



Technical Solutions

Knauf's guide to BS 5422:2023

for thermal insulation of pipes, ducts and vessels

The British Standard BS5422 2023 describes a method for specifying requirements for thermal insulating materials on pipes, tanks, vessels, ductwork and equipment for certain defined applications and conditions within the temperature range -40°C to $+700^{\circ}\text{C}$.

In any single application for pipework and equipment, thermal insulation material can perform a variety of functions simultaneously, including:

- conserve energy for both cooled and heated systems;
- retard freezing of contents;
- control condensation on refrigerated, chilled or cold surfaces;
- protect personnel from exposure to extremes of surface temperature;
- control process or service temperatures; and limit effects of system on indoor building temperature

The 2023 version introduces significant changes in thickness of insulation and removes some old tables as well as simplifying the existing tables making them more user friendly.

The calculation methodology remains in accordance to BS EN ISO 12241:2008 which was superseded by BS EN ISO 12241:2022 but it was a Committee wide decision was made to avoid delays in publishing BS5422 2023 and to review at a later date

The Energy Technology List tables have been added to the standard as enhanced tables Table 15B, Table 16B, Table 17B, Table 18B, Table 19B and Table 20B.

Secondary and Tertiary heating systems for district heating have been added to Tables 19C and Table 20C.

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Table 6 - BS 5422:2023

Minimum insulation thickness for chilled and cold water pipes to control condensation on a high emissivity outer surface (0.9) with an ambient temperature of +25 °C and a relative humidity of 80%

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		Thickness of Thermo-teK PS PRO ALU		Thickness of Thermo-teK PS PRO ALU	
	t = 10 °C		t = 5 °C		t = 0 °C	
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]
≤17,2	20	0,034	20	0,033	20	0,033
≤21,3	20	0,034	20	0,033	20	0,033
≤26,9	20	0,034	20	0,033	20	0,033
≤33,7	20	0,034	20	0,033	20	0,033
≤42,4	20	0,034	20	0,033	20	0,033
≤48,3	20	0,034	20	0,033	20	0,033
≤60,3	20	0,034	20	0,033	20	0,033
≤76,1	20	0,034	20	0,033	20	0,033
≤88,9	20	0,034	20	0,033	20	0,033
≤114,3	20	0,034	20	0,033	20	0,033
≤139,7	25	0,034	25	0,033	25	0,033
≤168,3	25	0,034	25	0,033	25	0,033
≤219,1	25	0,034	25	0,033	25	0,033
≤273	25	0,034	25	0,033	25	0,033
≤323,9	25	0,034	25	0,033	25	0,033

Key

t = temperature of contents (°C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

NOTE

Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements. In situations where the ambient air temperature is greater than 25 °C and/or the relative humidity exceeds 80%, these thicknesses might not be sufficient to control condensation.

Table 8 - BS 5422:2023

Minimum insulation thickness for chilled and cold water pipes to control condensation on a low emissivity outer surface (0.05) with an ambient temperature of +25 °C and a relative humidity of 80%

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\epsilon = 0.05$)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		Thickness of Thermo-teK PS PRO ALU		Thickness of Thermo-teK PS PRO ALU	
	t = 10 °C		t = 5 °C		t = 0 °C	
Outer DN [mm]	Advised Thickness [mm]	operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]
≤17,2	20	0,034	25	0,033	30	0,033
≤21,3	20	0,034	25	0,033	30	0,033
≤26,9	20	0,034	30	0,033	40	0,033
≤33,7	20	0,034	30	0,033	40	0,033
≤42,4	25	0,034	30	0,033	40	0,033
≤48,3	25	0,034	40	0,033	40	0,033
≤60,3	25	0,034	40	0,033	50	0,033
≤76,1	25	0,034	40	0,033	50	0,033
≤88,9	25	0,034	40	0,033	50	0,033
≤114,3	30	0,034	40	0,033	60	0,033
≤139,7	30	0,034	50	0,033	60	0,033
≤168,3	30	0,034	50	0,033	60	0,033
≤219,1	40	0,034	50	0,033	70	0,033
≤273	40	0,034	60	0,033	70	0,033
≤323,9	40	0,034	60	0,033	70	0,033

Key

t = temperature of contents (°C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

NOTE

Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements. In situations where the ambient air temperature is greater than 25 °C and/or the relative humidity exceeds 80%, these thicknesses might not be sufficient to control condensation.

