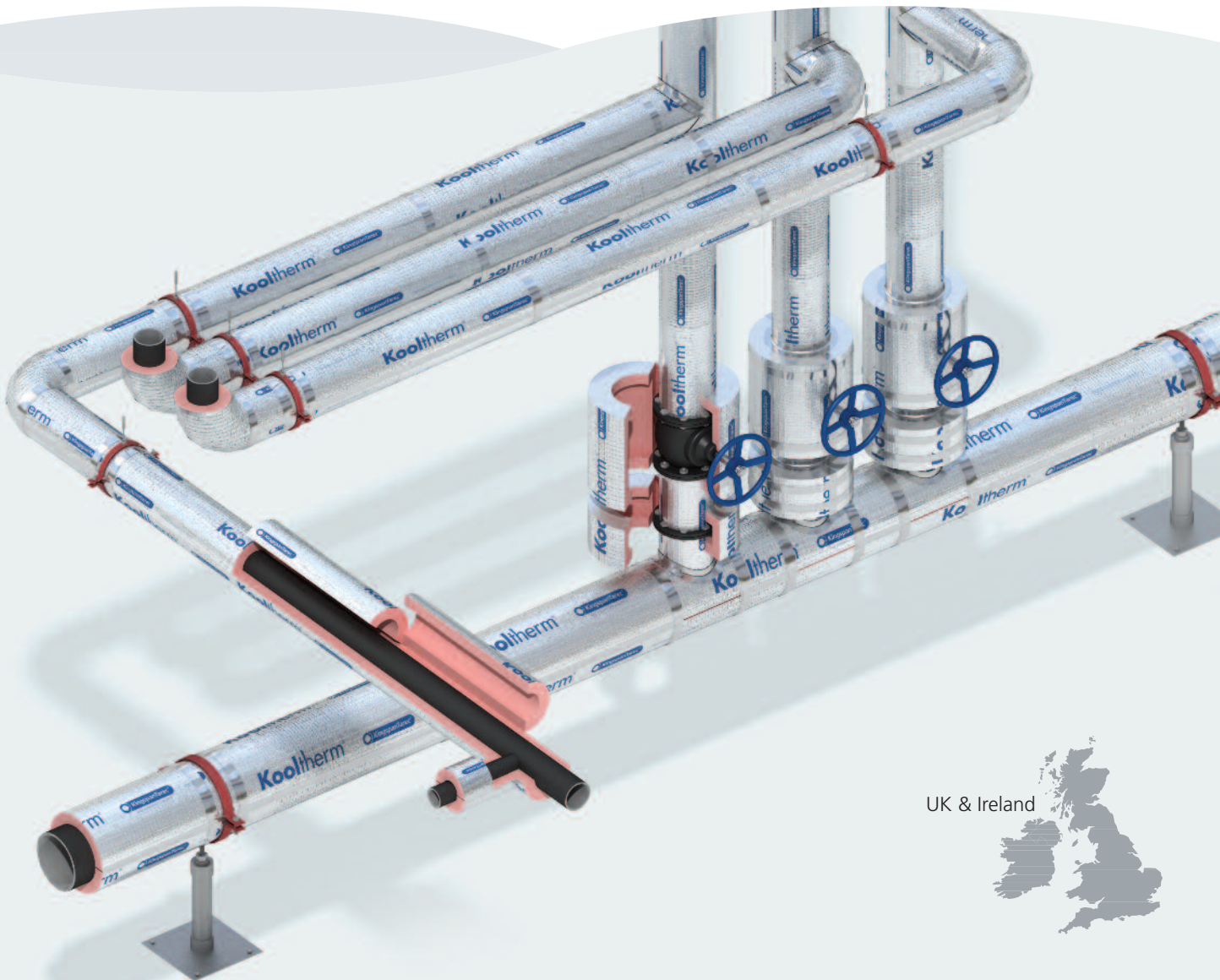


Kooltherm[®]

