FOR FURTHER INFORMATION ON THE

KOOLTHERM RANGE OF PRODUCTS

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Kooltherm®

PIPE INSULATION

Kooltherm Pipe Insulation Benefits & Advantages

- Class 0 Fire Rating for both phenolic and jacket.
- Negligible smoke emission.
- Factory Mutual approved.
- Best available thermal insulation properties.
- Closed cell structure provides excellent moisture resistance.
- Offers the lowest running cost and highest energy savings compared to other insulation materials when specified to BS 5422.
- Provides the optimum environmental solution in comparison to other insulation materials when specified to BS 5422.
- Non-fibrous.
- Excellent chemical resistance will not sustain vermin or mould.
- Factory applied vapour barrier jacket.
- Pipe sections treated with a specially formulated dust suppressant and passivating bore coating.
- Det Norske Veritas and Lloyd's Register approved for off shore applications.
- Suitable for use in food processing, pharmaceutical, medical and other clean air environments.
- Standard and heavy duty densities available.
- 10 Year Guarantee when installed in accordance with The Kooltherm Specification.

DNV

FM APPROVED

LPCB

Lloyd's Register

Kingspan®
INDUSTRIAL INSULATION

Technical Data

DESCRIPTION

Kooltherm Pipe Insulation are one metre lengths of preformed CFC Free phenolic faced with a factory applied reinforced aluminium foil jacket.

They are available in a full range of standard pipe diameters and insulation thicknesses. Non standard diameters and thicknesses are also available.

Kooltherm Pipe Insulation may be used on mild steel, stainless steel, copper and plastic pipework operating in the temperature range of –180˚C to +120˚C.

STANDARDS

Kooltherm phenolic preformed pipe sections exceed the requirements of BS 3927: 1986, Table 1 (Type A) specification.

They may be used to satisfy the requirements of BS 5422:1990 and other major national specifications including, NHS CO2, NES Y50, M&E 3, M&E 100, BS 6700:1997 and Water Byelaw 49.

All pipe sections carry the Water Byelaw 49 recommended identification marking W18 (ie; denoting a k-value of 0.018 W / m.K).

Kooltherm pipe sections are available in standard density 35kg / m^3 and heavy duty (60kg / m^3).

FIRE BEHAVIOUR

Kooltherm pipe sections are rated Class 0 as defined in the Building Regulations Approved Document B (1992) and achieve a smoke obscuration rating of less than 5%, when tested in accordance with BS 5111:Part 1 (classified as negligible).

ENVIRONMENTAL PROPERTIES

In addition to its contributions to energy efficiency, Kooltherm is manufactured entirely without CFC blowing agents. It provides designers and specifiers with an optimum solution towards compliance with international environmental agreements.
In terms of overall environmental efficiency on a cradle to grave analysis, Kooltherm can provide a very significant environmental advantage compared to all other insulation materials when specified to BS 5422.

ENERGY EFFICIENCY & SYSTEM RUNNING COSTS

Kooltherm offers the most thermally efficient insulation available when specified to BS 5422. Kooltherm offers a significantly better insulation performance than all other insulation materials, providing an energy saving benefit and lower long term system running costs.

MOISTURE RESISTANCE

Kooltherm has a > 90% closed cell structure which makes it highly resistant to moisture penetration and is also non-wicking. It is the ideal insulation material for cold, chilled, low temperature hot water and cryogenic pipework.

NOTE:
For further information on these issues, the following documents are available. Insulants and Running Costs, Insulants and the Environment, Moisture in Insulants.

KOOLTHERM THICKNESS TABLE 3

FROST PROTECTION

Based on BS 5422 Table 10

Also to comply with the Water Byelaw 49/BS 6700

FROST PROTECTION COMPARISONS FOR OTHER CONDITIONS COMPARISON WITH OTHER MATERIALS

Based on:-

Ambient still air temperature –10°C

Initial water temperature 5°C

Permitted ice formation 10%

			Total time to permitted ice formation in hours								
Pipe Size	Indoor	Outdoor	Kooltherm Thickness			Mineral Fibre Thickness			Elastomeric Foam Thickness		
NB (mm)	(unheated)	(see note)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
15	30	–	25	40	50	25	40	50	25	40	50
20	15	30	1.7	2.2	2.5	0.9	1.2	1.3	0.8	1.1	1.2
25	15	15	2.6	3.5	3.9	1.4	1.8	2.1	1.3	1.7	1.9
32	15	15	3.5	4.7	5.4	1.9	2.5	2.9	1.7	2.3	2.6
40	15	15	5.1	6.8	7.8	2.7	3.6	4.2	2.4	3.3	3.8
50	15	15	7.2	9.8	11.3	3.8	5.2	6.0	3.5	4.8	5.5
65	15	15	8.9	12.6	14.6	5.0	7.1	8.2	4.6	6.5	7.5
80	15	15	13.4	19.1	22.2	7.1	10.1	11.8	6.5	9.3	10.8
			17.9	25.7	30.2	9.5	13.7	16.1	8.7	12.5	14.7