Table 10 - BS 5422:2023

Indicative thickness of insulation for cooled and chilled water systems to control heat gain - Low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\epsilon = 0.05$)

Steel pipe outside diameter on which insulation has been based	Thickness of T hermo-teK PS PRO ALU			Thickness of Thermo-teK PS PRO ALU			Thickness of Thermo-teK PS PRO ALU		
	Cooled water temperatures > 10 °C t = 10 °C			Chilled water temperatures > 5 °C to < 10 °C t = 5 °C			Chilled water temperatures of 0 °C to < 4.9 °C t = 0 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]
≤17,2	20	0,033	2,48	20	0,033	2,97	25	0,033	3,47
≤21,3	20	0,033	2,72	20	0,033	3,27	25	0,033	3,81
≤26,9	20	0,033	3,05	25	0,033	3,58	25	0,033	4,18
≤33,7	20	0,033	3,41	25	0,033	4,01	30	0,033	4,6
≤42,4	20	0,033	3,86	25	0,033	4,53	30	0,033	5,11
≤48,3	20	0,033	4,11	25	0,033	4,82	30	0,033	5,45
≤60,3	20	0,033	4,78	25	0,033	5,48	40	0,033	6,17
≤76,1	20	0,033	5,51	30	0,033	6,3	40	0,033	6,7
≤88,9	20	0,033	6,17	30	0,033	6,9	40	0,033	7,77
≤114,3	20	0,033	7,28	30	0,033	8,31	40	0,033	9,15
≤139,7	25	0,033	8,52	30	0,033	9,49	40	0,033	10,45
≤168,3	25	0,033	9,89	30	0,033	10,97	40	0,033	11,86
≤219,1	25	0,033	12,27	30	0,033	13,57	40	0,033	14,61
≤273	25	0,033	14,74	30	0,033	16,28	40	0,033	17,48
≥273	25	-	-	30	-	-	40	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

ϵ = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at t °C in still air at 25 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Thicknesses derived solely against the criteria noted in this table may not necessarily satisfy other design requirements such as control of condensation.

NOTE 3

Heat gain relates to the specified thickness and temperature.

Table 11 - BS 5422:2023

Indicative thickness of insulation for cooled and chilled water systems to control heat gain - High emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Steel pipe outside diameter on which insulation has been based	Thickness of T hermo-teK PS PRO ALU			Thickness of Thermo-teK PS PRO ALU			Thickness of Thermo-teK PS PRO ALU		
	Cooled water temperatures > 10 °C t = 10 °C			Chilled water temperatures > 5 °C to < 10 °C t = 5 °C			Chilled water temperatures of 0 °C to < 4.9 °C t = 0 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]	Advised Thickness [mm]	Operational lambda value [W/mK]	Maximum permissible heat gain [W/m]
≤17,2	20	0,034	2,48	20	0,033	2,97	25	0,033	3,47
≤21,3	20	0,034	2,72	25	0,033	3,27	25	0,033	3,81
≤26,9	20	0,034	3,05	25	0,033	3,58	30	0,033	4,18
≤33,7	20	0,034	3,41	25	0,033	4,01	30	0,033	4,6
≤42,4	25	0,034	3,86	30	0,033	4,53	30	0,033	5,11
≤48,3	25	0,034	4,11	30	0,033	4,82	40	0,033	5,45
≤60,3	25	0,034	4,78	30	0,033	5,48	40	0,033	6,17
≤76,1	25	0,034	5,51	30	0,033	6,3	40	0,033	6,7
≤88,9	25	0,034	6,17	30	0,033	6,9	40	0,033	7,77
≤114,3	25	0,034	7,28	40	0,033	8,31	40	0,033	9,15
≤139,7	25	0,034	8,52	40	0,033	9,49	40	0,033	10,45
≤168,3	30	0,034	9,89	40	0,033	10,97	40	0,033	11,86
≤219,1	30	0,034	12,27	40	0,033	13,57	50	0,033	14,61
≤273	30	0,034	14,74	40	0,033	16,28	50	0,033	17,48
≥273	≥ 30	-	-	≥ 40	-	-	≥ 50	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at 50 °C [W/(m · K)]

ϵ = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardised assumptions: horizontal pipe at °C in still air at 25 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Thicknesses derived solely against the criteria noted in this table may not necessarily satisfy other design requirements such as control of condensation.

