

Second Issue March 2009



Kooltherm[®] Rigid Phenolic Insulation & **Kooltherm[®]** High-Density Rigid Phenolic Insulation

TECHNICAL DATA



Prestige Projects



Project: Lincoln University, UK
 Consulting Engineer: Mott McDonald
 Mechanical Contractor: Bellmarsh Building Services
 Insulation Contractor: Kendrick Insulation
 Products: **Kooltherm®** Pipe Insulation



Project: Hong Kong International Airport
 Architect: Foster and Partners
 Consulting Engineer: Mott McDonald
 Insulation Contractor: YDS
 Products: **Kooltherm®** Pipe Insulation
Kooltherm® Insulated Pipe Support Inserts
 Volume: **Kooltherm®** Pipe Insulation: 2,700 m³ / 95349 ft³
Kooltherm® Insulated Pipe Support Inserts: 45,000 no.



Project: Burj Al Arab Hotel, Jumeirah Beach, Dubai
 Engineer: W S Atkins
 Insulation Contractor: B K Gulf
 Products: **Kooltherm®** Pipe Insulation
Kooltherm® Insulated Pipe Support Inserts
 Volume: **Kooltherm®** Pipe Insulation: > 100,000 linear metres
Kooltherm® Insulated Pipe Support Inserts: > 30,000 no.

Insulation Benefits

Description

Kooltherm[®] rigid phenolic insulation is based on patented technology. Whilst retaining all the benefits of rigid polyurethane and rigid polyisocyanurate insulation

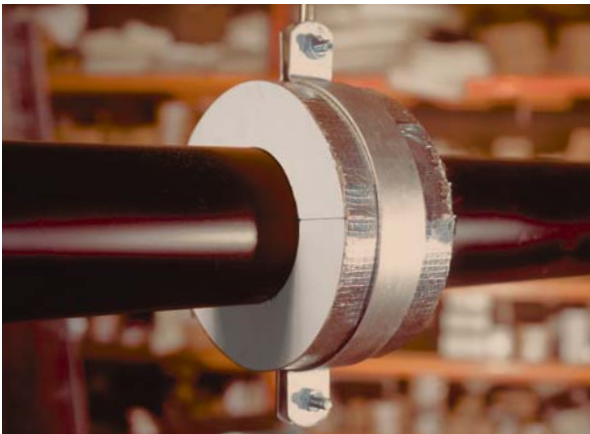
Kooltherm[®] rigid phenolic insulation has a far superior resistance to burning and spread of flame, and the lowest thermal conductivity of any commonly available insulant at 0.021 W/m·K / 0.145 Btu·in/hr·ft²·°F.

Kooltherm[®] High-Density rigid phenolic insulation is used in the manufacture of insulated pipe support inserts. Its greater density gives it much higher compressive strength and rigidity whilst retaining its far superior resistance to burning and spread of flame, making it an ideal insulation material for load bearing applications.

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are entirely CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

They have been developed to provide optimum performance with regards to insulation efficiency, fire resistance, low smoke emission, compressive strength, environment, health, safety and cost.

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation have gained a reputation for quality and consistency, a reputation that has spread worldwide.



Structure

Kooltherm[®] rigid phenolic insulation has a high closed cell content and fine cell structure.

Kooltherm[®] High-Density rigid phenolic insulation has an open cell structure.

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation consist of a densely cross linked matrix which does not readily break down in service.

Temperature Range

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation may be used for pipework and equipment operating within the temperature range -180°C to +120°C / -292°F to +248°F.

Thermal Performance

Kooltherm[®] rigid phenolic insulation has a thermal conductivity of 0.021 W/m·K / 0.146 Btu·in/hr·ft²·°F. This is the lowest thermal conductivity of any commonly available insulation material.

A low thermal conductivity allows specified thermal performance standards to be achieved with a minimal thickness of insulation. This is particularly significant where space saving is important.

A thinner insulant can facilitate installation in confined spaces. Furthermore, it can often result in a lower surface area and therefore savings in finishing materials.

Insulation Benefits

Moisture Resistance

Kooltherm[®] rigid phenolic insulation has a 95% (or greater) closed cell content, which makes it non-wicking and highly resistant to moisture penetration. This is particularly valuable in humid conditions where the build up of moisture can compromise the performance of lesser insulation materials. It is an ideal insulation material for cold, chilled and low temperature hot water pipework.



Because of its high density, **Kooltherm**[®] High-Density rigid phenolic insulation is also non-wicking and resistant to moisture penetration.

