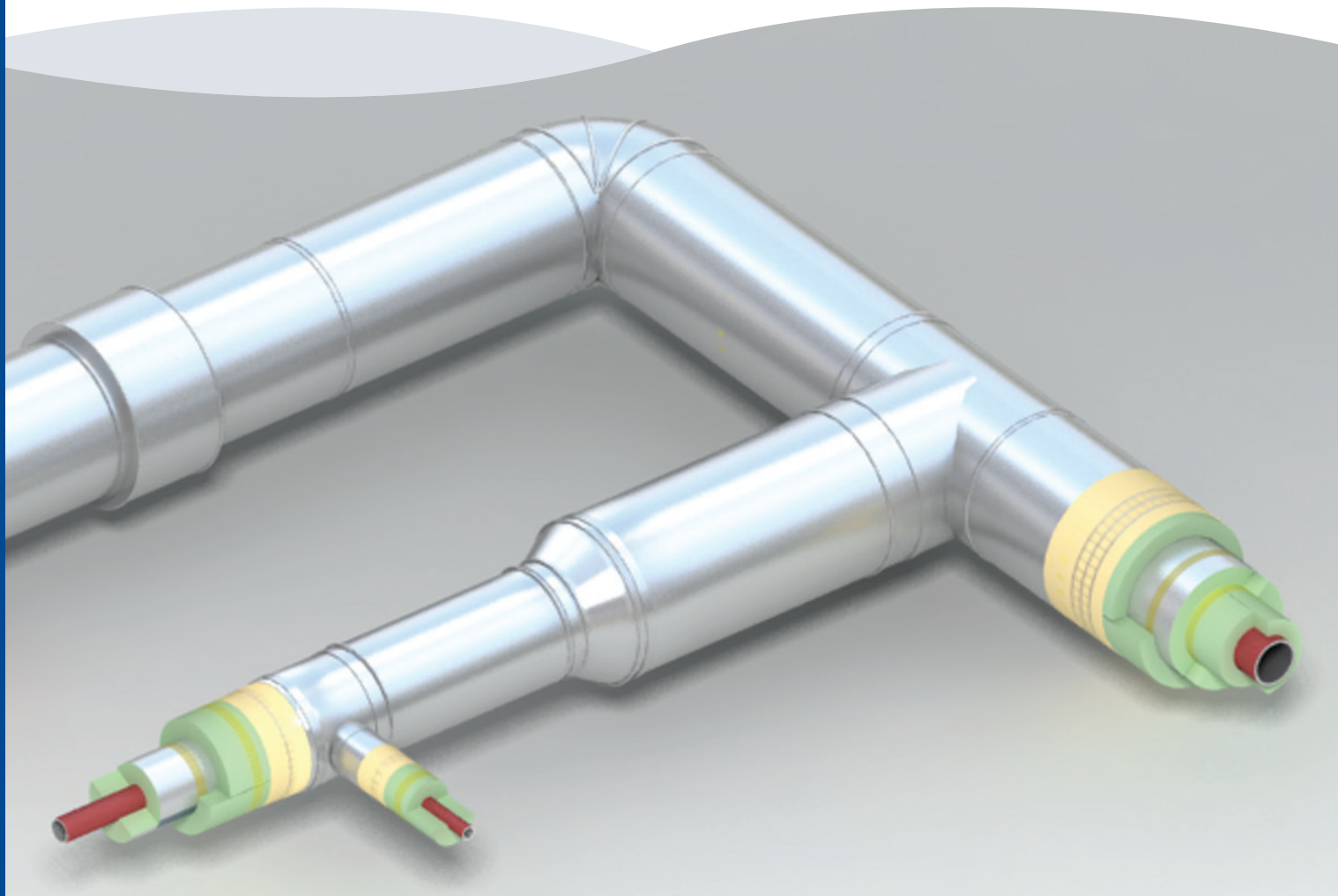
Kingspan™

Tarecpir™

Quick Guide

Insulation for the LNG, Petrochemical and Process Industries



Prestige Projects

Project:	Dahbol LNG India
Engineer:	Kvanerner
Insulation Contractor:	Punj Lloyd
Product:	Tarecpir 45 kg/m³ / 2.8 lb/ft³
Volume:	10,000 m³ / 35,4146 ft³

