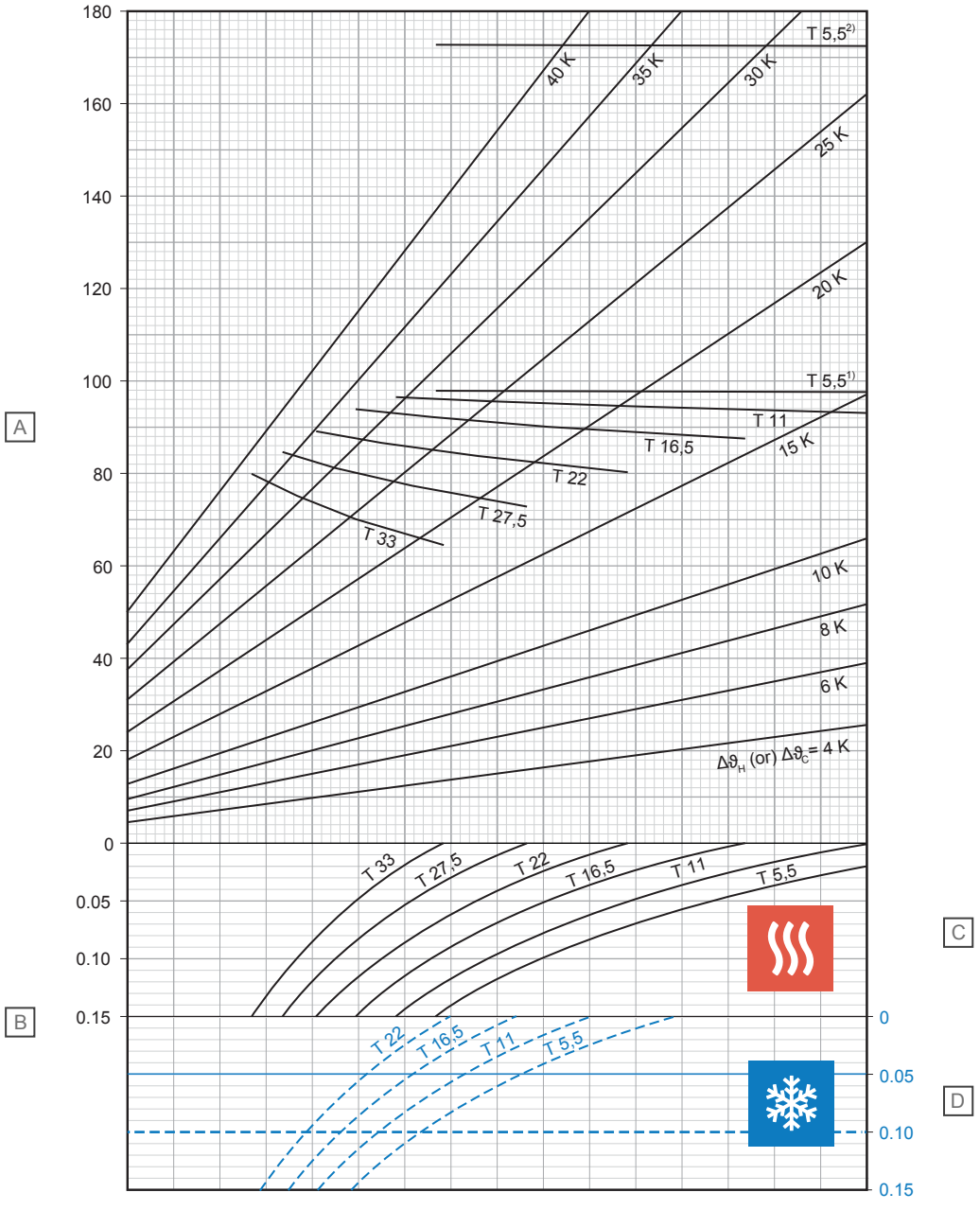
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	34,2	8
11	30,7	8
16,5	27,5	8
22	24,6	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 16 x 2,0 mm with screed load distribution layer (su = 35 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	97,7	12,6
11	93,1	14,2
16,5	87,6	15,8
22	80,2	17,0
27,5	72,8	18,1
33	64,5	18,8

