



RAVATHERM™
XPS

COMFORT AND RELIABILITY ON THE ROAD

+ Industry Solutions – The benefits of choosing RAVATHERM™ XPS insulation for your caravans and motorhomes





An informed choice

Why materials make a difference

Buying a motorhome or caravan is a major investment decision for any family. Whether you are choosing a vehicle for the annual holiday getaway, the long-haul trip of a lifetime or even to live in, quality, comfort and reliability all count. It's easy to fall in love with glitzy interiors and fashionable styling – but attention to the details hiding beneath the glossy exterior could make the difference between a cosy night in and a complete washout during yet another wet summer. Of course, making the right choice is easier when you've the chance to brush up on your knowledge. Why not get to know a little more about one of the core materials used by the world's leading motorhome and caravan manufacturers and beat the salesman at his own game?

Introducing the composite structure

Manufacturers of motorhomes and caravans, build walls, floors and ceilings of their vehicles using a type of construction known as 'composite construction'. They assemble so-called 'composite components' to create the overall structure – these panels generally consist of a rigid foam core (also known as the core layer material) and two outer facing materials.

Since these panels act as structural elements in motorhomes and caravans – and need to support a wide variety of loads as well as operate for longtime and in all weathers – the quality of the materials used to produce them is fundamental to the overall performance of the vehicle.

RAVATHERM™ XPS blue or grey polystyrene foam, produced by Ravago Building Solutions, has many benefits which make it the core material of choice for many motorhome and caravan manufacturers.

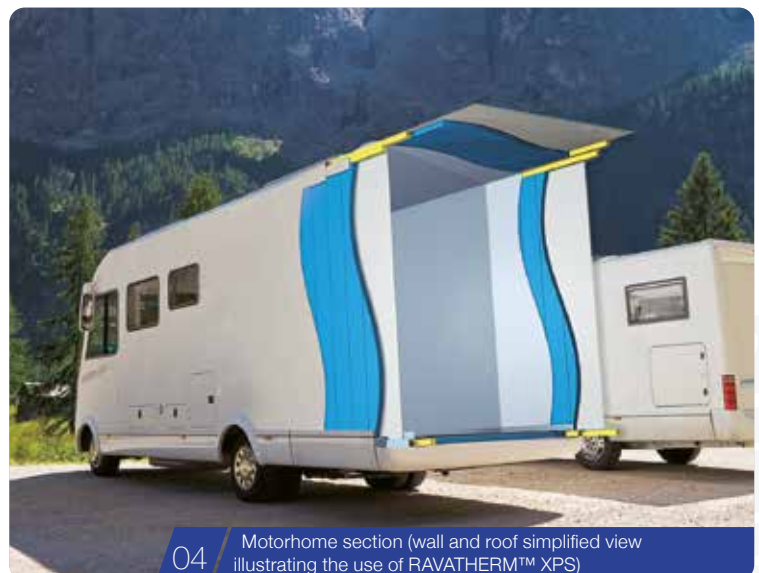
The blue and the grey XPS foam panels have a closed cell structure which gives them excellent insulating properties, long-term resistance against moisture and high mechanical strength.

Let's have a look at how RAVATHERM™ XPS matches up against the specific demands of the leaders in motorhome and caravan manufacturing.

Additionally, the properties of the core material within the composite panels have specific impacts on insulation performance, damp and moisture resistance body strength.



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Motorhome section (wall and roof simplified view illustrating the use of RAVATHERM™ XPS)



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Driven by performance

+ Combining comfort and energy efficiency

In the today world we all know the importance of energy efficiency; and we know this is good for the environment as well for our wallet.

In building, Architects understand that effective insulation helps keep people warm in winter and cooler in summer; and that the best materials must perform longtime, ideally over the life time of a construction.

In industry, forward-thinking manufacturers of motorhomes and caravans can also embrace this trend and turn to products such as RAVATHERM™ XPS to help insulate vehicles and make life on board more comfortable, for the long-term.



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So what does this mean for you?

Simply, by choosing a vehicle that uses RAVATHERM™ XPS as a core material you could reduce energy consumption and save money, and you may not need to turn up the heating to full in winter, or to blast out air-conditioning all summer.

To give you an example, it's not just motorhomes and caravans that benefit from the insulating properties of RAVATHERM™ XPS. Imagine how tough it must be to transport frozen food over long distances. Insulating materials for refrigerated trucks carrying perishable goods undergo the most stringent tests in terms of performance and longevity. RAVATHERM™ XPS meets the toughest requirements of such high level standards – so imagine what it could do for your caravan or motorhome!

Getting behind the scene

When you will choose your next vehicle, new or used, it may help you to know more on how insulation material are evaluated when it comes to their thermal performance and ability to insulate.

Thermal transmittance, so called U-value, measures the heat flow through a square metre of material. There is a heat flow as soon as we have a difference of temperature between the two sides of the material. The lower the heat flow the lower the U-value.