Quick Guide

HVAC & Building Services Pipe Insulation



UK & Ireland



Market Sectors

Marine

Terminal & LNG

Industrial

Hotel

Retail

Processing

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Leisure



Infrastructure

Apartments

Commercial

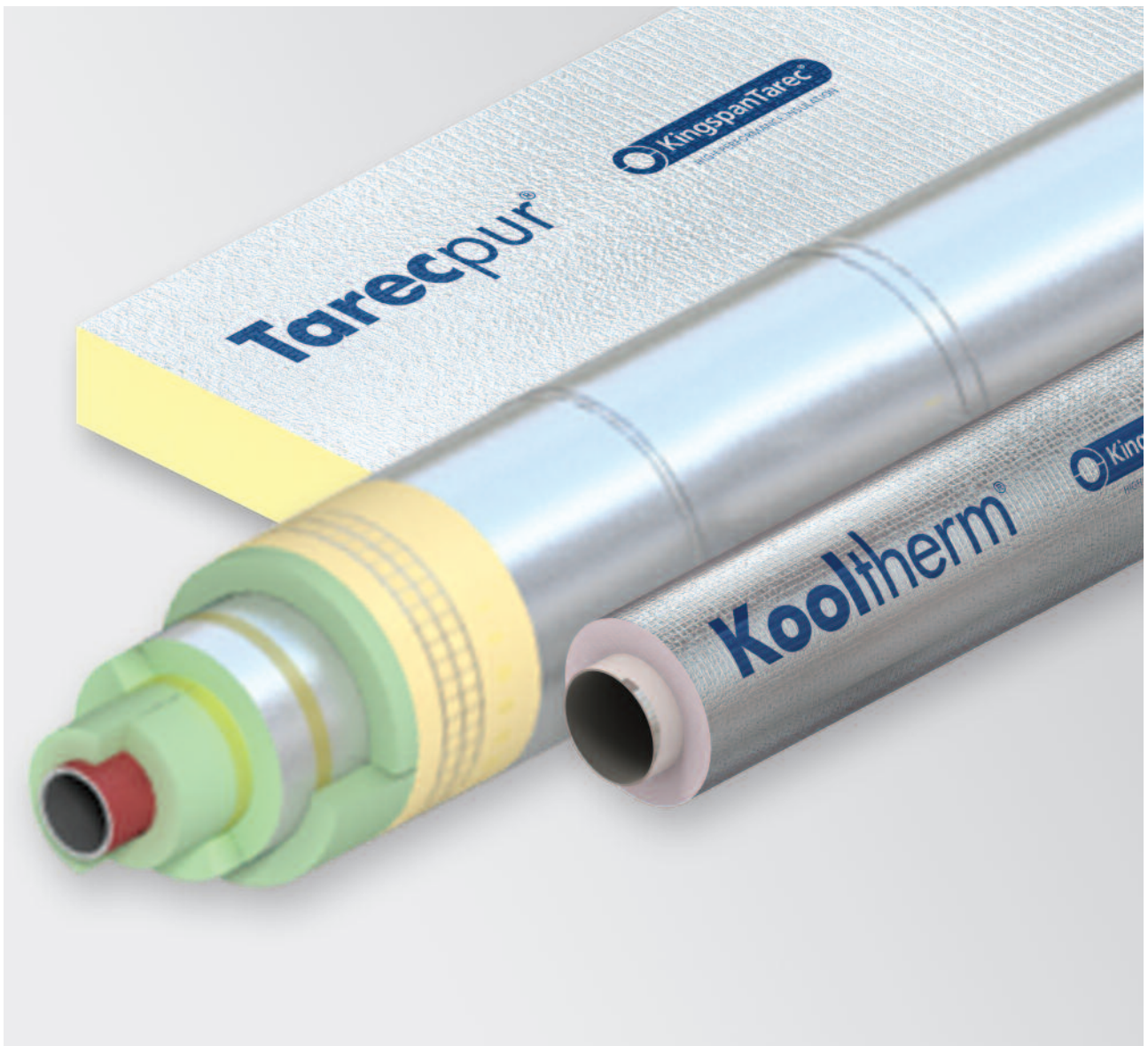
Healthcare

Education

Kingspan Tarec® Industrial Insulation

The Kingspan Tarec® Industrial Insulation joint venture was created through the merger of Tarec Insulation, a division of Recticel NV and Kingspan Insulation pipe and slabstock business based in Glossop.