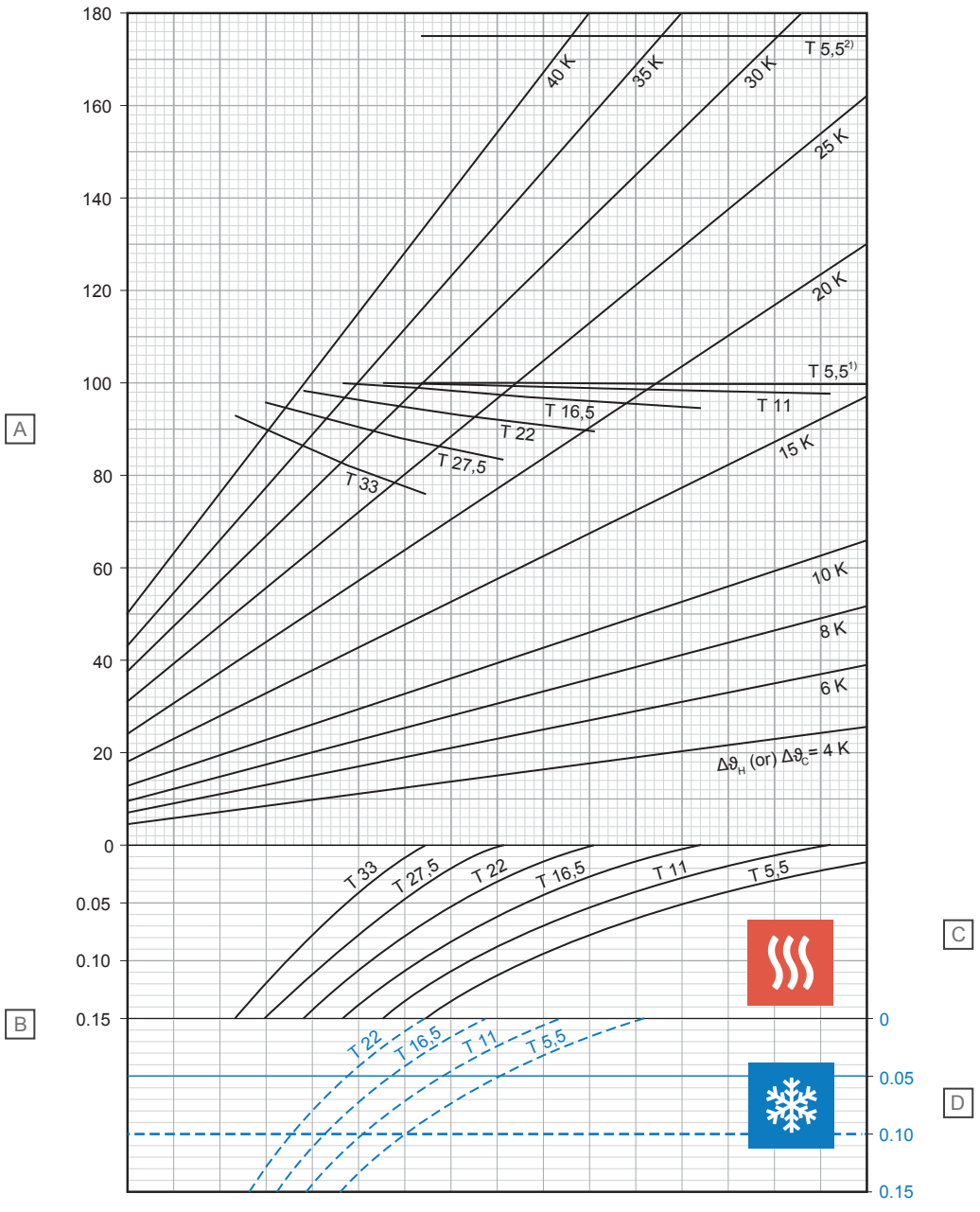
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	41,1	8
11	36,2	8
16,5	31,9	8
22	28,1	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 16 x 2,0 mm with screed load distribution layer (su = 45 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	99,9	13,7
11	97,8	15,8
16,5	94,7	17,9
22	89,6	19,8
27,5	83,6	21,6
33	76,2	22,9