Project:	Puerto Rico LNG
Engineer:	PDM
Insulation Contractor:	Insulations Inc
Product:	Tarecpir 35 kg/m³ / 2.2 lb/ft³

Insulation Benefits

Description

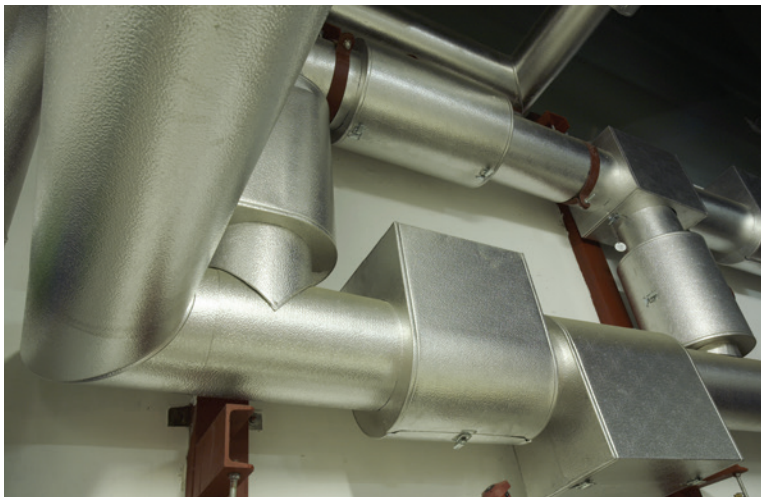
The Tarec™pir range of CFC/HCFC–free rigid polyisocyanurate (PIR) insulation is suitable for a wide spectrum of applications. Whilst retaining all of the benefits of rigid polyurethane insulation, Tarec™pir has a considerably increased resistance to burning and spread of flame.

The Tarec™pir insulation range consists of:

- Tarec™pir M1 (improved fire performance);
- Tarec™pir B2 (improved thermal efficiency);
- Tarec™pir CR (cryogenic applications);
- Tarec™pir HT (high temperature); and
- Tarec™pir HD (high density).

Tarec™pir has been developed to provide optimum performance with regards to insulation efficiency, fire resistance, compressive strength, environment, health, safety and cost.

Tarec™pir has, over time, gained worldwide recognition in many industries including Building Services / HVAC, industrial process, petrochemical, cryogenic and LNG for outstanding product quality and performance.



Structure

Tarec™pir has a high closed cell content and consists of a densely cross linked matrix which does not readily break down in service.

Temperature Range

Tarec™pir may be used for pipework and equipment operating within the temperature range –200°C to +120°C / –328°F to +248°F, and even up to +200°C / +392°F for Tarec™pir HT.

Thermal Performance

Tarec™pir is one of the most thermally efficient insulation materials commonly available. It retains its thermal performance under the most severe operating conditions by virtue of its closed cell structure and high resistance to moisture absorption.

Tarec™pir has a thermal conductivity as low as 0.024 W/m·K / 0.166 Btu·in/hr·ft²·°F.

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.

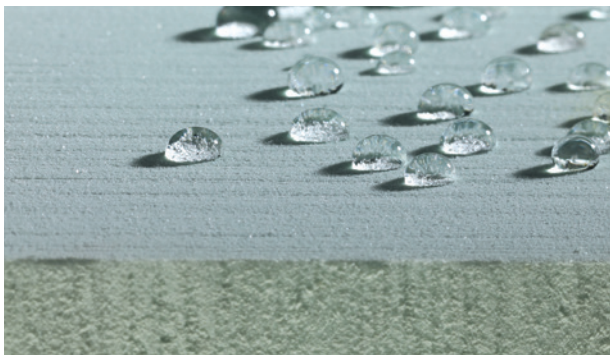
A thinner insulant can facilitate installation in confined spaces. Furthermore, it can often result in a lower surface area and therefore savings in finishing materials.

