

THERMOBREAK[®]

THERMAL & ACOUSTIC INSULATION FOR TRANSIT VEHICLES



THERMOBREAK[®] RT
THERMOBREAK[®] AcoustiPlus

Physically crosslinked polyolefin foam for thermal and acoustic insulation in transit vehicles.
Meets the highest Fire and Smoke classification in major International Standards
EN 45545-2 (HL3), NFPA 130, BS 6853 and TB/T 3237.

SEKISUI

FOAM
INTERNATIONAL
Global Foam Solutions

PHYSICALLY
CROSSLINKED
SEKISUI TECHNOLOGY



Enhancing Passenger Comfort & Safety

Effective thermal and acoustic insulation maintains a balanced interior environment by protecting passengers from noise and exterior temperature extremes. Thermal insulation of the rail car and HVAC system provides improved energy efficiency thus reducing loads and energy consumption.

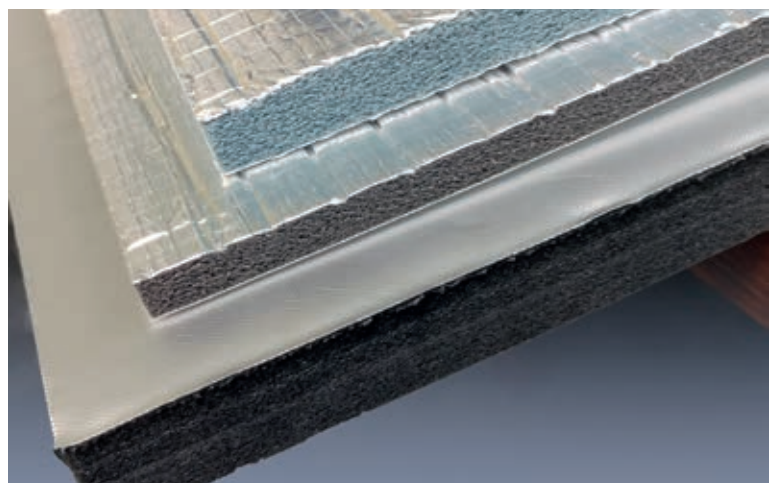
These key factors highlight the importance of insulation in enhancing passenger comfort and safety whilst at the same time reducing environmental impact.

Thermobreak® RT and **Thermobreak®AcoustiPlus** are innovative, fibre-free insulation materials specifically designed for the railway and HVAC transportation equipment market.

Thermobreak® RT and Thermobreak® AcoustiPlus are manufactured from physically crosslinked polyolefin foam, invented and commercialised by the Sekisui Chemical group.

Today Sekisui Chemical is the largest polyolefin foam manufacturer in the world with multiple manufacturing facilities throughout Europe, USA, Asia and Australia, employing over 23,000 people. All foam manufacturing facilities are ISO 9001 and ISO 14001 accredited.

Sekisui Chemical is committed to a corporate policy that recognises the utmost importance of our living environment. Our responsibility to the environment during the development of products and in all of our manufacturing processes is of highest priority.

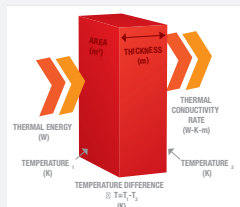


Market Leading Performance

Developed in Australia, Thermobreak® is widely used by leading railway builders and HVAC equipment manufacturers and has been supplied to numerous railway projects globally for over 20 years.

Our unique physically crosslinked technology results in a smaller and more evenly distributed cell structure. Cell structure directly affects thermal conductivity and vapour permeability. Both are key factors in insulation performance.

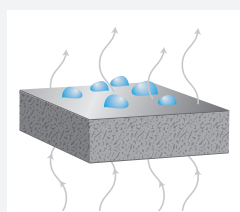
Thermobreak®'s thermal performance remains relatively unchanged over a 10 year period.