Structures with a low U-value deliver better insulating performance because they lower the rate of heat loss.

For example, a 3cm thick RAVATHERM™ XPS panel will show the same U-value as a 17cm thick plywood panel.

Comparative testing done in accordance with EN 1647 standard, shows that overall U-value of vehicle constructed with RAVATHERM™ XPS core, is about 10% lower than the one of vehicle built with generic materials.

Choosing RAVATHERM™ XPS foam, is the peace of mind of having selected the market best-performing insulation for your motorhome or caravan.



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08 Thermal insulation boards
RAVATHERM™ XPS and RAVATHERM™ XPS X



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Protecting your investment with RAVATHERM™ XPS

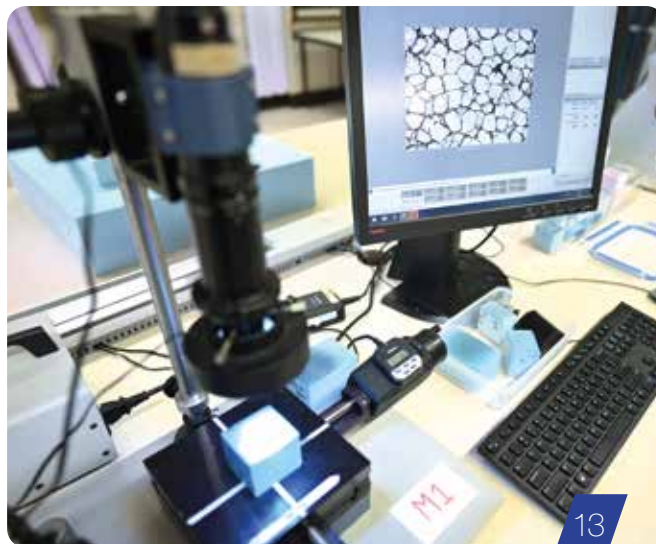
Where science plays a part...

Moisture should be your enemy in a motorhome or caravan. No-one wants to see – or smell – mould on walls, floor or ceilings. Keeping moisture out is vital to protect the long-term performance and comfort of your precious investment.

Water vapours released by showers, cooking, drying laundry, people and pets breathing, can all increase moisture level in the air. Without regular ventilation, this moisture can condense on the surfaces of structural components causing odour and mould or – worse – diffuse in the form of water vapour within the composite panels and condense there, thus affecting their performance.

Insulation materials containing moisture will not perform as well as dry materials, thus rising heating or air-conditioning running costs of your vehicle. Be aware that wet insulation material with 10% moisture can lose up to 45% of its insulation performance; indeed, trapped moisture conducts heat 25 times more than dry air.

These information should help you to make the right choice when you will chose the next motor-home or caravan to buy.

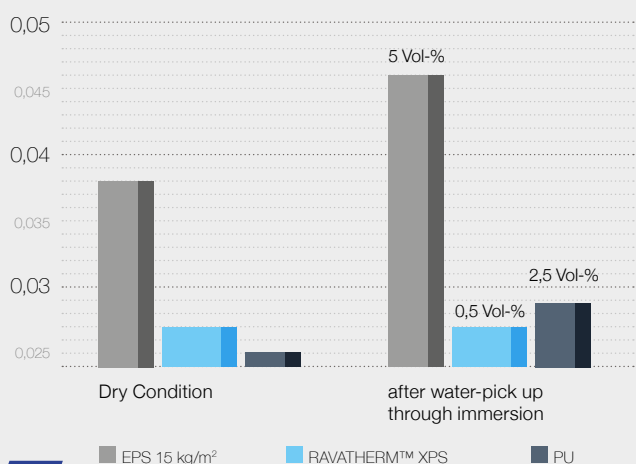


But why is it like this? Because of the cellular structure of RAVATHERM™ XPS

A glance at the bar chart at the right side is self explanatory. It compares the thermal performance of core materials typically used in the leisure vehicle industry before and after exposure to water (Water pick up done according to EN 12087).

RAVATHERM™ XPS foam's closed cell structure allows very marginal water up take, and thus, excellent thermal performance long term even when exposed to humid conditions.

Pay attention, because any additional dead load related to water pick up, would also affect fuel consumption of the vehicle; indeed the higher the weight to shuffle, the higher the fuel consumption is.