Insulation Benefits

Moisture Resistance

Tarec™pir 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.

When used in conjunction with a vapour tight facing, Tarec™pir provides a system which is totally moisture resistant.



Chemical Resistance & Compatibility

Tarec™pir is resistant to a wide range of oils, solvents and chemicals. Its compatibility with most solvent based coatings and adhesives, and polyester and epoxy resin based coatings, allows it to maintain its physical integrity when in contact with such substances.

Quality Assurance

The Tarec™pir range is manufactured to the highest quality standards under a quality control system approved to EN ISO 9001: 2000.

Assessed to EN ISO 9001: 2000
Certificate No. 935626.1

Hygiene

Tarec™pir is resistant to fungus and mould growth, will not sustain vermin and is non–fibrous, odourless and non–tainting.

Fire Performance

Tarec™pir is a thermoset material. When subjected to fire, its outer surface forms a strong carbonaceous layer that retards further flame spread and penetration. Unlike thermoplastic materials, Tarec™pir does not melt or produce flaming droplets when exposed to fire. Tarec™pir satisfies the requirements of major industrial specifications.

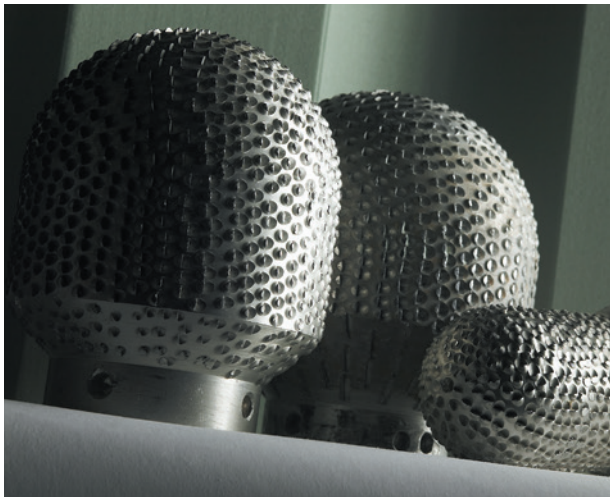
Insulation Benefits

Tarec™pir M1 Insulation

Tarec™pir M1 (improved fire performance) has been specially developed for industrial process and building services / HVAC applications where superior fire performance is required. Tarec™pir M1 is classified as being Class 0 by the Building Regulations in England & Wales, Northern Ireland and the Republic of Ireland, and Low Risk by the Building Standards in Scotland. It also achieves a Flame Spread Index of < 35* under ASTM E 84.

Tarec™pir B2 Insulation

Tarec™pir B2 (improved thermal efficiency) is recommended for building services where increased thermal efficiency is priority. Tarec™pir B2 has a thermal conductivity of 0.026 W/m·K / 0.166 Btu·in/hr·ft²·°F.



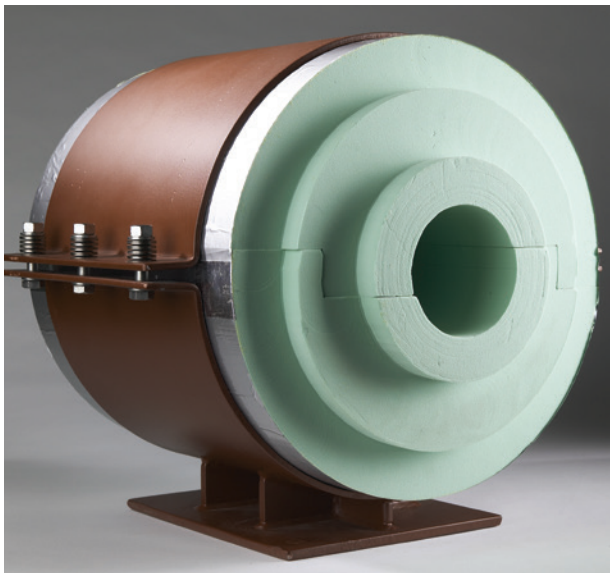
** Tarec™pir M1 40 kg/m³*

Tarec™pir CR Insulation

For cryogenic applications where excellent fire performance, enhanced compressive strength and resistance to thermal stress are required, Tarec™pir CR (cryogenic applications) has been developed.