The joint venture has brought together two companies with over 30 years of experience in the Building Services and Industrial insulation markets, with a worldwide reputation for high quality thermal insulation.



Kingspan Insulation & Recticel NV

Kingspan Insulation

Kingspan Insulation is a division of Kingspan Group plc, one of Europe's fastest growing building materials manufacturers. Kingspan Group plc was formed in 1970 and is a publically quoted group of companies with its headquarters in Kingscourt, County Cavan, Ireland.



Insulation



Insulated Panels



Profiles & Sections



Solar & Renewables



Timber Systems



Access Floors



Environmental



Recticel NV

Recticel NV is a leading producer and converter of rigid and flexible foams for the insulation, industrial, furniture and automotive industries, and a major manufacturer of bedding products.

Built on a foundation of advanced technology and superior quality, Recticel has created a prominent position in the foam industry.



Flexible Foams



Bedding



Insulation



Automotive

Kooltherm® Pipe Insulation

Kooltherm®

HVAC & Building Services Pipe Insulation

Kooltherm® Pipe Insulation comprises one metre long sections of Kooltherm® Insulation faced with a factory-applied aluminium foil vapour barrier jacket autohesively bonded to the insulation core during manufacture.

Kooltherm® Pipe Insulation is available in a range of thicknesses to suit different performance specifications and may be used on mild steel, stainless steel, copper and plastic pipework in standard and non-standard pipe diameters.

Kooltherm® Pipe insulation is available in a standard density of 37 kg/m³.

Higher density pipe insulation sections and insulated pipe supports fabricated from Kooltherm® Insulation in 60 kg/m³, 80 kg/m³ and 120 Kg/m³ densities are also available upon special request.

Kooltherm® Insulated Pipe Support Inserts

Kooltherm® Insulated Pipe Support Inserts provide optimal load bearing capacity whilst offering protection against insulation compression. Designed for use in pipe supports, hanger brackets and clamps, they will support the compressive loads imposed by horizontal pipework carrying water or other liquids.





Aluminium Foil Vapour Barrier Jacket

All Kooltherm® Pipe Insulation System products are faced, as standard, with an extremely durable and protective low vapour permeability aluminium foil vapour barrier jacket reinforced with a glass scrim.

The aluminium foil vapour barrier jacket is factory-applied to avoid onsite application, which carries the risk of vapour barrier damage and with it, a risk to the integrity of the system. This also reduces the labour cost for installation of the Kooltherm® Pipe Insulation System.

A matching self-adhesive aluminium foil vapour barrier tape is available to complete the vapour barrier at joints and breaks.