NOTE 3

Heat gain relates to the specified thickness and temperature.

Table 12 - BS 5422:2023

Minimum thickness of insulation for condensation control on ductwork carrying chilled air

THERMO-TEK BD 050-070

THERMO-TEK RL ECO ALU

Medium temperature	Minimum thickness Thermo-teK BD 050-070			Minimum thickness Thermo-teK RL ECO ALU		
	$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$	$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$
15	25	25	25	25	25	25
10	50	25	25	50	25	25
5	65 (40+25)	40	25	65 (40+25)	40	25
0	90 (50+40)	50	40	90 (50+40)	50	40

NOTE 1 Interstitial condensation is still likely to occur, unless the cladding protection is strictly vapour-tight.

NOTE 2 Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements.

NOTE 3 Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: indoor still air temperature +25 °C, relative humidity 80%, dew point temperature 21.3 °C

Table 13 - BS 5422:2023

Indicative thickness of insulation for ductwork carrying warm air to control heat loss.

THERMO-TEK BD 050-070

THERMO-TEK RL ECO ALU

Minimum thickness Thermo-teK BD 050-070			Minimum thickness Thermo-teK RL ECO ALU		
$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$	$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$
40	50	50	40	40	50

NOTE 1 Heat loss relates to the specified thickness and temperature.

NOTE 2 Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal duct at 35 °C, with 600 mm vertical sidewall in still air at 15 °C, emissivity of outer surface of insulated system as specified.

Table 14 - BS 5422:2023

Indicative thickness of insulation for chilled and dual-purpose ducting to control heat transfer

THERMO-TEK BD 060

THERMO-TEK RL ECO ALU

Minimum thickness Thermo-teK BD 050-070			Minimum thickness Thermo-teK RL ECO ALU		
$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$	$\epsilon = 0.05$	$\epsilon = 0.44$	$\epsilon = 0.90$
60	60	70	50	65 (40+25)	65 (40+25)

NOTE 1 Heat gain relates to the specified thickness and temperature.

NOTE 2 Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal duct at 13 °C, with 600 mm vertical sidewall in still air at 25 °C, emissivity of outer surface of insulated system as specified.

NOTE 3 Thicknesses derived solely against the criteria noted in this table may not necessarily satisfy other design requirements such as control of condensation.

Table 15A - BS 5422:2023

Base level thickness of insulation for non-domestic heating services to control heat loss – Low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\epsilon = 0.05$) - Low temperature heating services (≤ 95 °C)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 75 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	25	0,037	8,90
≤21,3	30	0,037	9,28
≤26,9	40	0,037	10,06
≤33,7	40	0,037	11,07
≤42,4	40	0,037	12,30
≤48,3	40	0,037	12,94
≤60,3	50	0,037	14,45
≤76,1	50	0,037	16,35
≤88,9	50	0,037	17,91
≤114,3	50	0,037	20,77
≤139,7	50	0,037	23,71
≤168,3	50	0,037	26,89
≤219,1	50	0,037	32,54
≤273	50	0,037	38,83
≥273	≥50	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at 50 °C [W/(m · K)]

ϵ = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 15B - BS 5422:2023

Enhanced level thickness of insulation for non-domestic heating services to control heat loss – Low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\epsilon = 0.05$) - Low temperature heating services (≤ 95 °C)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 75 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	40	0,037	7,78
≤21,3	40	0,037	8,42
≤26,9	40	0,037	9,05
≤33,7	50	0,037	9,86
≤42,4	50	0,037	10,83
≤48,3	50	0,037	11,42
≤60,3	50	0,037	12,61
≤76,1	60	0,037	14,12
≤88,9	60	0,037	15,28
≤114,3	60	0,037	17,51
≤139,7	60	0,037	19,72
≤168,3	70	0,037	22,34
≤219,1	70	0,037	26,61
≤273	70	0,037	30,91
≥273	≥ 70	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at 50 °C [W/(m · K)]

ϵ = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 16A - BS 5422:2023

Base level thickness of insulation for non-domestic heating services to control heat loss – High emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\varepsilon = 0.9$) - Low temperature heating services (≤ 95 °C)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 75 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	30	0,037	8,90
≤21,3	40	0,037	9,28
≤26,9	40	0,037	10,06
≤33,7	40	0,037	11,07
≤42,4	40	0,037	12,30
≤48,3	50	0,037	12,94
≤60,3	50	0,037	14,45
≤76,1	50	0,037	16,35
≤88,9	50	0,037	17,91
≤114,3	50	0,037	20,77
≤139,7	60	0,037	23,71
≤168,3	60	0,037	26,89
≤219,1	60	0,037	32,54
≤273	60	0,037	38,83
≥273	≥ 60	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at 50 °C [W/(m · K)]