Its fire performance (Class 0 to the Building Regulations in England & Wales, Northern Ireland and the Republic of Ireland, and Low Risk to the Building Standards in Scotland, plus a Flame Spread Index of < 25 under ASTM E 84), and its resistance to thermal stress makes Tarec™pir CR ideal for insulation applications with a working temperature as low as –200°C / –328°F.

Insulation Benefits



Tarec™pir HD Insulation

Tarec™pir HD (high density) is a specially modified rigid polyisocyanurate insulation available in a range of densities up to 320 kg/m³ / 20 lb/ft³. Tarec™pir HD is particularly suitable for use in load bearing applications, making it ideal for insulated pipe support inserts.

The use of Tarec™pir HD for insulated pipe support inserts can help to avoid the potential problems of cold bridging and / or energy loss between the pipework and support structure.

Tarec™pir HT Insulation

Tarec™pir HT (high temperature) is a specially modified rigid polyisocyanurate insulation with a standard density of 40 kg/m³ / 2.5 lb/ft³. Other densities are available upon request. Due to its special formulation, Tarec™pir HT is capable of dealing with a continuous working temperature of +200°C / +392°F.

When Tarec™pir HT is used at high temperatures, the insulation maintains its closed cell content and its dimensional stability throughout its in service life.

Tarec™pir HT has been used on many high demanding projects worldwide.

Applications

Tarec™pir is a versatile insulation material with a high strength to density ratio. It is lightweight, easy to transport, handle and install. Tarec™pir is specified for use in a wide range of applications including:

- industrial process, food, beverage, brewery, pharmaceutical and chemical plants;
- cryogenic, LNG, LPG, petrochemical, ethylene and ammonia production; and
- Building Services / HVAC applications.

In particular, Tarec™pir satisfies the strict requirements of major petrochemical and LNG specifications. As a result, Tarec™pir is synonymous with specifications for high quality thermal insulation worldwide.

Availability

Tarec™pir is available in the following forms as standard:

- pipe sections and bends;
- insulated pipe support inserts;
- radiused and bevelled segments;
- standard slab: 2500 mm x 1000 mm / 98.4 in x 39.3 in & 2500 mm x 1250 mm / 98.4 in x 49.2 in;
- standard and non standard pipe sizes; and
- single layer, multi layer or rebated joints.

Technical Data

Tarec™pir HT Rigid Polyisocyanurate Insulation 40 kg/m³ / 2.5 lb/ft³

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m³	40
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0,026
Colour			Gris
Closed Cell Content	(EN ISO 4590) Methode 1 / (ASTM D 2856) Methode B	%	≥ 95
Operating Temperature Limits	Limite maximale Limite minimale	°C °C	+200 –180
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 kPa kPa	 230 150
Minimum Tensile Strength at +23°C	(ASTM D 1623) Parallel Perpendicular	 kPa kPa	 490 340
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +93°C bij 24 hours –30°C bij 24 hours +70°C bij 24 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 40
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5,5
Water Vapour Permeability	(ASTM E 96)	ng/Pa.s.m	≤ 5,5

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft³	2.5
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu·in/hr·ft²·°F	0.18
Colour			Grey
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°F °F	+392 –292
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 psi psi	 33.4 21.8
Minimum Tensile Strength at +73°F	(ASTM D 1623) Parallel Perpendicular	 psi psi	 71.0 49.3
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +199.4°F for 24 hours –22°F for 24 hours +158°F for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 40
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	Perm inch	≤ 3.8