THERMAL CONDUCTIVITY

Thermobreak® RT has the lowest thermal conductivity of any flexible insulation material; **0.032 W/mK (23°C) (0.22 BTU.in/h.ft² @ 73° F).**

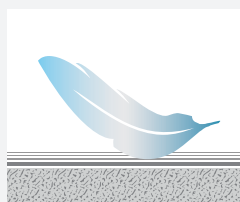
Thermobreak® Acoustiplus also has a very low thermal conductivity of; **0.035 W/mK (23°C) (0.25 BTU.in/h.ft² @ 73° F)**



VAPOUR PERMEABILITY

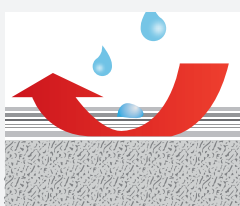
Vapour Permeability of almost zero (Thermobreak® RT) ensures our thermal conductivity remains relatively constant for a period of 10 years thus significantly contributing to building sustainability and energy cost reduction.

Vapour Permeability = 2.3×10^{-15} Kg/Pa.s.m (0.002 perm-inch)
Permeability Resistance Factor: $\mu > 80,000$



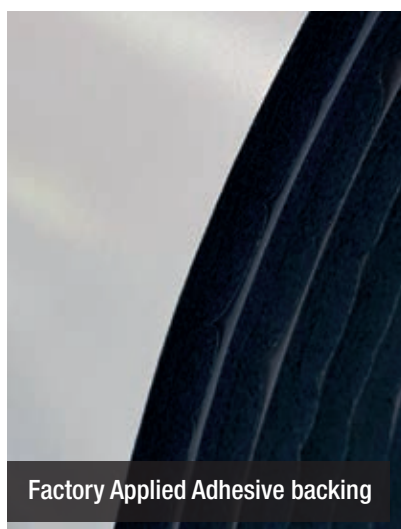
LIGHTWEIGHT

Thermobreak® RT & Acoustiplus are extremely lightweight (only 25kg/m³) meaning a reduction in total weight of the vehicle resulting in increased energy efficiency.

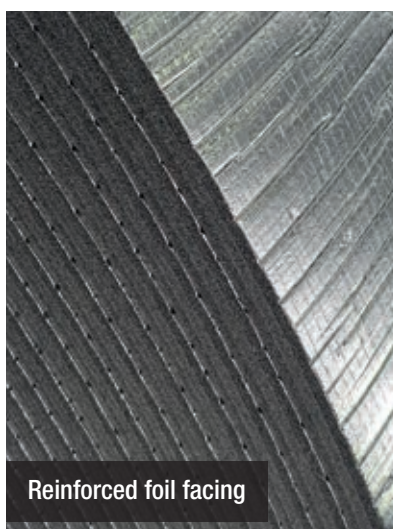


LOW WATER ABSORPTION

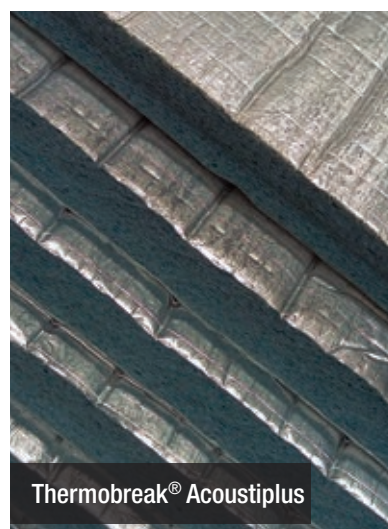
Thermobreak® RT & Thermobreak® Acoustiplus have very low water absorption (**0.2% v/v & 0.3% respectively**).



