Basotect®

Ideal sound absorption and thermal insulation for the transportation industry

BASF
We create chemistry

Basotect®

UNIQUE VERSATILE STRUCTURED.

Basotect® – the melamine resin foam for sound absorption and thermal insulation in the transportation industry

THE FOAM
for unlimited application possibilities

Traffic noise is a constant companion for all travelers, whether they travel by car, train or air. Therefore, demands on noise protection in the transportation sector are constantly increasing. Driving comfort and safety are also becoming increasingly important. But only a few materials can meet the demands and legal standards for traffic and transportation while simultaneously being suitable for effective processing. Basotect® is the material of choice here – as a versatile and efficient foam for sound absorption and thermal insulation:

- Because of its excellent sound absorption, Basotect® contributes to achieving the rising noise protection standards.
- Owing to its low weight, the foam reduces both fuel consumption and CO_2 emissions.
- Due to its high thermal stability, Basotect® can be easily employed in applications close to the engine.
- Its excellent flame retardance enables versatile applications where strict fire safety regulations are in force.

➔ **The ideal property profile for functional integration with just one material!**

Basotect® is a foam made of melamine resin. Its typical characteristic is the fine, open-cell structure: It is simultaneously flexible and dimensionally stable. This open-cell structure ensures that noise is absorbed almost completely. But Basotect® can do even more: it is light and offers high fire safety, excellent thermal stability and good thermal insulation. Therefore, Basotect® can be used in numerous applications in the transportation sector – from cars, buses, trucks and trains through to ships and airplanes.

Basotect® is supplied to processors in blocks in the standard size of 2500 x 1250 x 500 mm. The processors manufacture shaped parts, for example, by cutting, stamping and pressing.

Tailor-made product range

Basotect® G+
is the ideal material for transportation applications owing to its excellent sound absorption and thermal insulation properties.

Basotect® TG
is suitable particularly for applications that can be thermoformed – without additional impregnation steps.

Basotect® UF+
is notable for higher flexibility, improved fire safety and lower weight as well as excellent processability.

Basotect® UL
features ultralow weight and is particularly suitable for aerospace.

ALL ADVANTAGES AT A GLANCE

EXCELLENT
SOUND ABSORPTION

LOW
WEIGHT

HIGH
THERMAL STABILITY

EXCELLENT
FIRE SAFETY

GOOD
THERMAL INSULATION

SIMPLE
PROCESSABILITY/ THERMOFORMING

EXCELLENT
CHEMICAL RESISTANCE

Excellent sound absorption: The open-cell structure of Basotect® guarantees that sound waves are not reflected as an echo but can penetrate unhindered into the cell structure. The sound energy is dissipated in the cells.

Low weight: The open-cell foam structure of Basotect® contributes to its low density of just 9 g/l. The particularly lightweight Basotect® UL is even 30 % lighter.

High thermal stability: Basotect® retains its properties over a wide temperature range. It remains flexible at -200 °C and is even suitable for application temperatures of up to 240 °C.

Excellent fire safety: Basotect® meets the most important international fire safety standards. Melamine resin has a high nitrogen content, and so a naturally high fire resistance without any additional flame retardants. Since Basotect® is a thermoset, it does not melt or drip when it comes into contact with flames.

Good thermal insulation: Basotect® has a thermal conductivity of less than 0.035 W/m·K, which means reliable thermal insulation even at high temperatures.

Simple processability/thermoforming: Because of its high flexibility and dimensional stability, Basotect® can be easily processed to various shapes. The thermoformable Basotect® TG can be pressed to three-dimensional components with a temperature of over 200 °C.

Excellent chemical resistance: Thanks to its highly cross-linked structure, Basotect® is resistant to many organic solvents.

BASOTECT® ON THE ROAD.

