



# Kooltherm® Pipe Insulation and BS 5422: 2023

## Summary

The British Standards Institution (BSI) has now published the latest edition of **BS 5422: 2023** - (Thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40 °C to +700 °C - Method for specifying).

This standard is the cornerstone of thermal insulation standards in the UK, setting minimum levels of performance for different operating conditions. This is the first update since 2009 and has been long awaited by the industry.

BS 5422: 2023 introduces several key changes which will affect the specification of Kingspan Kooltherm® Pipe Insulation.

## Key Changes

In summary

- Tables within the standard have been simplified, removing rarely used thermal insulation values and removing separate tables for steel and copper pipework. These have instead been replaced by a "less than or equal to" value, which in theory gives contractors only a single table with which to refer to.
- References in regards to reaction to fire have been changed to reflect the requirement for Euroclass fire ratings, and removing the now withdrawn national classification requirements. The standard now reads:

**In buildings other than dwellings**, the complete assembly of materials as placed on market (whether faced or unfaced) shall be class B-s3, d2 (European class) or better, in accordance with BS EN 13501-1: 2018 (Fire classification of construction products and building elements - Classification using data from reaction to fire tests).

**In dwellings**, the complete assembly of installed insulation materials (whether faced or unfaced) shall be class C-s3, d2 (European class) or better.

- The tables from the Energy Technology List (also known as Enhanced Capital Allowances) have now been incorporated into the standard as additional enhanced tables.
- A specific district heating table has been added based upon 55 °C flow temperatures with much more demanding heat loss requirements than existing tables.
- Single wall plastic pipework is now considered to have no insulative value of their own.

## Updates to the Calculation Standard

A key point to note is that the standard does not currently take into account the changes to the **BS EN ISO 12241: 2022** (Thermal insulation for building equipment and industrial installations. Calculation rules) calculation standard. BS 5422: 2023 has been released in accordance with the 2008 edition of the calculation standard, rather than the newly released 2022 edition. This was done to minimise delays, but this does mean that the standard will need to be recalculated in the future to take these changes into account (Q3 2023 is referenced in the standard but as of Q2 2024 there has been no change to the standard). This standard change has significant impact on calculating thicknesses for condensation control, and will lead to some widespread thickness changes when incorporated.

It is worth noting that the standard also includes the below reference in section 8.3.3 – the implication being that unless instructed otherwise that the enhanced (Table B) should be used for each relevant standard.

### 8.3.3 Minimum thickness of insulation to control heat

**Note:** The relevant thicknesses defined in Table 15 to Table 18 have been derived using the methodology set out in Annex A.

In the absence of specific instructions from the specifier, enhanced insulation thickness has been captured from the legacy Energy Technology List / Capital Allowances levels, and shall be as given in Table 15B, Table 16B, Table 17B and Table 18B.

## Insulation Thickness Tables

Kingspan Insulation Ltd would recommend that contractors' seek guidance on the required performance levels if it is not clearly stated in a specification.

Tables to comply with the new requirements of BS 5422: 2023 using Kooltherm® Pipe Insulation are shown below, with the relevant A and B tables shown together for comparison. For pipe sizes >273 mm outer diameter (OD) the standard has removed target W/m heat losses and has replaced it with the same thickness to be used as 273 mm OD.