Factory Applied Adhesive backing



Reinforced foil facing



Thermobreak® Acoustiplus

THERMOBREAK[®] RT

Insulation for Transit Vehicles

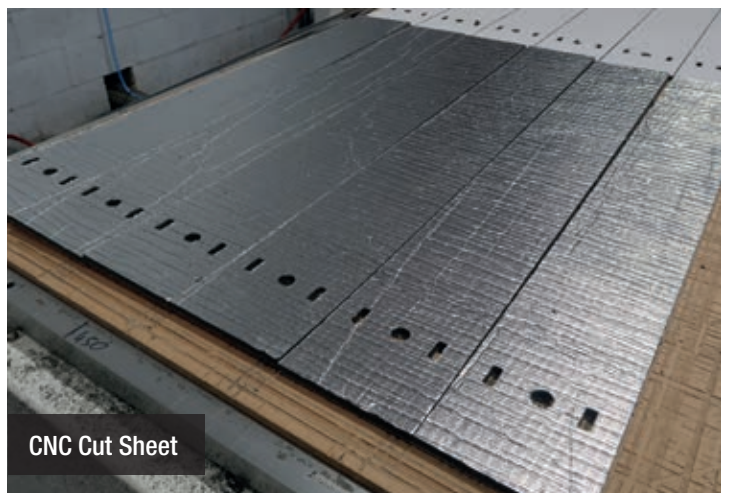
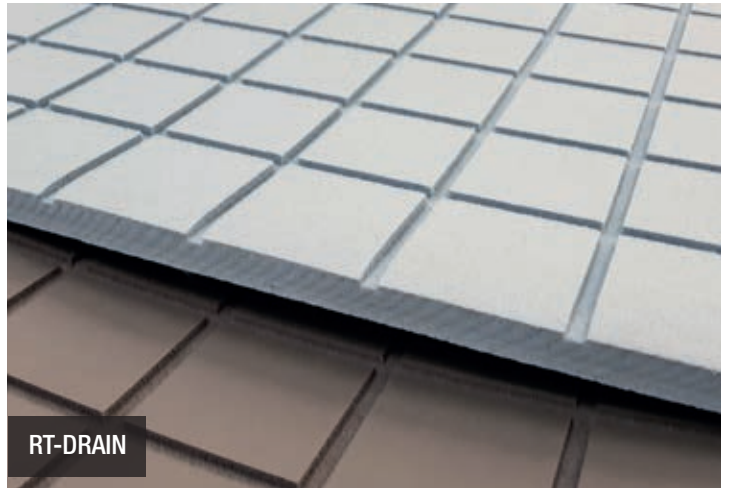
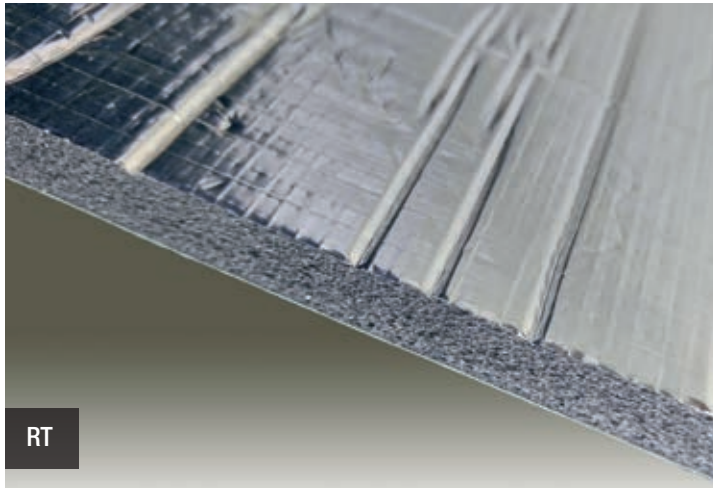
Technically Superior Closed Cell Thermal Insulation

Our unique physically crosslinked technology results in a smaller and more evenly distributed closed cell structure. Cell structure directly affects thermal conductivity and vapour permeability. Both are key factors in short and long-term insulation performance. Coupled with low emissivity reinforced aluminium foil facing, Thermobreak[®] RT offers superior insulation performance and durability compared to any other flexible insulation.