Features & Benefits

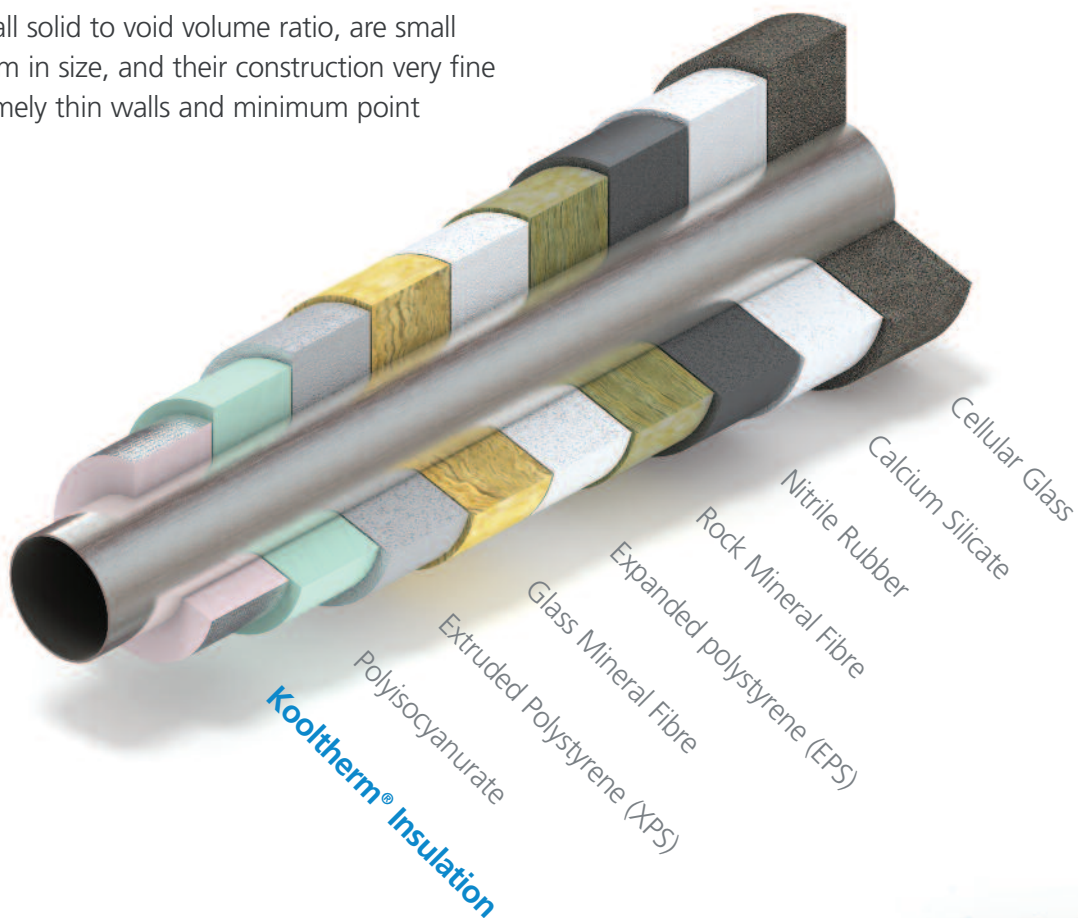
Thermal Performance

With a thermal conductivity as low as 0.021 W/m·K (at 10°C mean), Kooltherm® Insulation is the most thermally efficient insulation material commonly used. A low thermal conductivity allows specified thermal performance standards to be achieved with thinner insulation.

The superior thermal performance of Kooltherm® Insulation derives mainly from its closed cell properties. Its closed cell structure has been optimised to resist heat transfer. The closed cells have a small solid to void volume ratio, are small and uniform in size, and their construction very fine with extremely thin walls and minimum point

contacts (struts). They are filled with a thermally efficient CFC/HCFC-free blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

As a result of its closed cell structure, Kooltherm® Insulation is unaffected by air infiltration – problems that can be experienced with mineral fibre and which can reduce thermal performance.



Moisture Resistance

Kooltherm® Insulation has a 95% (or greater) closed cell structure, which makes it non-wicking and highly resistant to moisture penetration.

The risk of moisture absorption into the insulation is effectively eliminated as the factory-applied aluminium foil facing to Kooltherm® Pipe Insulation System products provides a high performance vapour barrier jacket.



Fire

Kooltherm® Insulation and Kooltherm® High-Density Insulation have a densely cross-linked structure that makes them difficult to ignite and when subjected to fire, the outer surface forms a strong carbonaceous layer that limits heat generation and retards further flame spread.

The excellent fire and smoke performance characteristics of Kooltherm® Insulation and Kooltherm® High-Density Insulation clearly demonstrates their suitability for the designated application, with the test results below enabling Kooltherm to be classified to the Building Regulations as Class O.

Property	Test Method	Typical Result
Reaction to fire	EN 13501-1	B ₁ - s1, d0
Fire propagation	BS 476-6	Index of performance (I) not exceeding 12 and sub-index (i ₁) not exceeding 6*
Flame spread	BS 476-7	Class 1*

* These test results combined enable a Class 0 classification to the Building Regulations in England & Wales, Northern Ireland and the Republic of Ireland, and a Low Risk classification to the Building Standards in Scotland.