Note: The conditions specified in BS 5422 Table 10 and BS 6700 are:-

Ambient temperatures, Indoor –3°C

Outdoor –5°C

Initial water temperature 5°C

Evaluation period 24H

Permitted ice formation 50%

Note:

Calculations based thermal conductivity values at 0°C

Kooltherm 0.018W/mK

Mineral Fibre 0.032W/mK

Elastomeric Foam 0.035W/mK

The values given against these properties are typical. They are not meant to imply specification limits and should not be used for this purpose without reference to Kingspan Industrial Insulation.

This brochure cancels and supersedes all previous editions. Kingspan Industrial Insulation reserves the right to amend specifications without prior notice.

Whilst the information contained in this brochure is true and accurate to the best of our knowledge and belief, all liability for errors and omissions, damage or loss resulting herefrom is hereby excluded. Recommendations for use should be verified as to suitability and compliance with actual requirements, specifications and any applicable laws and regulations.

Fig. 1 Application of foil covered pipe sections

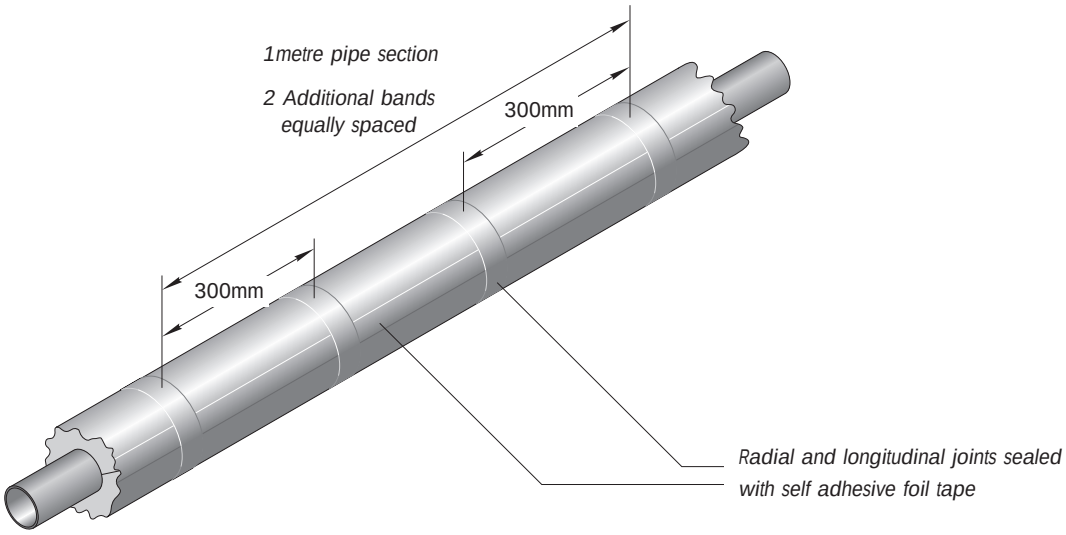


Fig. 2 Additional finishes available for protection over the foil jacket.

	1ST COAT	MEMBRANE	2ND COAT
EXTERNAL (Weather Protection)	Encacel T	Chilglass No.10	Encacel T
PLANT ROOMS	CP 55	Chilglass No.10	CP 55
GENERAL AREAS	CP 50	Canvas	CP 50
REFRIGERATION	KP 13	Chilglass No.10	KP 13