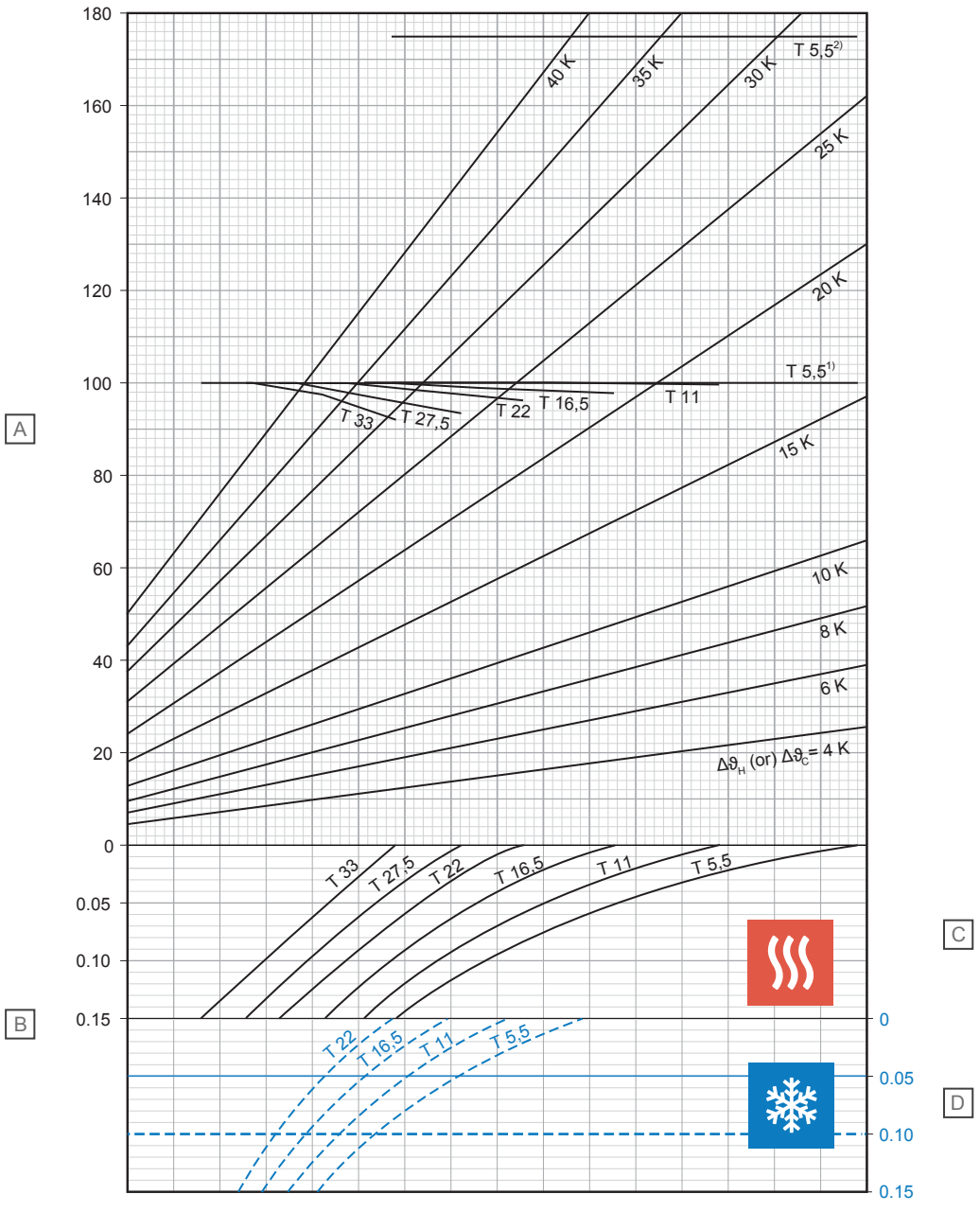
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	39,3	8
11	34,7	8
16,5	30,7	8
22	27,2	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 16 x 2,0 mm with screed load distribution layer (su = 65 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	15,6
11	99,8	18,1
16,5	97,9	20,6
22	96,1	23,3
27,5	93,6	26,2
33	92,4	29,7