Environmental

Kooltherm® Insulation and Kooltherm® High-Density Insulation are based on award winning patented technology. They are CFC/HCFC-free non-fibrous, premium performance rigid thermoset modified resin insulants manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Details of compliance with BREEAM can be found on www.kingspantarec.com/tarecUK/environmental.htm



Manufactured to
BS EN ISO 9001: 2008
Certificate No. 935626/1



Manufactured to
BS EN ISO 9001: 2008
Certificate No. 035/2
BS EN ISO 14001: 2004
Certificate No. EMS 035/2



Recommended Thickness

Insulation Thickness Table to Control Heat Loss

Steel Pipe Size			Water at 60°C		Water at 75°C	
			Kooltherm®	max. heat loss	Kooltherm®	max. heat loss
NB (inches)	NB (mm)	OD (mm)		(W/m)		(W/m)
3/8	10	17.2	15	6.60	15	8.90
1/2	15	21.3	15	7.13	15	9.28
3/4	20	26.9	15	7.83	20	10.06
1	25	33.7	20	8.62	20	11.07
1 1/4	32	42.4	20	9.72	20	12.30
1 1/2	40	48.3	20	10.21	25	12.94
2	50	60.3	20	11.57	25	14.45
2 1/2	65	76.1	25	13.09	25	16.35
3	80	88.9	25	14.58	25	17.91
4	100	114.3	25	17.20	30	20.77
5	125	139.7	25	19.65	30	23.71
6	150	168.3	25	22.31	30	26.89
8	200	219.1	30	27.52	30	32.54
10	250	273.0	30	32.40	35	38.83

<i>Estimated Mean Temperature of Insulation:</i>	+50°C
<i>Ambient Air Temperature:</i>	+15°C
<i>Surface Emissivity ε (Outer Surface):</i>	0.05
<i>Assumed Thermal Conductivity (k-value) of Kooltherm® 37kg/m³ Insulation:</i>	0.025 W/m·K

Table 1: Indicative Thickness (mm) of Insulation for Non-Domestic Hot Water (60°C) and Low Temperature Heating Service Areas (75°C) to Control Heat Loss

(Based on Non-domestic Building Services Compliance Guide: 2010 Edition, Section 11; TIMSA HVAC Guide Sections 6.2.1 & 6.2.2; and BS 5422:2009 Tables 15 & 17)



Insulation Thickness Table to Control Heat Gain

Steel Pipe Size			Water at 0°C		Water at 5°C	
NB (inches)	NB (mm)	OD (mm)	Kooltherm®	max. heat gain (W/m)	Kooltherm®	max. heat gain (W/m)
3/8	10	17.2	15	3.47	15	2.97
1/2	15	21.3	15	3.81	15	3.27
3/4	20	26.9	15	4.18	15	3.58
1	25	33.7	15	4.60	15	4.01
1 1/4	32	42.4	15	5.11	15	4.53
1 1/2	40	48.3	15	5.45	15	4.82
2	50	60.3	20	6.17	15	5.48
2 1/2	65	76.1	20	6.70	15	6.30
3	80	88.9	20	7.77	15	6.90
4	100	114.3	20	9.15	15	8.31
5	125	139.7	20	10.45	20	9.49
6	150	168.3	25	11.86	20	10.97
8	200	219.1	25	14.61	20	13.57
10	250	273.0	25	17.48	20	16.28

<i>Ambient Air Temperature:</i>	+25°C
<i>Relative Humidity:</i>	80%
<i>Surface Emissivity ε (Outer Surface):</i>	0.05
<i>Assumed Thermal Conductivity (k-value) of Kooltherm® 37kg/m³ Insulation:</i>	0.021 W/m·K

Table 2: Minimum Thickness (mm) of Insulation required for chilled water supplies to control heat gain
 (Based on Non-domestic Building Services Compliance Guide: 2010 Edition, Section 11; TIMSA HVAC Guide Sections 6.2.3; and BS 5422:2009 Table 10)

Recommended Thickness

Insulation Thickness Table to Control Condensation

Steel Pipe Size			Water Temperature		
NB (inches)	NB (mm)	OD (mm)	0°C	5°C	10°C
3/8	10	17.2	20	20	15
1/2	15	21.3	20	20	15
3/4	20	26.9	25	20	15
1	25	33.7	25	20	15
1 1/4	32	42.4	25	20	15
1 1/2	40	48.3	30	25	15
2	50	60.3	30	25	20
2 1/2	65	76.1	30	25	20
3	80	88.9	35	25	20
4	100	114.3	35	30	20
5	125	139.7	40	30	20
6	150	168.3	40	30	25
8	200	219.1	40	35	25
10	250	273.0	45	35	25