The Thermobreak RT Range

- **Thermobreak[®] RT** - ideal for body and HVAC ducting insulation due to its excellent thermal performance.
- **Thermobreak[®] RT Drain** - ideal for floor insulation where drainage is required for moisture accumulation.
- **Thermobreak[®] RT Tube** - for outstanding pipe insulation & easy installation.

Thermobreak[®] RT is the first closed cell insulation product to achieve HL3 level up to 25mm thickness.



Meets & Exceeds International Standards

Fire & Smoke Safety

Thermobreak® RT offers the highest fire and smoke ratings to meet most major National and International Standards.

- EN 45545-2 (HL3 up to 25mm [1"])
- PRIIA-NFPA 130
- BS 6853 (Cat 1a, 1b)
- TB/T 3237
- UN ECE R118



Environmental, Health & Safety

Thermobreak® RT is manufactured to ISO 14001 environmental management standards and supports environmental initiatives and directives.

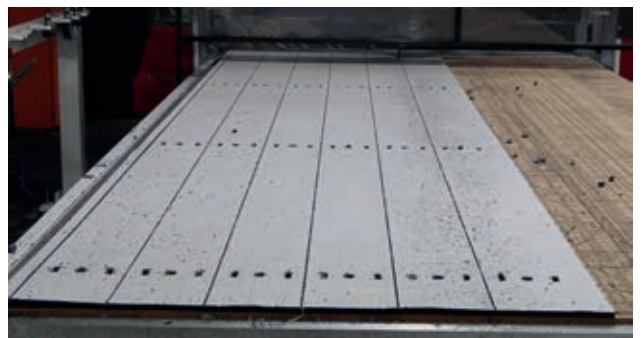
- Compliance to REACH directive
- Compliance to RoHS directive
- Zero ODP (Montreal Protocol)
- Zero PVC, zero formaldehyde
- Resistance to mould growth
- Low GWP



Easy to Fabricate & Install

Thermobreak® RT has been specifically designed with ease of fabrication and installation in mind.

- Optional factory applied pressure sensitive adhesive backing
- Easy to cut with conventional equipment
- Fibre free
- No surface sealing (encapsulation) required



BODY INSULATION



DUCT INSULATION



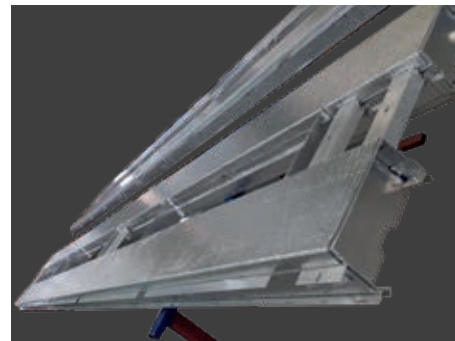
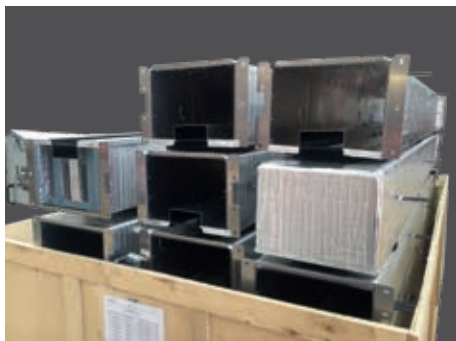
TRAIN AC UNITS



Application Areas

Major applications include duct insulation, AC insulation and body/wall insulation.