Steel Pipe Size	Hot Water 60 °C				Low Temperature Heating Water ≤95 °C			
	Kooltherm®	Max. heat loss	Kooltherm®	Max. heat loss	Kooltherm®	Max. heat loss	Kooltherm®	Max. heat loss
	Table 17 A		Table 17 B		Table 15 A		Table 15 B	
OD (mm)	ε = 0.05 silver	(W/m)	ε = 0.05 silver	(W/m)	ε = 0.05 silver	(W/m)	ε = 0.05 silver	(W/m)
≤17.2	15	6.6	15	6.04	15	8.9	20	7.78
≤21.3	15	7.13	20	6.45	15	9.28	20	8.42
≤26.9	15	7.83	20	7	20	10.06	25	9.05
≤33.7	20	8.62	20	7.71	20	11.07	25	9.86
≤42.4	20	9.72	25	8.46	25	12.3	30	10.83
≤48.3	20	10.21	25	9.01	25	12.94	30	11.42
≤60.3	20	11.57	30	9.94	25	14.45	30	12.61
≤76.1	25	13.09	30	11.25	30	16.35	35	14.12
≤88.9	25	14.58	30	12.17	30	17.91	35	15.28
≤114.3	25	17.2	35	14.29	30	20.77	40	17.51
≤139.7	25	19.65	35	16.09	30	23.71	40	19.72
≤168.3	30	22.31	35	18.24	35	26.89	40	22.34
≤219.1	30	27.52	40	22.06	35	32.54	45	26.61
≤273	30	32.4	40	25.95	35	38.83	45	30.91
>273	30	-	40	-	35	-	45	-
Hot Water at 60°C thermal conductivity: Low Temperature Heating Water (LTHW) at ≤95°C thermal conductivity: Ambient Temperature:						0.026 W/m.k 0.027 W/m.k + 15 °C		

Table 1: Indicative thickness (mm) of insulation for Non-Domestic Hot Water (60 °C) and Low Temperature Heating Service Areas (≤95 °C) to control heat loss.

The required thicknesses for heat gain and condensation are combined below, with the most onerous thickness for each condition being shown.

Steel Pipe Size	Water 0 °C to 4.9 °C		Water >4.9 °C to <10 °C		Water >10 °C	
	Kooltherm®	Max. heat loss	Kooltherm®	Max. heat loss	Kooltherm®	Max. heat loss
	Standard		Standard		Standard	
OD (mm)	$\epsilon = 0.05$ silver	(W/m)	$\epsilon = 0.05$ silver	(W/m)	$\epsilon = 0.05$ silver	(W/m)
≤17.2	25	-3.45	20	-2.97	15	-2.48
≤21.3	25	-3.81	20	-3.27	15	-2.72
≤26.9	30	-4.18	25	-3.58	20	-3.05
≤33.7	30	-4.6	25	-4.01	20	-3.41
≤42.4	35	-5.11	25	-4.53	20	-3.86
≤48.3	35	-5.45	25	-4.82	20	-4.11
≤60.3	35	-6.17	30	-5.48	20	-4.78
≤76.1	40	-6.7	30	-6.3	25	-5.51
≤88.9	40	-7.77	30	-6.9	25	-6.17
≤114.3	40	-9.15	35	-8.31	25	-7.28
≤139.7	45	-10.45	35	-9.49	25	-8.52
≤168.3	45	-11.86	35	-10.97	25	-9.89
≤219.1	45	-14.61	40	-13.57	30	-12.27
≤273	50	-17.48	40	-16.28	30	-14.74
Ambient Air Temperature Relative Humidity: Minimum Surface Temperature:					+25 °C 80% +21.3 °C	

Table 2: Indicative thickness (mm) of insulation required for cold and chilled water supplies to control heat gain and control condensation.

A new table for district heating systems has been introduced, in Table 19C. The thicknesses for compliance are as below. It should be noted that this does not replace requirements within CIBSE CP1 (2020) and there may be additional requirements for compliance with CIBSE CP1.

Steel Pipe Size	District Heating 55 °C	
	Kooltherm®	Max. heat loss
	Table 19C	
OD (mm)	$\epsilon = 0.05$ silver	(W/m)
≤21.3	25	4.4
≤26.9	25	4.7
≤33.7	35	4.7
≤42.4	35	5.1
≤48.3	45	5.1
≤60.3	50	5.4
≤76.1	55	5.8
≤88.9	60	6.1
>89.0	60	-
Ambient Temperature:		20 °C
Flow Temperature:		55 °C

**Table 3: Indicative thickness (mm) of insulation required for district heating to control heat loss.**

Note: All of our tables have been calculated to the new BS EN ISO 12241: 2022 standard.

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