<i>Ambient Air Temperature:</i>	+25°C
<i>Relative Humidity:</i>	80%
<i>Surface Emissivity ε (Outer Surface):</i>	0.05
<i>Assumed Thermal Conductivity (k-value) of Kooltherm® 37kg/m³ Insulation:</i>	0.021 W/m·K

Table 3: Minimum Thickness (mm) of Insulation required for cold and chilled water supplies to control condensation (Based on Non-domestic Building Services Compliance Guide: 2010 Edition, Section 11; TIMSA HVAC Guide Sections 7.2; and BS 5422:2009 Table 8)



Insulation Thickness Table to Protect Against Freezing

Steel Pipe Size			Pipe Location	
NB (inches)	NB (mm)	OD (mm)	Indoor	Outdoor
½	15	21.3	20	45
¾	20	26.9	15	25
1	25	33.7	15	15
1¼	32	42.4	15	15
1½	40	48.3	15	15
2	50	60.3	15	15
2½	65	76.1	15	15
3	80	88.9	15	15

Copper Pipe Size	Pipe Location	
OD (mm)	Indoor	Outdoor
15	25	70
22	15	25
28	15	15
35	15	15
42	15	15
54	15	15
76.1	15	15
108	15	15

<i>Ambient Air Temperature – Indoor:</i>	-6°C
<i>Ambient Air Temperature – Outdoor:</i>	-10°C
<i>Initial Water Temperature:</i>	+2°C
<i>Evaluation Period:</i>	12 hours
<i>Permitted Ice Formation:</i>	50%
<i>Assumed Thermal Conductivity (k-value) of Insulation:</i>	
<i>Kooltherm®</i>	0.021 W/m·K

Table 4: Minimum Thickness (mm) of Insulation required to give protection against freezing under specified commercial and institutional conditions

(Based on TIMSA HVAC Guide; and BS 5422:2009)

Pipe Supports

Kooltherm® Insulated Pipe Support Inserts are available to suit a full range of pipe diameters and in a full range of insulation thicknesses as shown in the following table; however, special sizes are available on request.

In addition to allowing a continuous vapour barrier on below ambient systems, thermal analysis of a +75°C LTHW system to EN ISO 10211:2007 has shown that Kooltherm Insulated Pipe Support Inserts can limit heat loss by up to 4x more than rubber lined pipe clips, 5x more than metal pipe clips and 10x more than hardwood pipe support inserts.

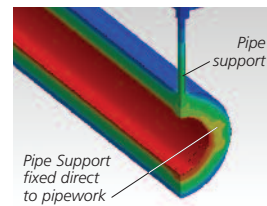
Load bearing calculations for the standard range of Kooltherm® Insulated Pipe Support Inserts are based upon the minimum compressive strength of the relevant density and include a safety factor of five. They are designed to support the maximum static compressive loads imposed by horizontal water filled mild steel and copper pipework with hanger supports spaced at the maximum centres shown below. Kooltherm® Insulated Pipe Support Inserts are not designed to accommodate pipe anchor loads and stresses.

Steel Pipe

Steel Pipe Size			Kooltherm® Insulated Pipe Support Inserts				
DN (in)	DN (mm)	OD (mm)	Length (mm)	Max. Load (kg)	Spreader Plate (mm)	Support Distance (m)	Density (kg/m ³)
½	15	21.3	99	12	none	3	60
¾	20	26.9	99	15	none	3	60
1	25	33.7	99	19	none	3	60
1¼	32	42.4	99	23	none	3	60
1½	40	48.3	99	27	1.0	4	60
2	50	60.3	99	33	1.0	4	60
2½	65	76.1	99	62	1.0	4	80
3	80	88.9	99	73	1.0	4	80
4	100	114.3	99	94	1.0	4	80
5	125	139.7	99	115	1.0	6	80
6	150	168.3	124	410	1.5	6	120
8	200	219.1	124	534	1.5	6	120
10	250	273.0	124	666	2.0	6	120
12	300	323.9	200	1265	2.0	4	120
14	350	355.6	200	1389	2.0	4	120
16	400	406.4	200	1585	2.0	4	120
18	450	457.0	200	1784	2.0	4	120

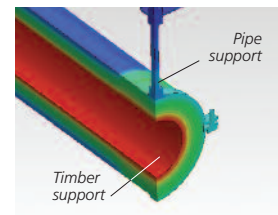
Values given are based upon Kooltherm® insulated pipe support inserts with an integral metal spreader plate.