Fire Test Classifications

Property	Test Method	Typical Value
Epiradiateur	NF P 92–501	M4

Fire Test Specifications

Property	Test Method	Typical Value
Vertical Burning	DIN 4102–1: 1998	B2

Technical Data

Tarec™ pir M1 Rigid Polyisocyanurate Insulation 33-80 kg/m³ / 2.1-5.0 lb/ft³

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m³	33	40	50	80
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.026	0.026	0.026	0.029
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°C °C	+120 –200	+120 –200	+120 –200	+120 –200
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 kPa kPa	 180 90	 220 140	 310 200	 700 520
Minimum Tensile Strength at +23°C	(ASTM D 1623) Parallel Perpendicular	 kPa kPa	 350 190	 410 300	 510 350	 850 700
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +93°C for 24 hours –30°C for 24 hours +70°C for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 40	< 35	< 35	< 20
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	ng/Pa.s.m	≤ 5.5	≤ 5.5	≤ 5.5	≤ 5.5

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft³	2.1	2.5	3.1	5.0
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu·in/hr·ft²·°F	0.18	0.18	0.18	0.20
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°F °F	+248 –328	+248 –328	+248 –328	+248 –328
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 psi psi	 26 13	 32 20	 45 29	 102 75
Minimum Tensile Strength at +73°F	(ASTM D 1623) Parallel Perpendicular	 psi psi	 51 28	 60 44	 74 51	 123 102
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +199.4°F for 24 hours –22°F for 24 hours +158°F for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 40	< 35	< 35	< 20
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	Perm inch	≤ 3.8	≤ 3.8	≤ 3.8	≤ 3.8

Fire Test Classifications

Fire Test	Test Method	Typical Result			
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*	Class 1*	Class 1*
Horizontal Burning	EN ISO 3582: 2000	≤ 25 mm / 1 in	≤ 25 mm / 1 in	≤ 25 mm / 1 in	≤ 25 mm / 1 in
Oxygen Index	EN ISO 4589–2: 1996	≥ 30%	≥ 30%	≥ 30%	≥ 30%
Temperature Index	EN ISO 4589–3: 1996	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F
Flame Spread Index	ASTM E 84	≤ 30	≤ 25	≤ 25	–
Fire Propagation	NEN 6065	Class 2	–	–	–
Smoke Index	NEN 6066	1.5** / 2.2***	–	–	–

** These test results combined enables 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.*
*** Faced with a glass reinforced aluminium foil vapour barrier jacket.*
**** Faced with a multiple layered polyester and aluminium foil vapour barrier jacket.*

Fire Test Specifications

Fire Test	Test Method	Specification			
Epiradiateur	NF P 92–501	M1	M1	M1	M1
Vertical Burning	DIN 4102–1: 1998	B2	B2	B2	B2

Technical Data

Tarec™ pir B2 Rigid Polyisocyanurate Insulation 33-60 kg/m³ / 2.1-3.75 lb/ft³

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value		
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m³	33	40	60
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.026	0.026	0.028
Colour			Cream	Cream	Cream
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≤ 95	≤ 95	≤ 95
Operating Temperature Limits	Upper Limit Lower Limit	°C °C	+120 –180	+120 –180	+120 –180
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 kPa kPa	 180 90	 250 150	 430 230
Minimum Tensile Strength at +23°C	(ASTM D 1623) Parallel Perpendicular	 kPa kPa	 350 250	 450 350	 690 530
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +93°C for 24 hours –30°C for 24 hours +70°C for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 30	< 30	< 30
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	ng/Pa.s.m	≤ 5.5	≤ 5.5	≤ 5.5

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value		
Nominal Density	(EN ISO 845) /(ASTM D 1622)	lb/ft³	2.1	2.5	3.75
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu·in/hr·ft²·°F	0.180	0.180	0.194
Colour			Cream	Cream	Cream
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≤ 95	≤ 95	≤ 95
Operating Temperature Limits	Upper Limit Lower Limit	°F °F	+248 –292	+248 –292	+248 –292
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 psi psi	 26 13	 36 22	 62 33
Minimum Tensile Strength at +73°F	(ASTM D 1623) Parallel Perpendicular	 psi psi	 51 36	 65 51	 100 77
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +199.4°F for 24 hours –22°F for 24 hours +158°F for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 30	< 30	< 30
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	Perm inch	≤ 3.8	≤ 3.8	≤ 3.8