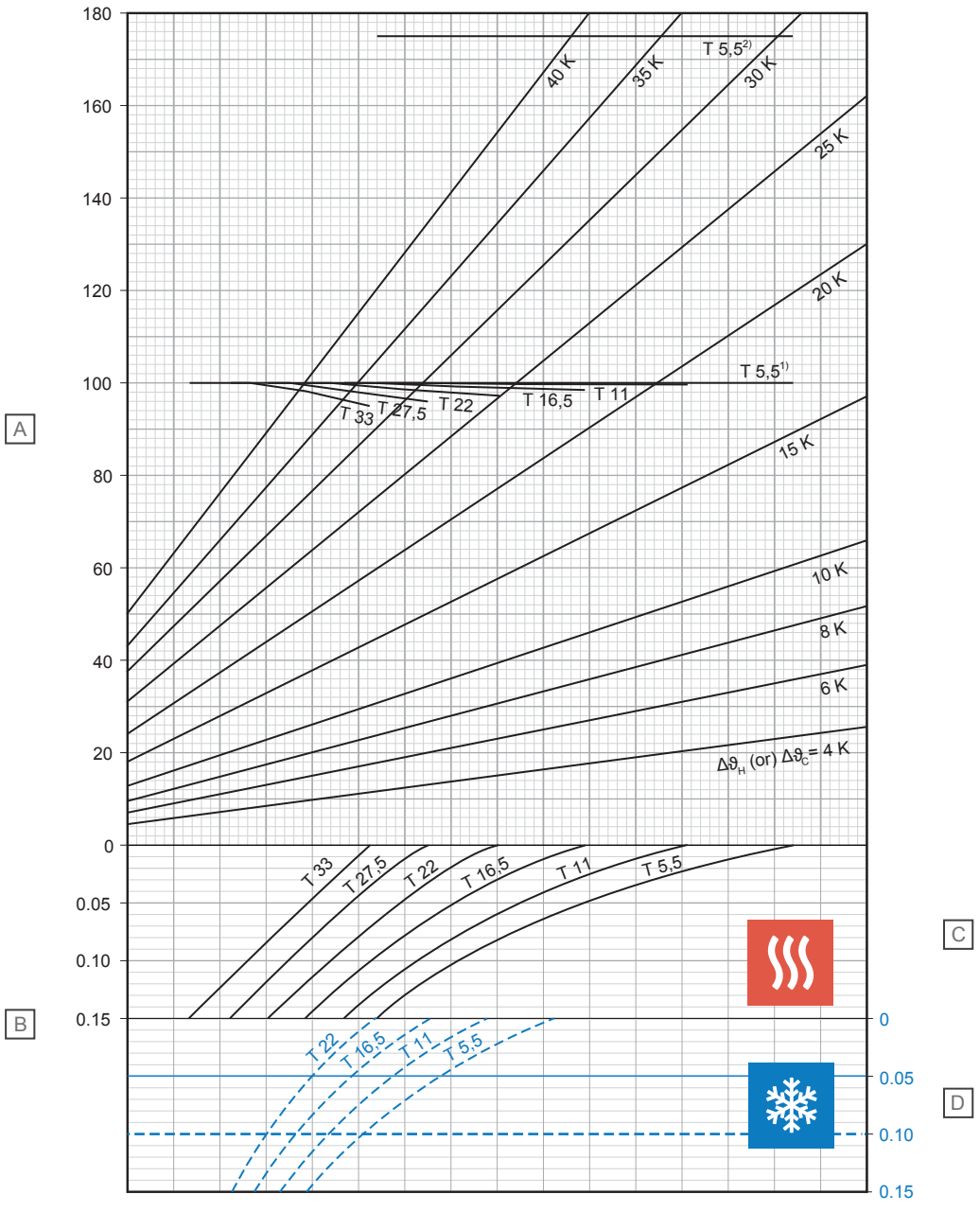
D - Cooling

T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	35,8	8
11	31,9	8
16,5	28,5	8
22	25,4	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

Uponor MLCP RED 16 x 2,0 mm with screed load distribution layer (su = 75 mm with λu = 1,2 W/mK)



Item	Unit	Description
A	W/m²	Specific thermal heating or cooling output [q_H or q_C]
B	m²K/W	Thermal resistance [$R_{\lambda,B}$]

C - Heating

T (cm)	q_H (W/m²)	$\Delta\vartheta_{H,N}$ (K)
5,5	100,0	16,6
11	99,8	19,2
16,5	98,6	21,8
22	97,1	24,7
27,5	95,7	27,8
33	94,5	31,4

D - Cooling

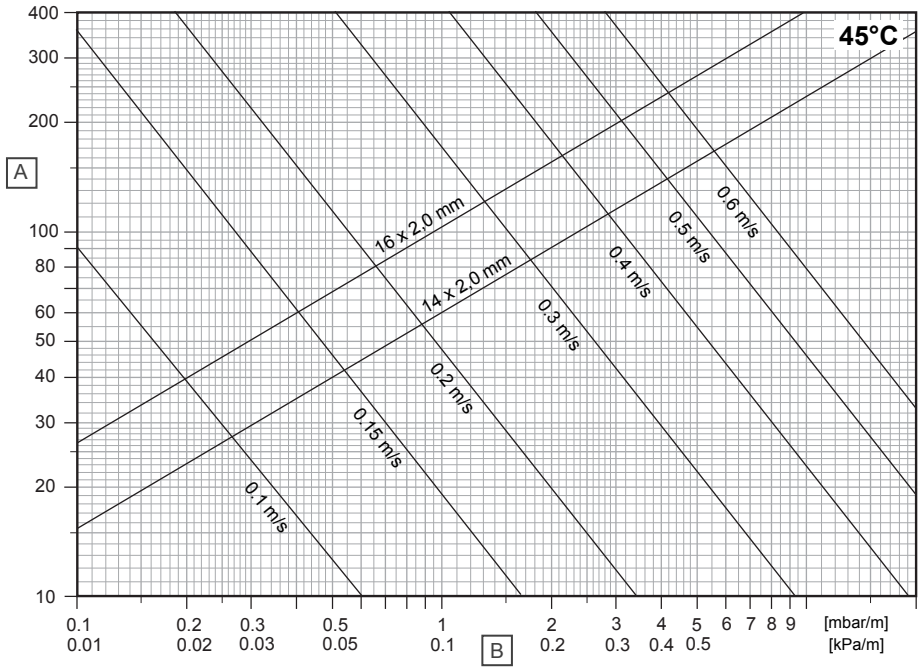
T (cm)	q_C (W/m²)	$\Delta\vartheta_{C,N}$ (K)
5,5	34,2	8
11	30,6	8
16,5	27,4	8
22	24,5	8

[1] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 29 °C or ϑ_i 24 °C and $\vartheta_{F,max}$ 33 °C