ε = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 16B - BS 5422:2023

Enhanced level thickness of insulation for non-domestic heating services to control heat loss – High emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\varepsilon = 0.9$) - High temperature heating services (≤ 95 °C)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 75 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	40	0,037	7,78
≤21,3	40	0,037	8,42
≤26,9	50	0,037	9,05
≤33,7	50	0,037	9,86
≤42,4	50	0,037	10,83
≤48,3	60	0,037	11,42
≤60,3	60	0,037	12,61
≤76,1	60	0,037	14,12
≤88,9	70	0,037	15,28
≤114,3	70	0,037	17,51
≤139,7	70	0,037	19,72
≤168,3	70	0,037	22,34
≤219,1	80	0,037	26,61
≤273	80	0,037	30,91
≥273	80	-	-

Key

t = water temperature; standardized assumption for calculation purposes (°C)

λ = thermal conductivity at 50 °C [W/(m · K)]

ε = emissivity of outer surface of insulated system

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 17A - BS 5422:2023

Base level thickness of insulation for non-domestic hot water service areas to control heat loss – Low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$) - Thermal conductivity at 40 °C

Steel pipe diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 60 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
≤17,2	25	6,60
≤21,3	25	7,13
≤26,9	30	7,83
≤33,7	30	8,62
≤42,4	30	9,72
≤48,3	40	10,21
≤60,3	40	11,57
≤76,1	40	13,09
≤88,9	40	14,58
≤114,3	40	17,20
≤139,7	40	19,65
≤168,3	40	22,31
≤219,1	40	27,52
≤273	40	32,40
≥273	≥ 40	-

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 60 °C in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

Table 17B - BS 5422:2023

Enhanced level thickness of insulation for non-domestic hot water service areas to control heat loss – Low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$)

Steel pipe diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 60 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	30	0,036	6,04
≤21,3	40	0,036	6,45
≤26,9	40	0,036	7
≤33,7	40	0,036	7,71
≤42,4	40	0,036	8,46
≤48,3	40	0,036	9,01
≤60,3	50	0,036	9,94
≤76,1	50	0,036	11,25
≤88,9	50	0,036	12,17
≤114,3	50	0,036	14,29
≤139,7	50	0,036	16,09
≤168,3	60	0,036	18,24
≤219,1	60	0,036	22,06
≤273	60	0,036	25,95
≥273	≥ 60	-	-

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 60 °C in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

Table 18A - BS 5422:2023

Base level thickness of insulation for non-domestic hot water service areas to control heat loss – High emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\varepsilon = 0.9$)

Steel pipe diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 60 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	30	0,036	6,60
≤21,3	30	0,036	7,13
≤26,9	40	0,036	7,83
≤33,7	40	0,036	8,62
≤42,4	40	0,036	9,72
≤48,3	40	0,036	10,21
≤60,3	40	0,036	11,57
≤76,1	40	0,036	13,09
≤88,9	40	0,036	14,58
≤114,3	50	0,036	17,20
≤139,7	50	0,036	19,65
≤168,3	50	0,036	22,31
≤219,1	50	0,036	27,52
≤273	50	0,036	32,40
≥273	≥ 50	-	-

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

Table 18B - BS 5422:2023

Enhanced level thickness of insulation for non-domestic hot water service areas to control heat loss – High emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\varepsilon = 0.9$)

Steel pipe diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		
	t = 60 °C		
Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Max Heat Loss [W/m]
≤17,2	40	0,037	6,04
≤21,3	40	0,037	6,45
≤26,9	40	0,037	7,00
≤33,7	50	0,037	7,71
≤42,4	50	0,037	8,46
≤48,3	50	0,037	9,01
≤60,3	60	0,037	9,94
≤76,1	60	0,037	11,25
≤88,9	60	0,037	12,17
≤114,3	60	0,037	14,29
≤139,7	60	0,037	16,09
≤168,3	60	0,037	18,24
≤219,1	60	0,037	22,06
≤273	70	0,037	25,95
≥273	≥ 70	-	-