Chemical Resistance and Compatibility

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are resistant to a wide range of oils, solvents and chemicals. Their compatibility with most solvent based coatings and adhesives, and polyester and epoxy resin based coatings, allows them to maintain their physical integrity when in contact with such substances.



Hygiene

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are resistant to fungus and mould growth, will not sustain vermin and are non-fibrous, odourless and non-tainting.



Fire Performance

The resistance to burning and spread of flame of **Kooltherm**[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation is far superior to that of any other cellular plastic insulation material, regardless of facing type. In addition, there is an almost complete absence of smoke when these materials are subjected to a flame source, buying valuable time for evacuation.



Quality Assurance

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are manufactured to the highest quality standards under a quality control system approved to BS EN ISO 9001: 2000 / EN ISO 9001: 2000.



Applications

Kooltherm[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are lightweight, easy to transport, handle and install. They are specified for use on building services / HVAC projects including:

- public sector non residential (health, education, leisure); and
- private sector non residential (hotels, casinos, offices, commercial and public buildings).

In particular, **Kooltherm**[®] rigid phenolic insulation and **Kooltherm**[®] High-Density rigid phenolic insulation are used to insulate clean or sterile areas of hospitals and controlled environments, where hygiene is high priority and non-mineral fibre products are preferred.



Availability

Kooltherm[®] rigid phenolic insulation is available in the following forms as standard:

- pipe sections and bends;
- insulated pipe support inserts;
- radiused and bevelled segments;
- standard slab: 1220 mm x 1000 mm / 48.0 in x 39.3 in & 2440 mm x 1000 mm / 96.1 in x 39.3 in;
- standard and non standard pipe sizes; and
- single layer, multi layer or rebated joints.

Kooltherm[®] High-Density rigid phenolic insulation is used for insulated pipe support inserts only.



Technical Data

Kooltherm® Rigid Phenolic Insulation 37-60 kg/m³ (2.3-3.75 lb/ft³)

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value	
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m ³	37	60
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.021	0.029
Colour			Grey / Pink	Grey
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit	°C	+120	+120
	Lower Limit	°C	-180	-180
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621)	Parallel	150	320
		Perpendicular	100	170
Minimum Tensile Strength at +23°C	(ASTM D 1623)	Parallel	150	300
		Perpendicular	110	210
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126)	+93°C for 24 hours	%	≤ 1
		-30°C for 24 hours	%	≤ 1
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40-70 x 10 ⁻⁶	40-70 x 10 ⁻⁶
Friability for 10 mins	(ASTM C 421)	%	< 30	< 40

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value	
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft ³	2.3	3.75
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu-in/hr-ft ² ·°F	0.145	0.20
Colour			Grey / Pink	Grey
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit	°F	+248	+248
	Lower Limit	°F	-292	-292
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621)	Parallel	22	46
		Perpendicular	15	25
Minimum Tensile Strength at +73°F	(ASTM D 1623)	Parallel	22	44
		Perpendicular	16	31
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126)	+199.4°F for 24 hours	%	≤ 1
		-22°F for 24 hours	%	≤ 1
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40-70 x 10 ⁻⁶	40-70 x 10 ⁻⁶
Friability for 10 mins	(ASTM C 421)	%	< 30	< 40

Fire Test Classifications

Fire Test	Test Method	Typical Result	
Horizontal Burning	EN ISO 3582: 2000	≤ 10 mm / 0.4 in	≤ 10 mm / 0.4 in
Oxygen Index	EN ISO 4589-2: 1996	≥ 50%	≥ 50%
Temperature Index	EN ISO 4589-3: 1996	> 390°C / 734°F	> 390°C / 734°F
Flame Spread / Smoke Developed Indices	ASTM E 84	< 25 / 50	-

Fire Test Specifications

Fire Test	Test Method	Specification	
Fire Propagation	BS 476-6: 1989	Index of performance (I) not exceeding 12 and sub index (i ₁) not exceeding 6*	
Surface Spread of Flame	BS 476-7: 1997	Class 1*	Class 1*
Epiradiateur	NF P 92-501	M1	M1
Vertical Burning	DIN 4102-1: 1998	B2	B2

* 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. These tests were conducted on samples of 25 mm / 1 in thickness faced with a reinforced aluminium foil vapour barrier jacket.