Conventional Pipe Support Methods



Rubber lined pipe support

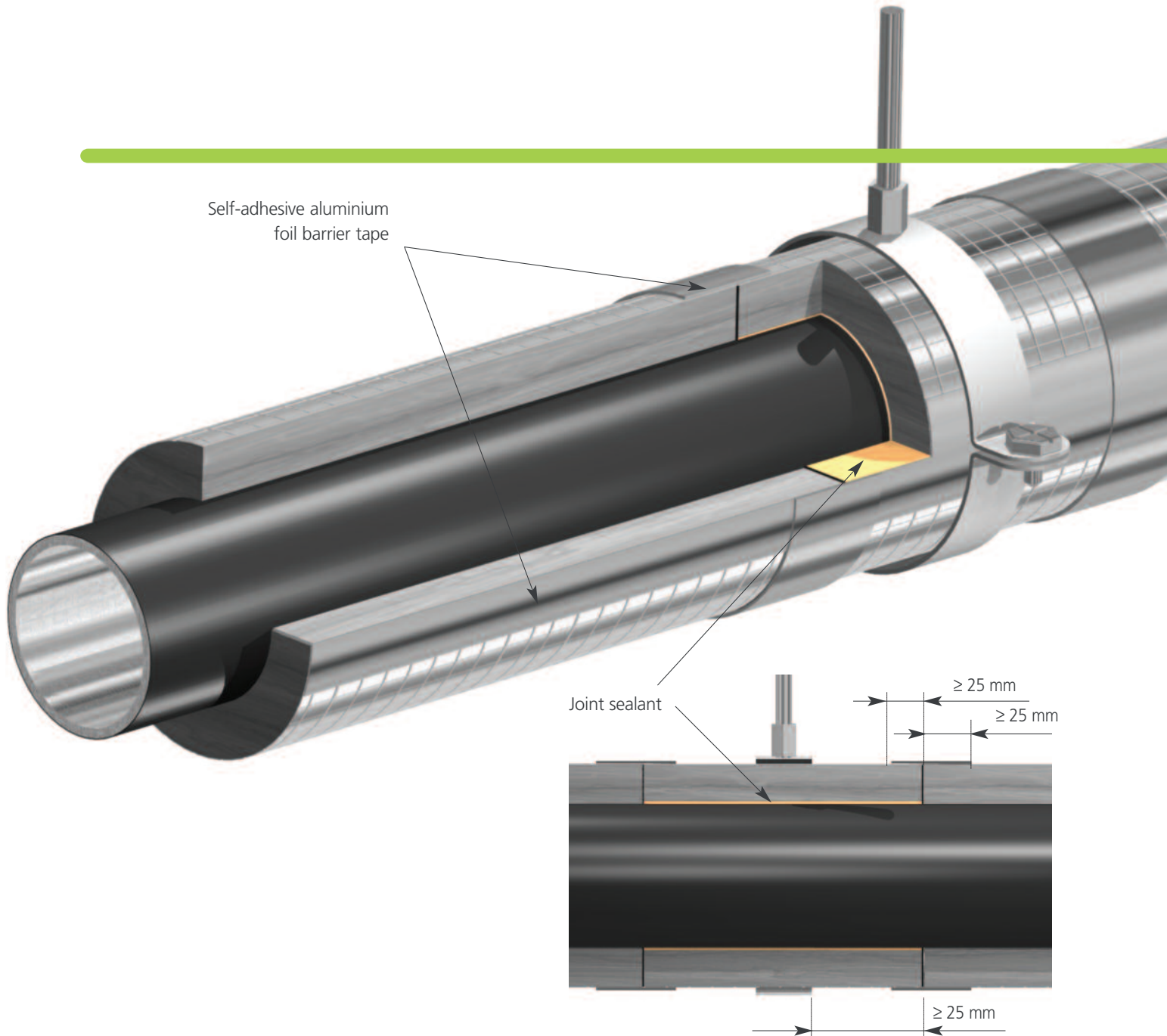
Thermal analysis* illustrates heat loss of up to **4 x greater** than through the Kooltherm® Support System.