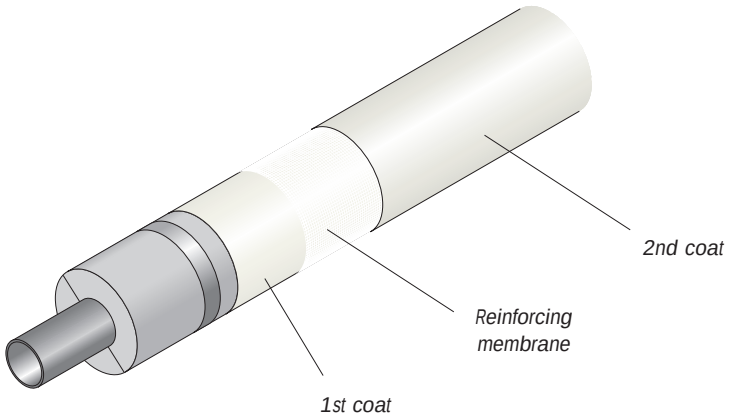


Fig. 3 Preformed bends are available as alternative to mitred sections

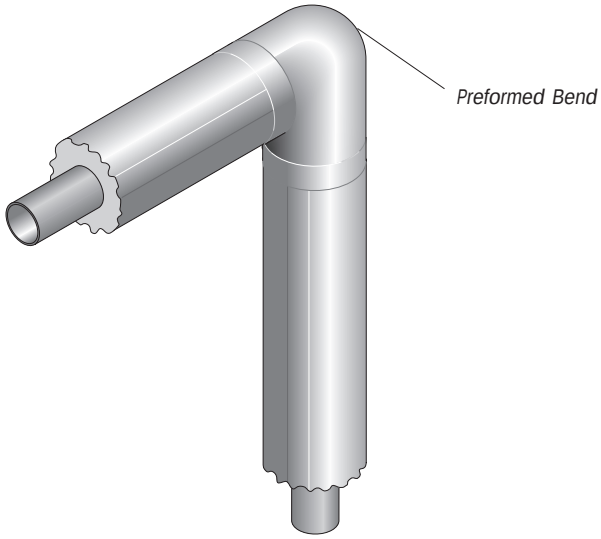
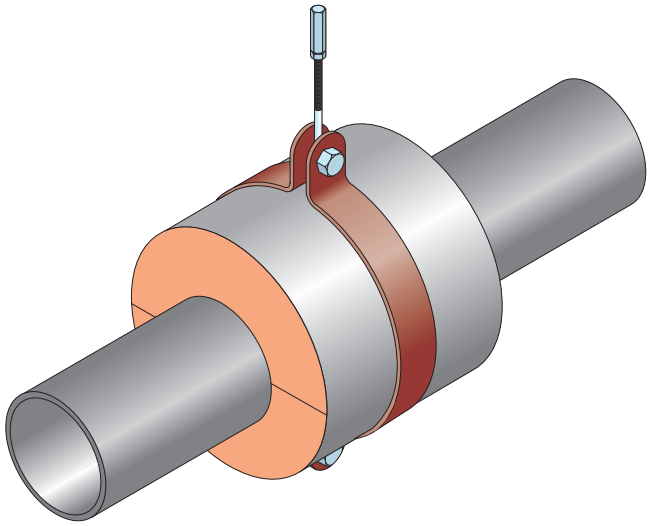


Fig. 4 K-Block, pipe support inserts



Note: Insulation exposed to weather conditions should be protected with a suitable weather resistant finish of either, Kingspan Encacel T, Polyisobutylene or metal cladding.

Insulation in plantrooms or other areas exposed to mechanical damage shall be protected with either, Kingspan Chil-Kote CP 55, plastic or metal cladding.

Thickness Tables and Comparisons

KOOLTHERM THICKNESS TABLE 1

Hot Water Supply at 60°C
Based on BS 5422: 1990 Table 15
Heating Systems at 75°C and 100°C
Based on BS 5422: 1990 Tables 11, 12, & 13.

HEAT LOSS COMPARISONS

Heating water, mean temperature 75°C
Ambient still air temperature 10°C
Thermal conductivity at 55°C mean;
Kooltherm 0.023W / mK
Mineral Fibre 0.037W / mK

Fuel Type ->	Gas			Solid			Oil			Estimated Heat Loss in Watts per Linear Metre									
Water Temp ->	60°C	75°C	100°C	60°C	75°C	100°C	60°C	75°C	100°C										
Pipe Size	Thickness			Thickness			Thickness			Kooltherm Thickness					Mineral Fibre Thickness				
NB (mm)	(mm)			(mm)			(mm)			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
15	15	15	15	15	15	15	15	15	15	15	20	25	30	35	20	25	30	40	50
20	15	15	15	15	15	15	15	15	15	9.4	8.1	7.2	6.6	6.1	12.4	11.2	10.3	9.1	8.3
25	20	15	20	15	15	15	20	15	20	11.1	9.4	8.4	7.6	7.0	14.4	12.9	11.8	10.3	9.3
32	20	15	20	15	15	15	20	15	20	13.0	11.0	9.7	8.7	8.0	16.7	14.9	13.6	11.7	10.5
40	20	15	20	15	15	15	20	20	20	15.2	12.7	11.1	10.0	9.1	19.3	17.1	15.5	13.2	11.8
50	20	15	20	20	15	15	25	20	25	16.8	14.0	12.2	10.9	9.9	21.3	18.7	16.9	14.4	12.7
65	25	20	25	20	15	20	25	20	25	20.0	16.5	14.3	12.7	11.5	25.1	21.9	19.6	16.6	14.6
80	25	20	25	20	20	20	25	20	25	24.3	19.9	17.0	15.1	13.6	30.1	26.1	23.3	19.4	16.9
100	25	20	25	20	20	20	25	20	25	27.7	22.6	19.3	17.0	15.2	34.1	29.5	26.2	21.7	18.8
125	25	20	25	20	20	20	25	25	25	34.3	27.8	23.6	20.6	18.4	41.9	36.0	31.8	26.1	22.5
150	25	20	25	20	20	20	25	25	25	41.2	33.2	28.0	24.4	21.7	49.9	42.7	37.5	30.6	26.2
200	25	20	25	25	20	20	35	25	25	48.6	39.0	32.7	28.4	25.2	58.6	49.9	42.7	35.4	30.1
250	30	25	25	25	20	25	35	25	35	62.0	49.5	41.4	35.8	31.6	74.3	63.0	54.9	44.2	37.3
Flat	35	30	30	30	20	30	35	30	35	76.3	60.6	50.5	43.5	38.3	90.9	76.8	66.7	53.4	44.9