Kooltherm® High-Density Rigid Phenolic Insulation 80-120 kg/m³ (5.0-7.5 lb/ft³)

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value	
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m ³	80	120
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m-K	0.030	0.032
Colour			Grey	Grey
Operating Temperature Limits	Upper Limit	°C	+120	+120
	Lower Limit	°C	-180	-180
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621)			
	Parallel	kPa	590	1000
	Perpendicular	kPa	440	800
Minimum Tensile Strength at +23°C	(ASTM D 1623)			
	Parallel	kPa	520	800
	Perpendicular	kPa	350	600
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126)			
	+93°C for 24 hours	%	≤ 1	≤ 1
	-30°C for 24 hours	%	≤ 1	≤ 1
Linear Expansion Coefficient	(ASTM D 696)	m/m-K	40-70 x 10 ⁻⁶	40-70 x 10 ⁻⁶
Friability for 10 mins	(ASTM C 421)	%	< 30	< 10

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value	
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft	5.0	7.5
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu-in/hr-ft ² -°F	0.208	0.222
Colour			Grey	Grey
Operating Temperature Limits	Upper Limit	°F	+248	+248
	Lower Limit	°F	-292	-292
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621)			
	Parallel	psi	86	145
	Perpendicular	psi	64	116
Minimum Tensile Strength at +73°F	(ASTM D 1623)			
	Parallel	psi	75	116
	Perpendicular	psi	51	87
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126)			
	+199.4°F for 24 hours	%	≤ 1	≤ 1
	-22°F for 24 hours	%	≤ 1	≤ 1
Linear Expansion Coefficient	(ASTM D 696)	ft/ft-K	40-70 x 10 ⁻⁶	40-70 x 10 ⁻⁶
Friability for 10 mins	(ASTM C 421)	%	< 30	< 10

Fire Test Classifications

Fire Test	Test Method	Typical Result	
Horizontal Burning	EN ISO 3582: 2000	≤ 10 mm / 0.4 in	≤ 10 mm / 0.4 in
Oxygen Index	EN ISO 4589-2: 1996	≥ 50%	≥ 50%
Temperature Index	EN ISO 4589-3: 1996	> 390°C / 734°F	> 390°C / 734°F
Smoke Index	NES 711	-	≤ 1.6
Toxicity Index	NES 713	-	≤ 2.7

Fire Test Specifications

Fire Test	Test Method	Specification	
Fire Propagation	BS 476-6: 1989	Index of performance (I) not exceeding 12 and sub index (i ₁) not exceeding 6*	
Surface Spread of Flame	BS 476-7: 1997	Class 1*	Class 1*
Epiradiateur	NF P 92-501	M1	M1
Vertical Burning	DIN 4102-1: 1998	B2	B2

* 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. These tests were conducted on samples of 25 mm / 1 in thickness faced with a reinforced aluminium foil vapour barrier jacket.

Contact Details

Customer Service

For quotations, order placement and details of despatches please contact the Kingspan Tarec Industrial Insulation Customer Service Department on the numbers below:

UK and Ireland – Tel: +44 (0) 870 733 0021
– Fax: +44 (0) 870 733 0022
– email: sales.uk@KingspanTarec.co.uk

Rest of World – Tel: +32 (0) 14 44 25 21
– Fax: +32 (0) 14 44 25 37
– email: sales.be@KingspanTarec.com

Technical Advice

Kingspan Tarec Industrial Insulation supports all of its products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors.

Calculations can be run to provide heat losses / gains, condensation / dew point risk, required insulation thicknesses etc... upon receipt of project specifications. Thereafter, any number of permutations can be run to help you achieve your desired targets.

General application advice and advice on design detailing and fixing etc... can also be given. Site surveys are also undertaken as appropriate. Please contact the Kingspan Tarec Industrial Insulation Technical Service Department on the numbers below:

UK and Ireland – Tel: +44 (0) 870 733 0021
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– email: technical.uk@KingspanTarec.co.uk

Rest of World – Tel: +32 (0) 14 44 25 36
– Fax: +32 (0) 14 42 72 21
– email: technical.be@KingspanTarec.com

Literature & Samples

Kingspan Tarec Industrial Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users.

For copies please contact the Kingspan Tarec Industrial Insulation Marketing Department on the numbers below:

UK and Ireland – Tel: +44 (0) 870 733 0021
– Fax: +44 (0) 870 733 0022
– email: info.uk@KingspanTarec.co.uk

Rest of World – Tel: +32 (0) 14 44 25 21
– Fax: +32 (0) 14 44 25 37
– email: info.be@KingspanTarec.com

General Enquiries

For all other enquiries contact Kingspan Tarec Industrial Insulation on the numbers below:

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Rest of World – Tel: +32 (0) 14 44 25 25
– Fax: +32 (0) 14 42 72 21
– email: info.be@KingspanTarec.com

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