NOTE 1

Insulation thicknesses in this table have been calculated according to EN ISO 12241:2008 using standardised assumptions: horizontal pipe in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

Table 19A - BS 5422:2023

Base level thickness of insulation for domestic heating and hot water systems having low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 60 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
≤8.0	20	7,06
≤10.0	20	7,23
≤12.0	20	7,35
≤15.0	20	7,89
≤22.0	20	9,12
≤28.0	20	10,07
≤35.0	20	11,08
≤42.0	20	12,19
≤54.0	20	14,12
≥54.0	≥ 20	-

Table 19B - BS 5422:2023

Enhanced level thickness of insulation for domestic heating and hot water systems having low emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 60 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
≤8.0	20	5,82
≤10.0	20	6,20
≤12.0	20	6,52
≤15.0	20	7,03
≤22.0	20	8,02
≤28.0	25	8,87
≤35.0	25	9,63
≤42.0	25	10,58
≤54.0	30	11,83
≥54.0	≥ 30	-

t = water temperature; standardized assumption for calculation purposes (°C)

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 60 °C in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 19C - BS 5422:2023

Indicative thickness of insulation for district heating systems having low emissivity outer surfaces (secondary system)

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 55 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
≤21,3	50	4,4
≤26,9	50	4,7
≤33,7	60	4,7
≤42,4	70	5,1
≤48,3	80	5,1
≤60,3	90	5,4
≤76,1	100	5,8
≤88,9	120	6,1
≥88,9	≥ 120	-

t = water temperature; standardized assumption for calculation purposes (°C)

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 55 °C in still air at 20 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

Maximum permissible heat losses derived from BS EN 12828:2012+A1:2014 for district heating, linear U-values Class 7 (found in Branschstandard Teknisk Isolering).

Table 20A - BS 5422:2023

Base level thickness of insulation for domestic heating and hot water systems having high emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 60 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
8.0	20	7,06
10.0	20	7,23
12.0	20	7,35
15.0	20	7,89
22.0	20	9,12
28.0	25	10,07
35.0	25	11,08
42.0	25	12,19
54.0	25	14,12
≥54.0	≥ 25	-

Table 20B - BS 5422:2023

Enhanced level thickness of insulation for domestic heating and hot water systems having high emissivity outer surfaces

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 60 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
8.0	20	5,82
10.0	20	6,20
12.0	20	6,52
15.0	20	7,03
22.0	25	8,02
28.0	25	8,87
35.0	30	9,63
42.0	30	10,58
54.0	40	11,83
≥54.0	≥ 40	-

t = water temperature; standardized assumption for calculation purposes (°C)

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 60 °C in still air at 15 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

The thicknesses in this table are applicable to pipes serving commercial solar hot water panels.

Table 20C - BS 5422:2023

Indicative thickness of insulation for district heating systems having high emissivity outer surfaces (secondary system)

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Copper pipe diameter on which insulation thickness has been based	Thickness of Thermo-teK PS PRO ALU	
	t = 55 °C	
Outer DN [mm]	Advised Thickness [mm]	Max Heat Loss [W/m]
≤21,3	50	4,4
≤26,9	60	4,7
≤33,7	70	4,7
≤42,4	80	5,1
≤48,3	90	5,1
≤60,3	100	5,4
≤76,1	120	5,8
≤88,9	120	6,1
≥88,9	≥ 120	-

t = water temperature; standardized assumption for calculation purposes (°C)

NOTE 1

Insulation thicknesses in this table have been calculated according to BS EN ISO 12241:2008 using standardized assumptions: horizontal pipe at 55 °C in still air at 20 °C, emissivity of outer surface of insulated system as specified.

NOTE 2

Heat loss relates to the specified thickness and temperature.

NOTE 3

Maximum permissible heat losses derived from BS EN 12828:2012+A1:2014 for district heating, linear U-values Class 7 (found in Branschstandard Teknisk Isolering).