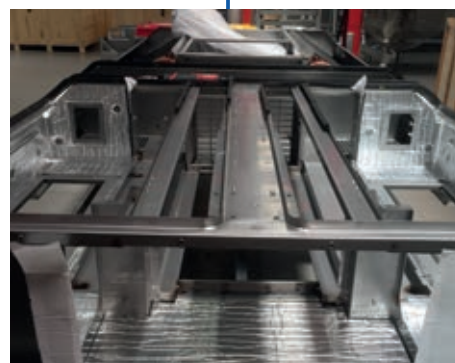
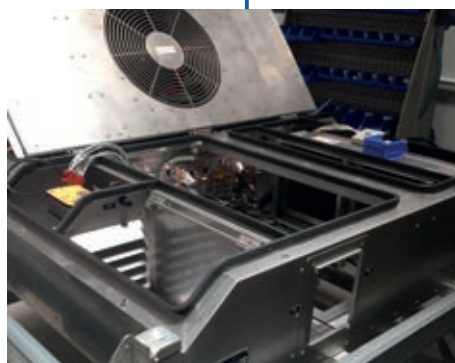
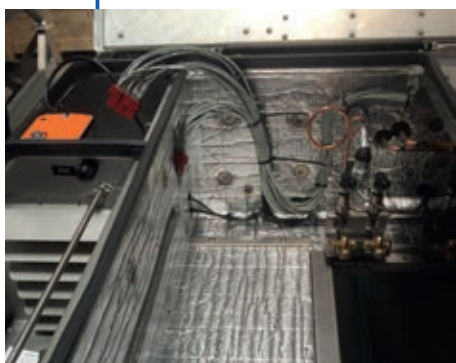
AC Ducts



Body Insulation



AC Units



Technical Data - Thermobreak® RT

Material: Physically (irradiation) crosslinked partially open cell polyolefin foam with factory applied reinforced aluminium foil and optional pressure sensitive adhesive backing

Density (foam core only):	25kg/m ³	1.5 lb / ft ³
Thermal Conductivity:	0.032 W/m/°K (@ 23° C)	0.22 BTU.in /h.ft ² @ 73° F
Water Vapour Permeability (ASTM E96):	2.3 x 10 ⁻¹⁵ kg/Pa.s.m (0.0084 mg.m/N.h)	0.002 perm-inch
Water Vapour Permeance:	1.95 x 10 ⁻⁴ g/MN.s	0.0034 perms (½" thickness)
Permeability Resistance Factor:	μ > 80,000	
Water Absorption by Volume (ASTM C1763, Procedure B, 24h):	<0.2% v/v	<0.2% v/v
Resistance to Fungi (ASTM G21):	Zero Growth	
Ozone Resistance:	Excellent	
UV Resistance:	Excellent	
Operating Temperature:	-80° C ~ +100° C (no adhesive)	-112° F ~ 212° F (no adhesive)

Fire & Smoke Behaviour

Thermobreak® RT

	Test Method	Description	Result	Tested thickness
Europe (EN)	ISO 5658 Part 2	Flame Spread	COMPLIES (EN 45545-2 R1, HL3 RATING) COMPLIES (UN ECE R118)	5 ~ 25 mm [1/4" - 1"]
	ISO 5659 Part 2	Smoke Toxicity	COMPLIES (EN 45545-2 R1, HL3 RATING)	
		Smoke Density	COMPLIES (EN 45545-2 R1, HL3 RATING)	
	ISO 5660 Part 1	Heat Release Rate	COMPLIES (EN 45545-2 R1, HL3 RATING)	
USA/Canada	ASTM E162	Surface Flammability	COMPLIES (PRIIA/NFPA 130)	5 ~ 25 mm [1/4" - 1"]
	ASTM E662	Smoke Density	COMPLIES (PRIIA/NFPA 130)	
	ASTM E1354	Heat Release Rate	COMPLIES (PRIIA)	
	BSS 7239 (Boeing)	Smoke Toxicity	COMPLIES (PRIIA)	
UK	BS 476 Parts 6 & 7	Class 0	COMPLIES (BS 6853, CLASS Ib RATING)	25 mm [1"]
	BS 6853 Annex B2	Smoke Toxicity	COMPLIES (BS 6853, CLASS Ib RATING)	
	BS 6853 Annex D8.4	Smoke Density	COMPLIES (BS 6853, CLASS Ib RATING)	
China	GB/T 2406.2	Oxygen Index	COMPLIES (TB/T 3237-2010)	20 mm [3/4"]
	UIC 564-2-1991	Combustion Resistance	COMPLIES (TB/T 3237-2010)	
	GB/T 8323.2-2008	Smoke Density	COMPLIES (TB/T 3237-2010)	
	TB/T 3237-2010 Part 4.4	Smoke Toxicity	COMPLIES (TB/T 3237-2010)	