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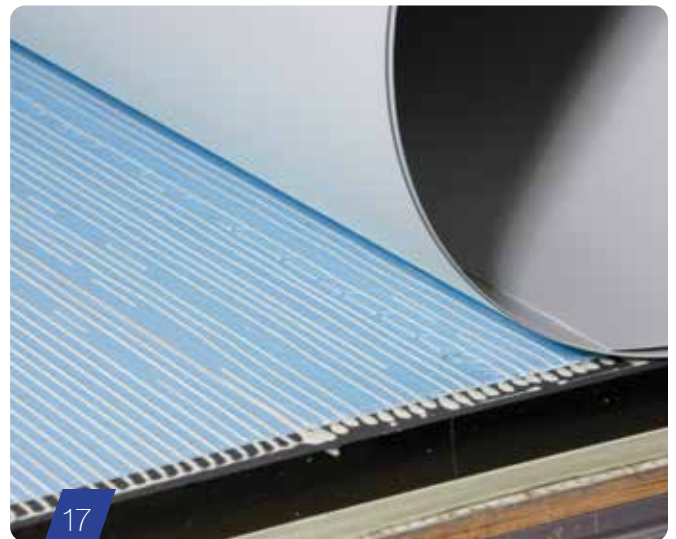
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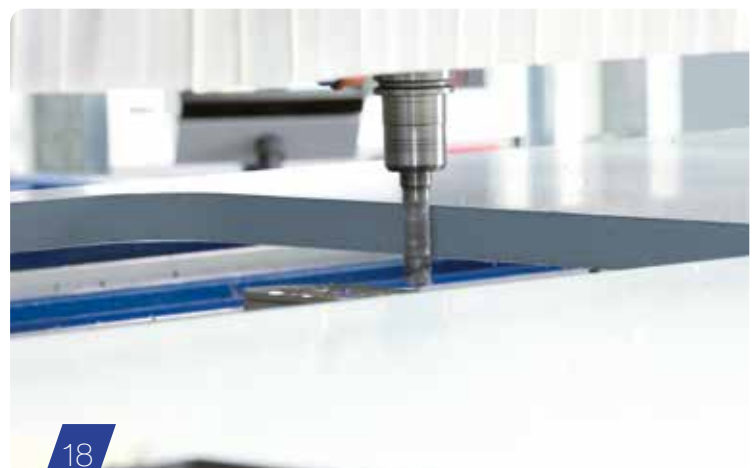


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- 14 Prepared sidewall panel for vehicle body construction.
- 15 Part of our production facility in Rheinmünster.
- 16 The structural adhesive is evenly applied to the surface of the core material, forming the basis for a durable bond between the individual layers.
- 17 The outer facing layer is precisely positioned and aligned on the prepared sandwich assembly to ensure a uniform and stable panel structure.
- 18 After curing, cut-outs for windows, doors, and service installations are precision-machined into the finished panel using CNC technology.



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Quality where it matters

Strength for the miles ahead



There's no better feeling than driving down the road with the wind in the hair and a holiday ahead of you – but that great feeling won't last long if the structure of your motorhome or caravan starts to show signs of weakness.

Motorhomes and caravans are designed and build to withstand high stresses from wind, induced vibrations from road conditions and cornering.

The composite panels that make the structure are there to take their part of the efforts and RAVATHERM™ XPS's resilience and strength make it the ideal choice for the core layer material of composite panels, bringing positive effects to the overall structure's stability, and giving you peace of mind and comfort when driving.

RAVATHERM™ XPS foam has outstanding mechanical properties such as:

- + excellent bending stiffness
- + high shear strength
- + excellent tensile strength
- + high compressive strength



Property	Unit
Density	kg/m ³
Declared thermal conductivity (λ_D)	W/m·K
Compressive stress or compressive strength at 10% deformation ¹	kPa
Modulus of elasticity ¹	MPa
Water vapour diffusion resistance factor	–
Water absorption after long-term immersion	%
Operating temperature	°C

The scientific corner!

RAVATHERM™ XPS foams technical profile

The ones who really like to get into the details will appreciate a technical overview of everything you need to know about RAVATHERM™'s performance. Please take a look at the table – and happy journey!

Standard	CE-Code	RAVATHERM™ XPS LB (GV)	RAVATHERM™ XPS X PLUS LB CT (GV)	RAVATHERM™ XPS X PLUS RTM (GV)	RAVATHERM™ XPS X PLUS HD300 BF
EN 1602	–	33	35	40	45
EN 13164	λ_D	0.033 $\leq$ 60 mm 0.034 60.1-100 mm 0.035 $>$ 100 mm	0.029 $\leq$ 100mm 0,030 $>$ 100mm	0.029	0.029
EN 826	CS(10Y)	300	300	400	700
EN 826	–	10 $<$ 30 mm 12 30-79 mm 15 $\geq$ 80 mm	12 $<$ 30 mm 15 30-79 mm 20 $\geq$ 80 mm	17 $<$ 30 mm 22 30-79 mm 28 $\geq$ 80 mm	35 $<$ 80 mm 38 80-120 mm
EN 12086	MU	150	150	150	150
EN 12087	WL(T)	1.5	1.5	1.5	0.7
–	–	-50/+75	-50/+75	-50/+75	-50/+75

¹⁾ 1 N/mm² = 10³ kPa = 1MPa



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