Fire Test Classifications

Fire Test	Test Method		Typical Result	
Horizontal Burning	EN ISO 3582: 2000	≤ 125 mm / 5 in	≤ 125 mm / 5 in	≤ 125 mm / 5 in
Temperature Index	EN ISO 4589–3: 1996	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F
Brandkennziffer		5.3	5.3	5.3

Fire Test Specifications

Fire Test	Test Method		Specification	
Vertical Burning	DIN 4102–1: 1998	B2	B2	B2

Technical Data

Tarec™ pir CR Rigid Polyisocyanurate Insulation 42-50 kg/m³ / 2.6-3.1 lb/ft³

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m³	42	45	48	50
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.025	0.026	0.026	0.026
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°C °C	+120 –200	+120 –200	+120 –200	+120 –200
Minimum Compressive Strength at +23°C	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 kPa kPa	 260 180	 310 200	 320 220	 340 230
Minimum Tensile Strength at +23°C	(ASTM D 1623) Parallel Perpendicular	 kPa kPa	 430 330	 490 380	 500 390	 510 400
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +93°C for 24 hours –30°C for 24 hours +70°C for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 30	< 30	< 30	< 25
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	ng/Pa.s.m	≤ 5.5	≤ 5.5	≤ 5.5	≤ 5.5

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft³	2.6	2.8	3.0	3.1
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu·in/hr·ft²·°F	0.17	0.18	0.18	0.18
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°F °F	+248 –328	+248 –328	+248 –328	+248 –328
Minimum Compressive Strength at +73°F	(EN 826) / (ASTM D 1621) Parallel Perpendicular	 psi psi	 38 26	 45 29	 46 21	 49 33
Minimum Tensile Strength at +73°F	(ASTM D 1623) Parallel Perpendicular	 psi psi	 62 48	 71 55	 73 57	 74 58
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +199.4°F for 24 hours –22°F for 24 hours +158°F for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 30	< 30	< 30	< 25
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	Perm inch	≤ 3.8	≤ 3.8	≤ 3.8	≤ 3.8

Fire Test Classifications

Fire Test	Test Method	Typical Result			
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*	Class 1*	Class 1*
Horizontal Burning	EN ISO 3582: 2000	≤ 10 mm / 0.4 in	≤ 10 mm / 0.4 in	≤ 10 mm / 0.4 in	≤ 10 mm / 0.4 in
Oxygen Index	EN ISO 4589–2: 1996	≥ 30%	≥ 30%	≥ 30%	≥ 30%
Temperature Index	EN ISO 4589–3: 1996	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F

** These test results combined enables 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.*

Fire Test Specifications

Fire Test	Test Method	Specification			
Flame Spread Index	ASTM E 84	< 25*	< 25*	< 25*	< 25*
Epiradiateur	NF P 92–501	M1	M1	M1	M1
Vertical Burning	DIN 4102–1: 1998	B2	B2	B2	B2

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

Technical Data

Tarec™ pir HD Rigid Polyisocyanurate Insulation 120-320 kg/m³ / 7.5-20.0 lb/ft³

General Physical Properties (Metric)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	kg/m³	120	160	224	320
Thermal Conductivity at +10°C	(EN 12667) / (ASTM C 518)	W/m·K	0.033	0.036	0.038	0.048
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°C °C	+120 –200	+120 –200	+120 –200	+120 –200
Minimum Compressive Strength	(EN 826) / (ASTM D 1621) Parallel at +23°C Parallel at –165°C Perpendicular at +23°C	 kPa kPa kPa	 1200 – 1000	 1900 4600 1650	 2950 9250 2750	 5750 18750 5000
Minimum Tensile Strength	(ASTM D 1623) Parallel at +23°C Parallel at –165°C Perpendicular at +23°C	 kPa kPa kPa	 1400 – 1300	 1750 1950 1550	 3000 3400 2800	 4900 5400 4700
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +93°C for 24 hours –30°C for 24 hours +70°C for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 10	< 10	< 5	< 5
Linear Expansion Coefficient	(ASTM D 696)	m/m·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	ng/Pa.s.m	≤ 5.5	≤ 5.5	≤ 5.5	≤ 5.5