Thermobreak® RT-LSH

	Test Method	Description	Result	Tested thickness
UK	BS 476 Parts 6 & 7	Class 0	COMPLIES (BS 6853, CLASS Ia RATING)	25 mm [1"]
	BS 6853 Annex B2	Smoke Toxicity	COMPLIES (BS 6853, CLASS Ia RATING)	
	BS 6853 Annex D8.4	Smoke Density	COMPLIES (BS 6853, CLASS Ia RATING)	

THERMOBREAK[®] AcoustiPlus

A New Generation Acoustic & Thermal Liner

Thermobreak[®] AcoustiPlus is a new generation lightweight acoustic material made from physically crosslinked polyolefin foam with **partially open cell** structure to enhance sound absorption, whilst maintaining the advantages of closed cell structure.

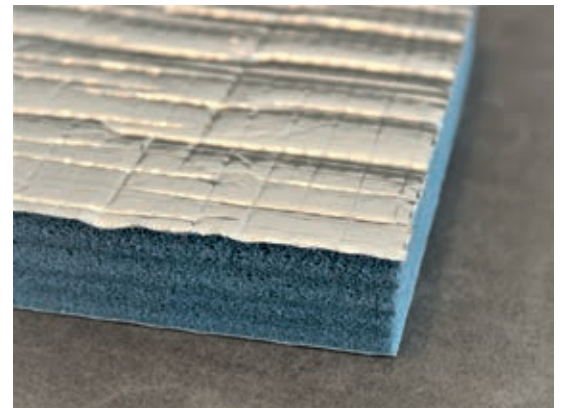
Thermobreak[®] AcoustiPlus is supplied with reinforced aluminium foil and is available with a factory applied pressure sensitive adhesive backing.



Compliance to International Fire & Smoke Standards

Thermobreak[®] AcoustiPlus complies with major international fire and smoke standards

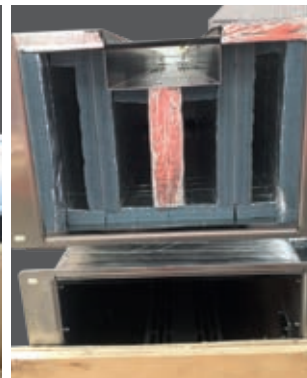
- EN 45545-2 (HL3)
- NFPA 130
- DIN 5510-2
- BS 476 Class 0



Engineered To Perform

Thermobreak[®] AcoustiPlus is ideal for wall and body insulation, duct insulation, AC insulation, floor insulation, as well as areas where noise absorption is required to enhance passenger comfort.