KOOLTHERM THICKNESS TABLE 2

CHW & CW SERVICES
Based on BS 5422: 1990 Table 7

HEAT GAIN COMPARISONS

Chilled water, mean temperature 5°C
Ambient still air temperature 25°C
Thermal conductivity at 14°C mean;
Kooltherm 0.018W / mK
Elastomeric Foam 0.040W / mK

Water Temp -> 0°C	5°C	10°C	Estimated Heat Gain in Watts per Linear Metre									
Pipe Size	Thickness		Kooltherm Thickness					Elastomeric Foam Thickness				
NB (mm)	(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
15	20	15	15	20	25	30	35	9	13	19	25	32
15	20	15	15	2.3	2.0	1.8	1.6	1.5	5.7	4.9	4.2	3.7	3.3
25	20	15	15	2.7	2.3	2.0	1.9	1.7	6.9	5.8	4.9	4.3	3.8
32	20	15	15	3.2	2.7	2.4	2.1	2.0	8.2	6.8	5.7	4.9	4.3
40	20	20	15	3.8	3.1	2.7	2.4	2.2	9.6	8.0	6.5	5.6	4.9
50	25	20	15	4.2	3.4	3.0	2.7	2.4	10.7	8.9	7.2	6.2	5.4
65	25	20	15	5.0	4.1	3.5	3.1	2.8	12.9	10.7	8.5	7.2	6.2
80	25	20	15	6.0	4.9	4.2	3.7	3.3	15.8	12.8	10.2	8.6	7.4
100	25	20	20	6.9	5.6	4.7	4.2	3.7	18.1	14.7	11.6	9.7	8.3
125	30	20	20	8.5	6.9	5.8	5.0	4.5	22.6	18.2	14.2	11.8	10.0
150	30	25	20	10.3	8.2	6.9	6.0	5.3	27.3	21.8	17.0	14.0	11.8
200	30	25	20	12.1	9.6	8.1	7.0	6.2	32.3	25.7	19.9	16.4	13.7
250	35	25	20	15.5	12.2	10.2	8.8	7.7	41.5	32.9	25.3	20.7	17.2
Flat	40	30	25	20.0	15.0	12.4	10.7	9.4	51.2	40.4	30.9	25.2	20.9

TYPICAL PROPERTIES

KOOLTHERM PHENOLIC	STANDARD	HEAVY DUTY
DENSITY	35 kg / m³	60 kg / m³
COMPRESSIVE STRENGTH Parallel to rise Perpendicular to rise	 172 kPa 84 kPa	 400 kPa 270 kPa
COLOUR	Grey	Cream
SPECIFIC HEAT CAPACITY	1.88 kJ / kg.°C	1.88 kJ / kg.°C
CHLORIDE CONTENT (extracted at 100°C)	35ppm	35ppm
CLOSED CELL CONTENT	> 90%	> 90%
WATER VAPOUR RESISTIVITY	240 MNs / gm	240 MNs / gm
ALUMINIUM FOIL JACKET Water Vapour Permeance (Satisfies all requirements of BS 5422 Table 1)	0.0006 g / s.MN	0.0006 g / s.MN

TYPICAL SPECIFICATION DETAILS

All pipework operating up to 120˚C to be fully insulated with Kooltherm, Class 0, CFC Free, Bore coated pipe insulation having a standard density of 35 kg / m³ and a factory applied reinforced aluminium foil vapour barrier jacket. All joints in the jacket to be sealed with 50mm wide self adhesive foil tape.

Each one metre length of pipe insulation to be additionally secured with two evenly spaced bands of tape at approximately 300mm centres.

At pipe hanger support brackets, Kooltherm K Block high density pipe support inserts shall be used.

Insulation thicknesses for each service temperature shall be in accordance with Table 1,2 or 3, or as otherwise specified. (For further details refer to the Kooltherm Specification Guide).

THERMAL PERFORMANCE
(Standard Density & Heavy Duty)

Mean Temperature °C	k-value W / m.K
– 20	0.018
– 10	0.018
0	0.018
10	0.018
50	0.023
80	0.025