[2] Limit curve valid for ϑ_i 20 °C and $\vartheta_{F,max}$ 35 °C

2.3 Pressure drop diagrams

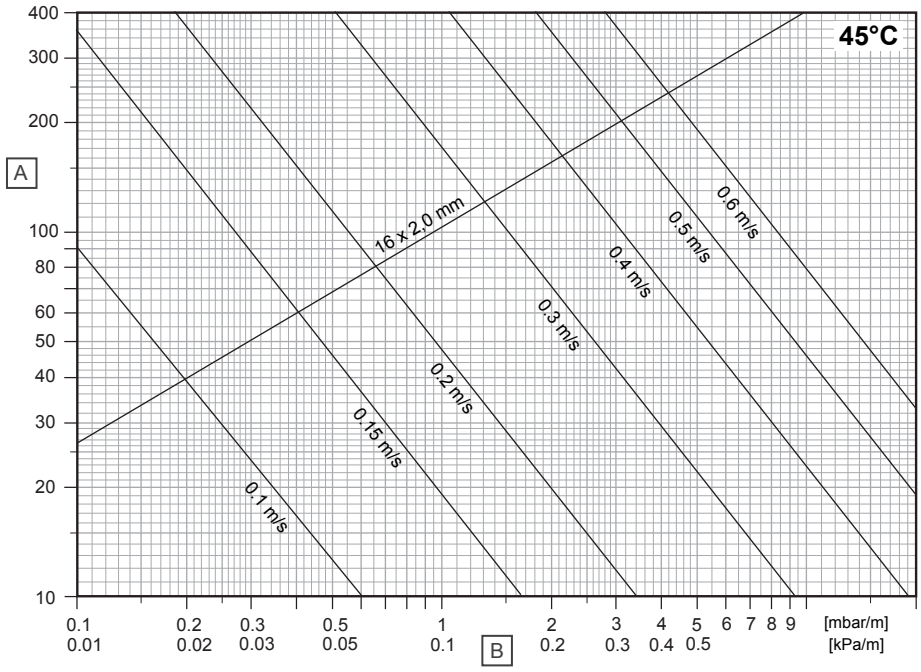
Uponor Comfort Pipe PLUS



DI0000226

Item	Unit	Description
A	kg/h	Mass flow rate
B	R	Pressure gradient

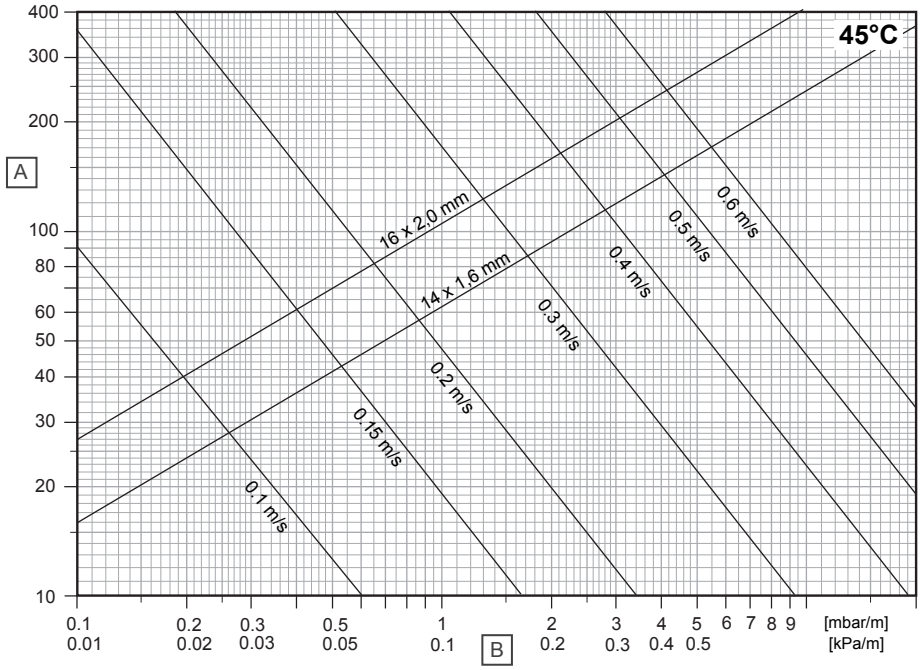
Uponor Comfort Pipe



DI0000262

Item	Unit	Description
A	kg/h	Mass flow rate
B	R	Pressure gradient

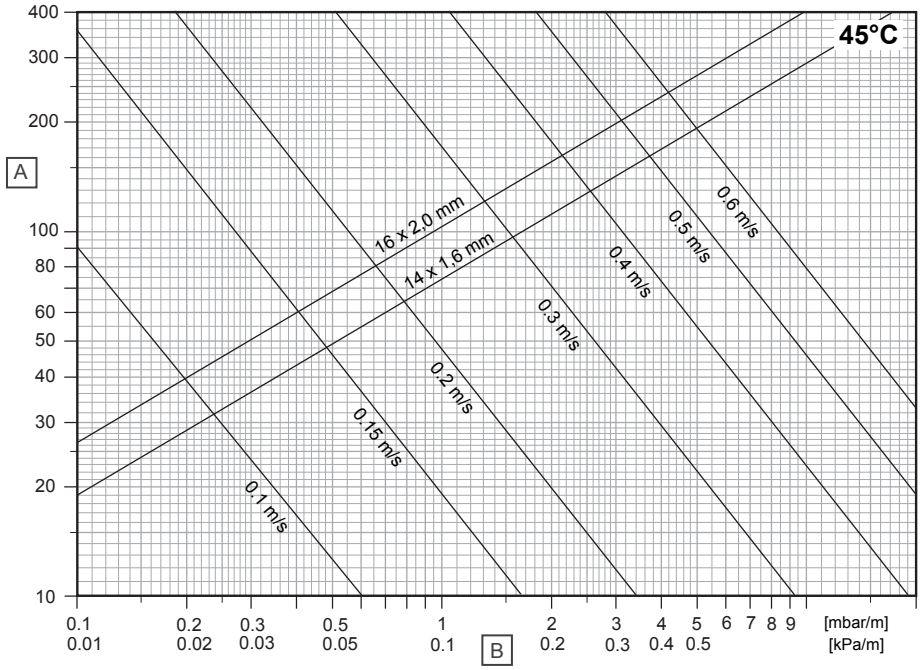
Uponor Smart UFH-pipe



DI0000263

Item	Unit	Description