General Physical Properties (Imperial)

Property	Test Method	Unit	Typical Value			
Nominal Density	(EN ISO 845) / (ASTM D 1622)	lb/ft³	7.5	10.0	14.0	20.0
Thermal Conductivity at +50°F	(EN 12667) / (ASTM C 518)	Btu·in/hr·ft²·°F	0.23	0.25	0.26	0.33
Colour			Green	Green	Green	Green
Closed Cell Content	(EN ISO 4590) Method 1 / (ASTM D 2856) Method B	%	≥ 95	≥ 95	≥ 95	≥ 95
Operating Temperature Limits	Upper Limit Lower Limit	°F °F	+248 –328	+248 –328	+248 –328	+248 –328
Minimum Compressive Strength	(EN 826) / (ASTM D 1621) Parallel at +73°F Parallel at –265°F Perpendicular at +73°F	 psi psi psi	 174 – 145	 276 667 240	 428 1342 399	 834 2720 725
Minimum Tensile Strength	(ASTM D 1623) Parallel at +73°F Parallel at –265°F Perpendicular at +73°F	 psi psi psi	 203 – 189	 254 283 225	 435 493 406	 711 783 682
Linear Dimensional Stability	(EN 1604) / (ASTM D 2126) +199.4°F for 24 hours –22°F for 24 hours +158°F for 48 hours and 95% RH	 % % %	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3	 ≤ 1 ≤ 1 ≤ 3
Friability for 10 mins	(ASTM C 421)	%	< 10	< 10	< 5	< 5
Linear Expansion Coefficient	(ASTM D 696)	ft/ft·K	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}	40–70 x 10^{-6}
Water Absorption	(ISO 2896)	Vol %	≤ 5.0	≤ 5.0	≤ 5.0	≤ 5.0
Water Vapour Permeability	(ASTM E 96)	Perm inch	≤ 3.8	≤ 3.8	≤ 3.8	≤ 3.8

Fire Test Classifications

Fire Test	Test Method	Typical Result			
Horizontal Burning	EN ISO 3582: 2000	≤ 20 mm / 0.8 in	≤ 20 mm / 0.8 in	≤ 20 mm / 0.8 in	≤ 20 mm / 0.8 in
Temperature Index	EN ISO 4589–3: 1996	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F	> 390°C / 734°F
Epiradiateur	NF P 92–501	M4	M4	M4	M4

Fire Test Specifications

Fire Test	Test Method	Specification			
Vertical Burning	DIN 4102–1: 1998	B2	B2	B2	B2

UK, Ireland & Gibraltar

Kingspan Industrial Insulation Ltd
Pembridge, Leominster, Herefordshire, HR6 9LA, United Kingdom
General Enquiries Tel: +44 (0) 1544 388 601
Technical Advice Tel: 0808 168 7363 or +44 (0) 1457 890534

Australasia, Oceania and SE Asia as far west and north as, and including, Myanmar, China, Mongolia, Japan

Kingspan Insulation Pty Ltd
266 Beringarra Ave, Malaga, WA 6090, Australia
Tel: 1300 247 235 (for calls within Australia only)
Tel: +61 8 6240 6200 (for calls outside of Australia)

All other countries

PAL Middle East PIR LLC
P.O. Box 113826, Dubai Investment Park 2, Dubai, U.A.E.
Tel: +971 4 889 1000

The rest of Europe (excluding Turkey, Malta & Cyprus) and Russia

Kingspan Insulation N.V.
Visbeekstraat 24
B – 2300 Turnhout, Belgium
Tel: +32 14 44 25 25

Canada, USA, Bermuda, the Cayman Islands, Puerto Rico & St Pierre and Miquelon

Kingspan Insulation LLC
2100 Riveredge Parkway, Suite 175, Atlanta, Georgia, 30328, USA
Tel: 1 800 227 7339 (for calls within USA only)
Tel: +1 (678) 589 7300 (for calls outside of USA)

www.kingspaninsulation.com

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