Table 22 - BS 5422:2023

Minimum insulation thickness to control the surface temperature of a non-metallic surface with a surface emissivity of 0.90 and design cold face temperature of 59 °C

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\epsilon = 0.9$)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU t = 100 °C		Thickness of Thermo-teK PS PRO ALU t = 200 °C		Thickness of KI TS Thermo-teK PS PRO ALU t = 300 °C	
	Outer DN mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]
≤17,2	20	0,039	20	0,048	20	0,058
≤21,3	20	0,039	20	0,048	20	0,058
≤26,9	20	0,039	20	0,048	20	0,058
≤33,7	20	0,039	20	0,048	25	0,058
≤42,4	20	0,039	20	0,048	25	0,058
≤48,3	20	0,039	20	0,048	25	0,058
≤60,3	20	0,039	20	0,048	25	0,058
≤76,1	20	0,039	20	0,048	25	0,058
≤88,9	20	0,039	20	0,048	25	0,058
≤114,3	20	0,039	20	0,048	25	0,058
≤139,7	25	0,039	25	0,048	25	0,058
≤168,3	25	0,039	25	0,048	25	0,058
≤219,1	25	0,039	25	0,048	30	0,058
≤273	25	0,039	25	0,048	40	0,058
≤323,9	25	0,039	25	0,048	40	0,058

Key

t = hot face temperature at mean temperature (°C) (with ambient still air at 20 °C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

NOTE 1

Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements.

NOTE 2

To simplify the use of this table, the values shaded have been adjusted to avoid the specification of apparently anomalous results given by the calculation method in BS EN ISO 12241:2008, due to the transition from turbulent to laminar flow.

Table 23 - BS 5422:2023

Minimum insulation thickness to control the surface temperature of a metallic surface with a surface emissivity of 0.05 and design cold face temperature of 50 °C

PIPE SECTION THERMO-TEK PS PRO ALU

Low emissivity outer surfaces ($\varepsilon = 0.05$)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU t = 100 °C		Thickness of Thermo-teK PS PRO ALU t = 200 °C	
	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]	Operational lambda value [W/mK]
≤17,2	20	0,039	25	0,048
≤21,3	20	0,039	25	0,048
≤26,9	20	0,039	30	0,048
≤33,7	20	0,039	30	0,048
≤42,4	20	0,039	30	0,048
≤48,3	20	0,039	40	0,048
≤60,3	20	0,039	40	0,048
≤76,1	20	0,039	40	0,048
≤88,9	20	0,039	40	0,048
≤114,3	20	0,039	50	0,048
≤139,7	25	0,039	50	0,048
≤168,3	25	0,039	50	0,048
≤219,1	25	0,039	50	0,048
≤273	25	0,039	60	0,048
≤323,9	25	0,039	60	0,048

Key

t = hot face temperature at mean temperature (°C) (with ambient still air at 20 °C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

NOTE 1

Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements.

NOTE 2

To simplify the use of this table, the values shaded have been adjusted to avoid the specification of apparently anomalous results given by the calculation method in BS EN ISO 12241:2008, due to the transition from turbulent to laminar flow.

Table 24 – BS 5422:2023

Minimum insulation thickness to control the surface temperature of a metallic surface with a surface emissivity of 0.9 and design cold face temperature of 50 °C

PIPE SECTION THERMO-TEK PS PRO ALU

High emissivity outer surfaces ($\varepsilon = 0.9$)

Steel pipe outside diameter on which insulation has been based	Thickness of Thermo-teK PS PRO ALU		Thickness of Thermo-teK PS PRO ALU	
	t = 100 °C		t = 200 °C	
	Outer DN [mm]	Advised Thickness [mm]	Operational lambda value [W/mK]	Advised Thickness [mm]
≤17,2	20	0,039	20	0,048
≤21,3	20	0,039	20	0,048
≤26,9	20	0,039	20	0,048
≤33,7	20	0,039	20	0,048
≤42,4	20	0,039	20	0,048
≤48,3	20	0,039	20	0,048
≤60,3	20	0,039	20	0,048
≤76,1	20	0,039	20	0,048
≤88,9	20	0,039	20	0,048
≤114,3	20	0,039	25	0,048
≤139,7	25	0,039	25	0,048
≤168,3	25	0,039	25	0,048
≤219,1	25	0,039	25	0,048
≤273	25	0,039	25	0,048
≤323,9	25	0,039	25	0,048

Key

t = hot face temperature at mean temperature (°C) (with ambient still air at 20 °C)

λ = thermal conductivity at mean temperature of insulation [W/(m · K)]

NOTE 1

Thicknesses given are calculated specifically against the criteria noted in the table. These thicknesses may not satisfy other design requirements.

NOTE 2

To simplify the use of this table, the values shaded have been adjusted to avoid the specification of apparently anomalous results given by the calculation method in BS EN ISO 12241:2008, due to the transition from turbulent to laminar flow.



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