A	kg/h	Mass flow rate
B	R	Pressure gradient

Uponor MLCP RED



DI0000266

Item	Unit	Description
A	kg/h	Mass flow rate
B	R	Pressure gradient

3 Installation

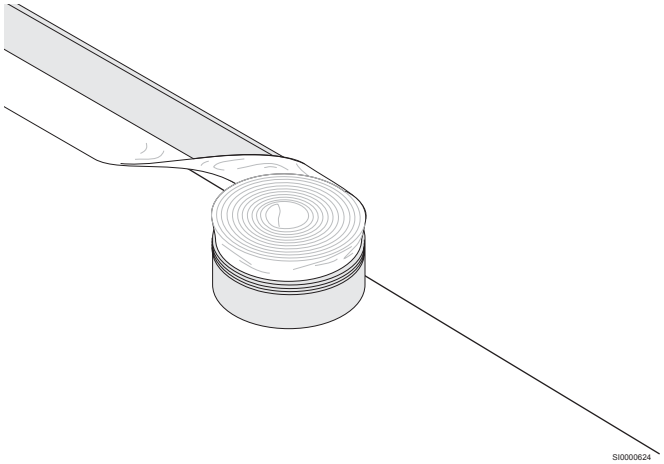
3.1 Installation process

Note

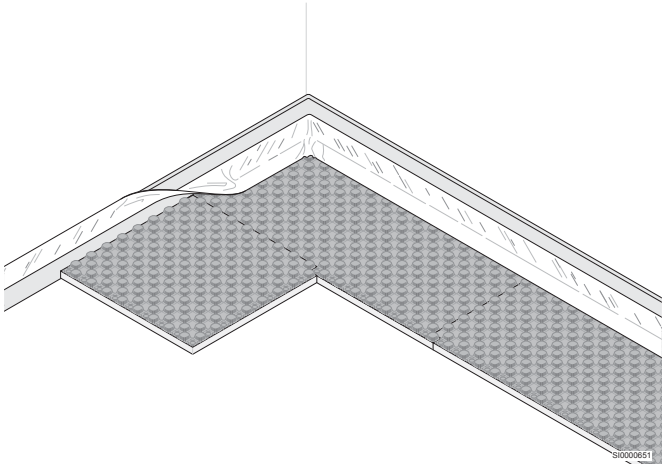
Installation must be performed by a qualified person in accordance with local standards and regulations.

As a guidance, always read and follow the instructions given in respective Uponor installation manual.