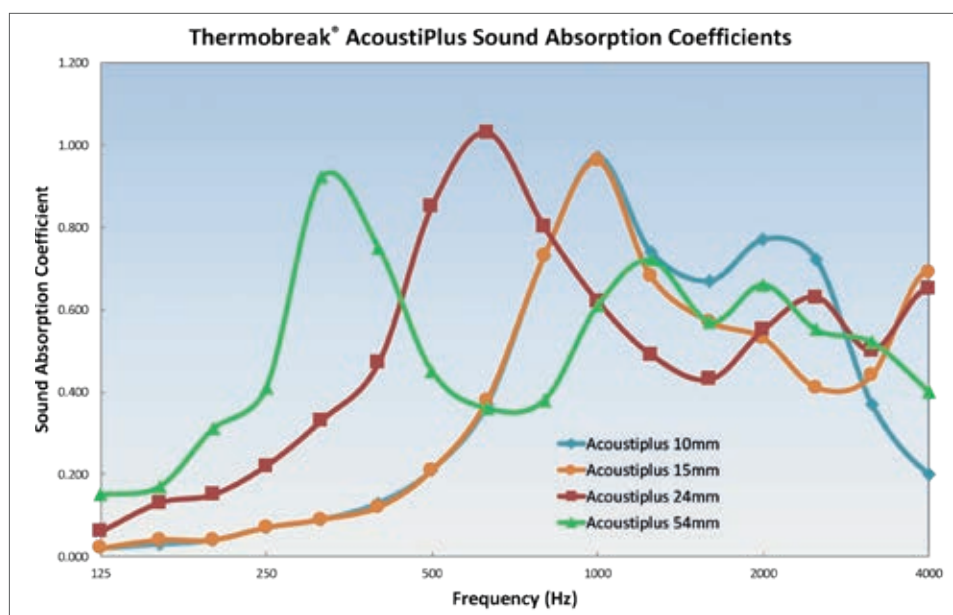
- Fibre free
- Lightweight and flexible
- Low water absorption
- Anti-microbial to ASTM G21
- Optional adhesive backing
- Easy to fabricate



Technical Data - Thermobreak® Acoustiplus

Material: Physically (irradiation) crosslinked partially open cell polyolefin foam with factory applied reinforced aluminium foil and optional pressure sensitive adhesive backing

Density (foam core only):	25kg/m³		1.5 lb / ft³
Thermal Conductivity:	0.035 W/m/°K (@ 23° C)		0.25 BTU.in /h.ft² @ 73° F
Resistance to Fungi (ASTM G21):	Zero Growth		Zero Growth
Noise Reduction Coefficient (ISO 354):	Thickness	SAC (aw)	NRC
	10 mm / 3/8”	0.30 (MH)	0.50
	15 mm / 5/8”	0.30 (MH)	0.45
	24 mm / 2”	0.55 (M)	0.55
	54 mm / 2”	0.55	0.55
	Other thicknesses available on request.		
Water Absorption by Volume (ASTM C1763, Procedure B, 24h):	<0.3% v/v		<0.3% v/v
Operating Temperature Range:	-80° C ~ +100° C (no adhesive)		-112° F ~ 212° F (no adhesive)
Maximum Recommended Design Air Velocity:	20.3 m/s		4000 fpm



Fire & Smoke Behaviour

	Test Method	Description	Result	Tested thickness
Europe	ISO 5658 Part 2	Flame Spread	COMPLIES (EN 45545-2 R1, HL3 RATING)	5 ~ 25 mm [1/4" - 1"]
	ISO 5659 Part 2	Smoke Toxicity	COMPLIES (EN 45545-2 R1, HL3 RATING)	
		Smoke Density	COMPLIES (EN 45545-2 R1, HL3 RATING)	
	ISO 5660 Part 1	Heat Release Rate	COMPLIES (EN 45545-2 R1, HL3 RATING)	
USA/Canada	ASTM E162	Surface Flammability	COMPLIES (PRIIA/NFPA 130)	25 mm [1"]
	ASTM E662	Smoke Density	COMPLIES (PRIIA/NFPA 130)	
	ASTM E1354	Heat Release Rate	COMPLIES (PRIIA)	
	BSS 7239 (Boeing)	Smoke Toxicity	COMPLIES (PRIIA)	
UK	BS 476 Parts 6 & 7	Class 0	Class 0	25 mm [1"]
China	DIN 54837	Burning Test	COMPLIES (DIN 5510:2) Classification S4, SR2, ST2"	"15 mm [9/16"]
	DIN EN ISO 5659-2: 2013	Smoke Toxicity	COMPLIES (DIN 5510:2) Classification S4, SR2, ST2"	