Timber support insert

Thermal analysis* illustrates significant heat loss of up to **10 x greater** than through the Kooltherm® Support System.

*When analysed in accordance with BS EN ISO 10211: 2007



Copper Pipe

Steel Pipe Size			Kooltherm® Insulated Pipe Support Inserts				
DN (in)	DN (mm)	OD (mm)	Length (mm)	Max. Load (kg)	Spreader Plate (mm)	Support Distance (m)	Density (kg/m ³)
–	–	15	99	9	none	3	60
–	–	22	99	12	none	3	60
–	–	28	99	15	none	3	60
–	–	35	99	19	none	3	60
–	–	42	99	23	none	3	60
–	–	54	99	30	1.0	4	60
–	–	67	99	45	1.0	4	60
–	–	76	99	62	1.0	4	80

Values given are based upon Kooltherm® insulated pipe support inserts with an integral metal spreader plate.

Technical Data

General Physical Properties (Kooltherm® Insulation)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m ³	37	60	80	120
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.021	0.029	0.030	0.032
Colour		Grey / Pink	Grey	Grey	Grey	Grey
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	–	–	–
Operating Temperature	Upper Limit	°C	+120	+120	+120	+120
	Lower Limit	°C	–50	–50	–50	–50
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621)					
	Parallel	kPa	150	320	590	100
	Perpendicular	kPa	100	170	440	800

General Physical Properties (Aluminium Foil Vapour Barrier Jacket)

Property	Test Method	Unit	Typical Value
Weight	(DIN EN ISO 536)	g/m ²	96
Thickness	(EDANA)	mm	471
Tensile Strength MD/CD	(DIN EN ISO 1924-2)	N/15 mm	> 40 / > 15
Elongation	(DIN EN ISO 1924-2)	%	< 7
Water Vapour Transmission	(ASTM F 1249)	g/m ² .24 hr	< 0.1

Fire Test Classifications (Kooltherm® Insulation)

Property	Test Method	Typical Result
Reaction to fire	EN 13501-1	Bi - s1, d0
Fire propagation	BS 476-6	Index of performance (I) not exceeding 12 and sub-index (i ₁) not exceeding 6*
Flame spread	BS 476-7	Class 1*

* These test results combined enable a Class 0 classification to the Building Regulations in England & Wales, Northern Ireland and the Republic of Ireland, and a Low Risk classification to the Building Standards in Scotland.

All KingspanTarec® cardboard packaging is 100% recycled content.



Case Studies



The Venetian® Macao-Resort-Hotel

LOCATION

Cotai Strip, Macau

CLIENT

Las Vegas Sands Corporation

ARCHITECTS

Aedas Architects Ltd (Lead Consultant & Executive), and HKS, Inc (Lead Design)

ENGINEERS

Parson Brinckerhoff (MEP), and Ove Arup & Partners HK Ltd (Structural)

MAIN CONTRACTOR

Hsin Chong Engineering (Macau) Ltd

Technical Data



Forum Grimaldi

LOCATION

Le Larvotto, Monaco, Principality of Monaco

CLIENT

État monégasque

ARCHITECTS

Notari (Lauréat) Fabrice Notari et Frédéric Genin

ENGINEERS

Coyne & Bellier (Structural) Fimatec (Mechanical)

CONTRACTORS

Campenon Bernard, Soletanche SAM & Viry France



Charles de Gaulle Airport

LOCATION

Roissy, France

CLIENT & ARCHITECT

Aéroports de Paris (ADP)

ENGINEERS

ADP, AMEC & Sechaud et Bossuyt



HIGH PERFORMANCE INSULATION

KingspanTarec® Industrial Insulation NV

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E-mail: info.uk@kingspantarec.com

www.KingspanTarec.com

Kingspan Tarec Industrial Insulation reserves the right to amend product specifications without prior notice. All information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Tarec Industrial Insulation offers a free Technical Advisory Service the advice of which should be sought for uses of Kingspan Tarec Industrial Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting the Marketing Department.