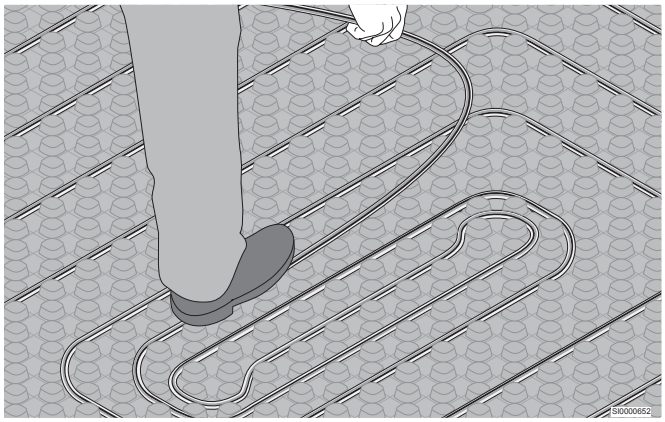
1. Edging strip installation



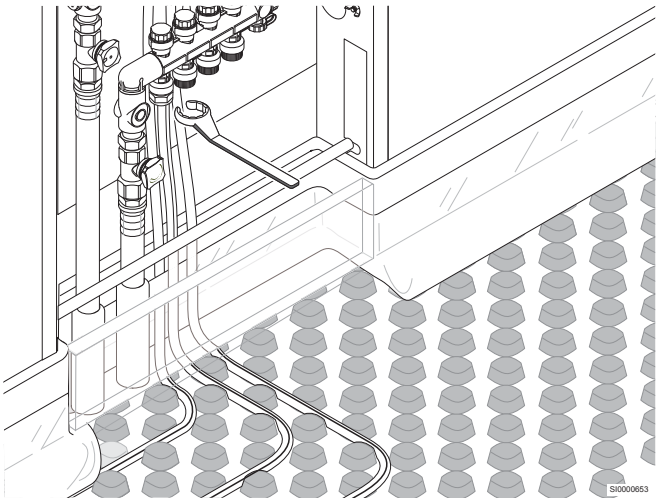
2. Panel installation



3. Pipe installation



4. Connecting pipes to the manifold



4 Technical data

4.1 Technical specifications

Uponor Nubos panel EPS

Description	Value	Value	Value
Type	ND 30-2	ND 11	Nub foil
Material	EPS 040 DES sg, PS	EPS 035 DEO dm, PS	PS
Dimension	1447 x 900 mm	1447 x 900 mm	1447 x 900 mm
Usable area	1420 x 873 mm	1420 x 873 mm	1420 x 873 mm
Max. live load	5,0 kN/m^2	30,0 kN/m^2	30,0 kN/m^2
Thermal resistance	0,75 m^{2}K/W	0,314 m^{2}K/W	-
Dynamic stiffness	20 MN/m^3	-	-
Compressive stress	-	≥ 100 kPa	-
Installation distances	5,5, 11, 16,5, 22, 27,5, 33 cm	5,5, 11, 16,5, 22, 27,5, 33 cm	5,5, 11, 16,5, 22, 27,5, 33 cm
Total height	48 mm	29 mm	18 mm
Type of system	Wet system	Wet system	Wet system
Load distribution layer	Cement screed or anhydrite screed	Cement screed or anhydrite screed	Cement screed or anhydrite screed

Uponor Comfort Pipe PLUS

	Value	Value
Pipe designation	Uponor Comfort Pipe PLUS 14 x 2,0 mm	Uponor Comfort Pipe PLUS 16 x 2,0 mm
Pipe dimension	14 x 2,0 mm	16 x 2,0 mm
Pipe length	120; 240; 640; 960 m	120; 240; 640 m
Material	PE-Xa, five-layer pipe	PE-Xa, five-layer pipe
Colour	White with two blue longitudinal stripes	White with two blue longitudinal stripes
Manufacturing	Refer to EN ISO 15875	Refer to EN ISO 15875
Certificates	KOMO, DIN CERTCO	KOMO, DIN CERTCO
Area of application	Class 4 + 5 / 6 bar (EN ISO 15875)	Class 4 + 5 / 6 bar (EN ISO 15875)
Max. operating temperature[1)]	90 °C (EN ISO 15875)	90 °C (EN ISO 15875)
Max. operating pressure	6 bar at 70° C	6 bar at 70° C
Pipe jointings	Uponor screw connection, Uponor Smart press coupling, Uponor Q&E technology	Uponor screw connection, Uponor Smart press coupling, Uponor Q&E technology
Weight	0,078 kg/m	0,091 kg/m
Water content	0,077 l/m	0,11 l/m
Oxygen tightness	Refer to ISO 17455; DIN 4726	Refer to ISO 17455; DIN 4726
Density	0,934 g/cm³	0,934 g/cm³
Material class	Class B2 and class E, DIN 4102 / EN 13501	Class B2 and class E, DIN 4102 / EN 13501
Min. bending radius	8 x D; free-hand bending (112 mm) 5 x D; supported bending (70 mm)	8 x D; free-hand bending (128 mm) 5 x D; supported bending (80 mm)
Pipe roughness	0,007 mm	0,007 mm
Ideal installation temperature	≥ 0 °C	≥ 0 °C
UV protection	Opaque cardboard (store remaining quantities in the cardboard box)	Opaque cardboard (store remaining quantities in the cardboard box)

1) When more than one design temperature appears for any class, the times should be aggregated (e.g. the design temperature profile for 50 years class 5 is: 20 °C for 14 years followed by 60 °C for 25 years, 80 °C for 10 years, 90 °C for 1 year and 100 °C for 100h).