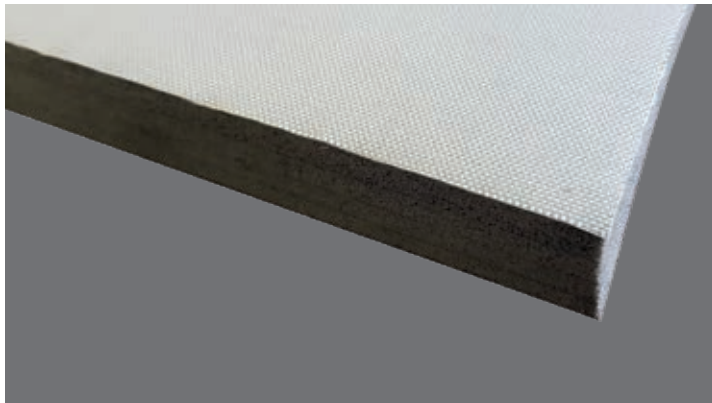
THERMOBREAK[®] RT-N

Insulation for Rail & Transport Applications

Non-Conductive Thermal Insulation for Electric Vehicles

Thermobreak[®] RT-N is an innovative new insulation designed specifically for vehicles requiring electrically non-conductive materials.

The new scrim material offers great strength and puncture resistance whilst also being non-conductive making it ideal for use in modern electric vehicles. Underneath this new scrim is the same high quality physically crosslinked polyolefin foam as used in Thermobreak RT with excellent permeability and thermal conductivity performance.



Technical Data - RT-N

Material: Physically crosslinked closed cell polyolefin foam with factory applied reinforced facing (electrically non-conductive) and pressure sensitive adhesive backing.

Density (foam core only):	25kg/m ³	1.5 lb / ft ³
Thermal Conductivity (ASTM C518):	0.032 W/m/°K (@ 23° C)	0.249 BTU.in /h.ft ² @ 73° F
Resistance to Fungi (ASTM G21):	Zero Growth	
Water Absorption by Volume: (ASTM C1763, Procedure B, 24h)	<0.2% v/v	<0.2%v/v
Operating Temperature Range:	-80° C ~ +100° C (no adhesive)	-112° F ~ 212° F (no adhesive)
UV Resistance:	Excellent	
Ozone Resistance:	Excellent	
Water Vapour Permeability (ASTM E96):	5.7 x 10 ⁻¹⁴ kg/Pa.s.m (0.21 mg.m/N.h)	0.039 perm-inch

Fire & Smoke Behaviour

Test Method	Description	Result
ISO 5658 Part 2	Flame Spread	COMPLIES (EN 45545-2 R1, HL1 RATING) COMPLIES (UN ECE R118)
ISO 5659 Part 2	Smoke Toxicity	COMPLIES (EN 45545-2 R1, HL1 RATING)
	Smoke Density	COMPLIES (EN 45545-2 R1, HL1 RATING)
ISO 5660 Part 1	Heat Release Rate	COMPLIES (EN 45545-2 R1, HL1 RATING)

Global Support & Distribution

Technical Support

Thermobreak® is backed by a series of software programs to enable proper thickness selection and assist designers with heat flow scenarios and temperature profiling:

- **ThermaCalc™** – thickness selection to avoid condensation and maximise energy savings
- **Thermal Conductivity V time** – software that compares thermal performance of Thermobreak® and competitor insulation materials over time given certain design parameters such as vapour permeability



Global Presence

Thermobreak® is distributed globally through a series of authorised distributors. This increasing network of specialised companies ensure that the material is readily available for projects. For your nearest distributor please consult our webpage.

The extensive distribution network is supported by regional Sekisui offices.



THERMOBREAK[®]

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SEKISUI

FOAM
INTERNATIONAL
Global Foam Solutions

ASIA PACIFIC REGION

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