Uponor Comfort Pipe

	Value
Pipe designation	Uponor Comfort Pipe 16 x 1,8 mm
Pipe dimension	16 x 1,8 mm
Pipe length	240; 640 m
Material	PE-Xa, five-layer pipe
Colour	White with one blue longitudinal stripe
Manufacturing	Refer to EN ISO 15875
Certificates	DIN CERTCO
Area of application	Class 4 + 5 / 6 bar (EN ISO 15875)
Max. operating temperature[1)]	90 °C (EN ISO 15875)
Max. operating pressure	6 bar at 70° C
Pipe jointings	Uponor screw connection Uponor Q&E technology
Weight	0,091 kg/m
Water content	0,11 l/m
Oxygen tightness	Refer to ISO 17455; DIN 4726
Density	0,934 g/cm³
Material class	Class B2 and class E, DIN 4102 / EN 13501
Min. bending radius	8 x D; free-hand bending (128 mm) 5 x D; supported bending (80 mm)
Pipe roughness	0,007 mm
Ideal installation temperature	≥ 0 °C
UV protection	Opaque cardboard (store remaining quantities in the cardboard box)

1) When more than one design temperature appears for any class, the times should be aggregated (e.g. the design temperature profile for 50 years class 5 is: 20 °C for 14 years followed by 60 °C for 25 years, 80 °C for 10 years, 90 °C for 1 year and 100 °C for 100h).

Uponor Smart UFH-pipe

	Value	Value
Pipe designation	Uponor Smart UFH-pipe 14 x 2,0 mm	Uponor Smart UFH-pipe 16 x 2,0 mm
Pipe dimension	14 x 2,0 mm	16 x 2,0 mm
Pipe length	240; 640 m	240; 640 m
Material	PE-RT Type II, five-layer pipe	PE-RT Type II, five-layer pipe
Colour	Natural colour	Natural colour
Manufacturing	Refer to EN ISO 22391	Refer to EN ISO 22391
Certificates	KOMO, DIN CERTCO	KOMO, DIN CERTCO
Area of application	Class 4 + 5 / 6 bar (EN ISO 22391)	Class 4 + 5 / 6 bar (EN ISO 22391)
Max. operating temperature[1)]	90 °C (EN ISO 22391)	90 °C (EN ISO 22391)
Max. operating pressure	6 bar at 70° C	6 bar at 70° C
Pipe jointings	Uponor screw connection Uponor Smart press coupling	Uponor screw connection Uponor Smart press coupling
Weight	0,0726 kg/m	0,0846 kg/m
Water content	0,079 l/m	0,113 l/m
Oxygen tightness	Refer to ISO 17455; DIN 4726	Refer to ISO 17455; DIN 4726
Density	0,941 g/cm³	0,941 g/cm³
Material class	Class B2 and class E, DIN 4102 / EN 13501	Class B2 and class E, DIN 4102 / EN 13501
Min. bending radius	8 x D; free-hand bending (112 mm) 5 x D; supported bending (70 mm)	8 x D; free-hand bending (128 mm) 5 x D; supported bending (80 mm)
Pipe roughness	0,007 mm	0,007 mm
Ideal installation temperature	≥ 0 °C	≥ 0 °C
UV protection	Opaque cardboard (store remaining quantities in the cardboard box)	Opaque cardboard (store remaining quantities in the cardboard box)

1) When more than one design temperature appears for any class, the times should be aggregated (e.g. the design temperature profile for 50 years class 5 is: 20 °C for 14 years followed by 60 °C for 25 years, 80 °C for 10 years, 90 °C for 1 year and 100 °C for 100h).

Uponor MLCP RED

Description	Value	Value
Pipe designation	Uponor MLCP RED 14 x 1,6 mm	Uponor MLCP RED 16 x 2,0 mm
Pipe dimension	14 x 1,6 mm	16 x 2,0 mm
Pipe length	240; 480 m	240; 480 m
Material	Multi-layer composite pipe (PE-RT - aluminium - PE-RT), monitored by SKZ (Southern German Plastics Centre), oxygen-tight refer to DIN 4726.	Multi-layer composite pipe (PE-RT - aluminium - PE-RT), monitored by SKZ (Southern German Plastics Centre), oxygen-tight refer to DIN 4726.
Colour	Red	Red
Manufacturing	Refer to EN ISO 21003	Refer to EN ISO 21003
Certificates	KOMO, DIN CERTCO	KOMO, DIN CERTCO
Area of application	Class 4 / 5 (ISO 10508)	Class 4 / 5 (ISO 10508)
Max. operating temperature	60 °C	60 °C
Max. operating pressure	4 bar	4 bar
Pipe jointings	Uponor screw connection	Uponor screw connection Uponor S-Press PLUS
Weight	0,076 kg/m	0,117 kg/m
Water volume	0,091 l/m	0,113 l/m
Oxygen tightness	Refer to ISO 17455; DIN 4726	Refer to ISO 17455; DIN 4726
Building material class	Class B2, refer to DIN 4102	Class B2, refer to DIN 4102
Min. bending radius	4xd if free bending (56 mm) 3xd if supported bend (42 mm)	4xd if free bending (64 mm) 3xd if supported bend (48 mm)
Pipe roughness	0,004 mm	0,004 mm
Best mounting temperature	≥ 0 °C	≥ 0 °C
UV protection	Brown cardboard (store remaining quantities in the cardboard box)	Brown cardboard (store remaining quantities in the cardboard box)

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Production: Uponor/SKA

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