CAR TRUCK BUS

EXCELLENT **SOUND ABSORPTION**

LOW **WEIGHT**

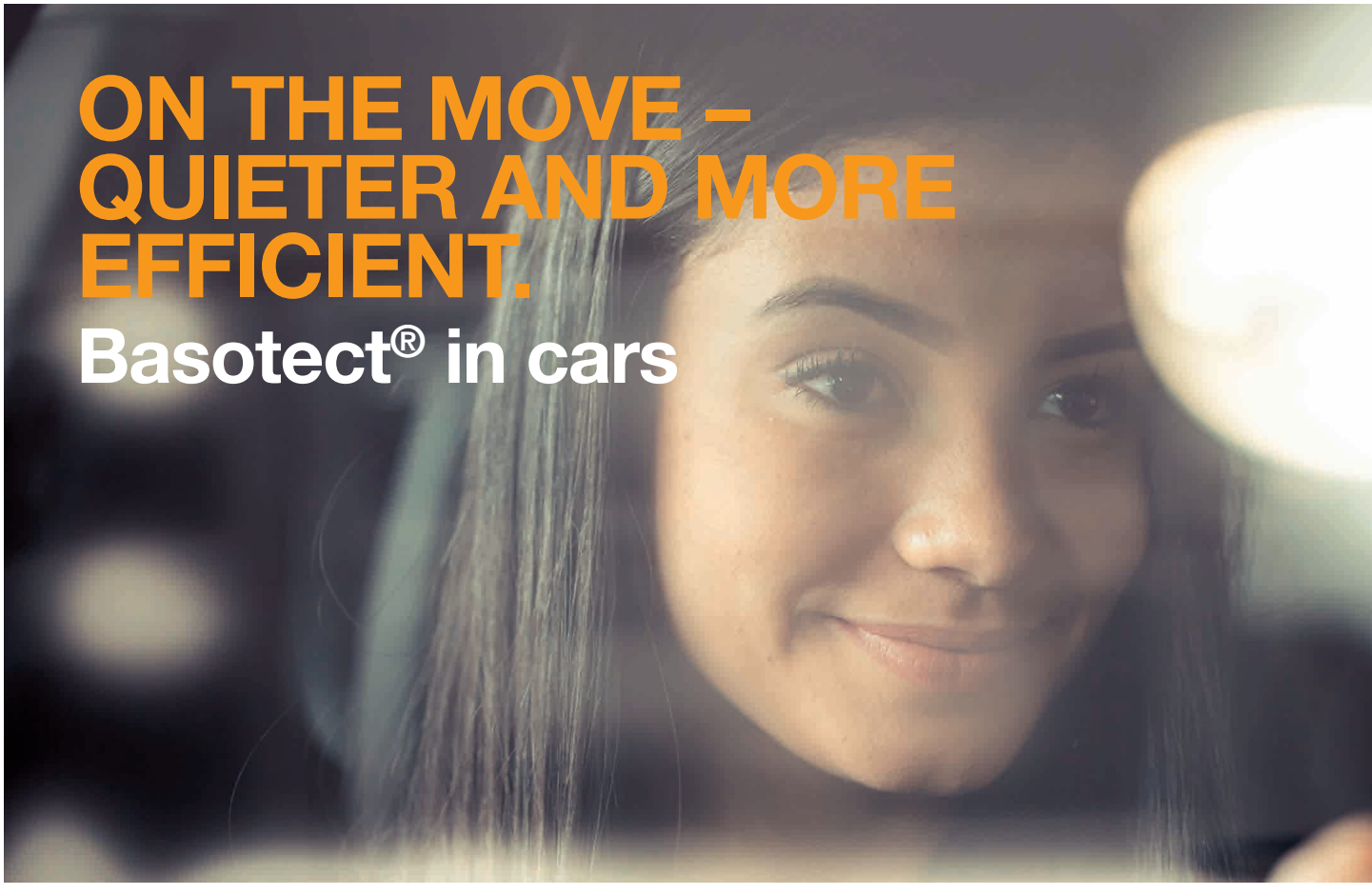
HIGH **THERMAL STABILITY**

EXCELLENT **FIRE SAFETY**

GOOD **THERMAL INSULATION**

SIMPLE **PROCESSABILITY/ THERMOFORMING**

EXCELLENT **CHEMICAL RESISTANCE**



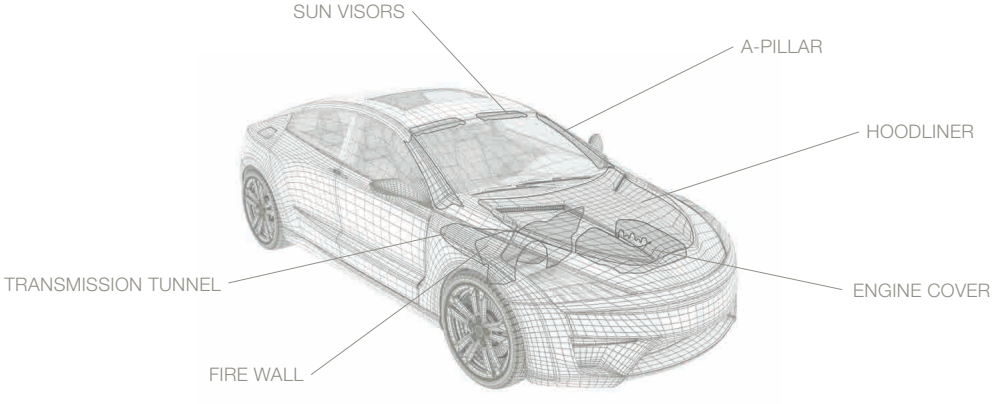
ON THE MOVE – QUIETER AND MORE EFFICIENT.

Basotect® in cars

Population growth, urbanization and globalization lead to increasing passenger and goods traffic as well as public transport. The consequences are noise and emissions, particularly in areas with a high population density. Noise exposure is an increasing risk to health, which requires measures for the reduction of noise both for passengers and for residents.

The rising standards for low fuel consumption and fewer emissions are also leading directly to more noise. This is because the automotive industry is increasingly relying on smaller, high-performance engines with direct injection in order to comply with consumption and emission standards. It is thus possible to reduce fuel consumption and weight. However, such engines produce more heat and higher noise levels. Owing to its high thermal stability, Basotect® can be mounted close to the engine block and thus achieves efficient **noise reduction** and more comfort. Due to its low weight and good thermal insulation, Basotect® can also contribute to extending the range of **electric vehicles**.

As the only thermoset foam produced especially for **thermo-forming**, Basotect® TG allows the production of sophisticated three-dimensional and customer-specific parts used for sound absorption in narrow spaces. Thus, pre-cut parts made of Basotect® TG can be pressed to three-dimensional components. By hot pressing, it is also possible to manufacture **material composites** with accurate contours consisting of a Basotect® core and non-woven, fabric, metal or plastic laminates, which are then used for noise damping or as a heat shield.



Laminated absorber elements are suitable for installation under the engine hood, such as engine hood covers, in dividing walls between engine space and passenger compartment, as well as covers in front of the bulkhead and in the transmission tunnel – wherever there are **high continuous-use temperatures**.

Basotect® G+ and Basotect® TG meet the **fire safety standards** according to FMVSS 302. In the case of the UL-94 test standard, Basotect® achieves an excellent V-0 and HF-1 classification.

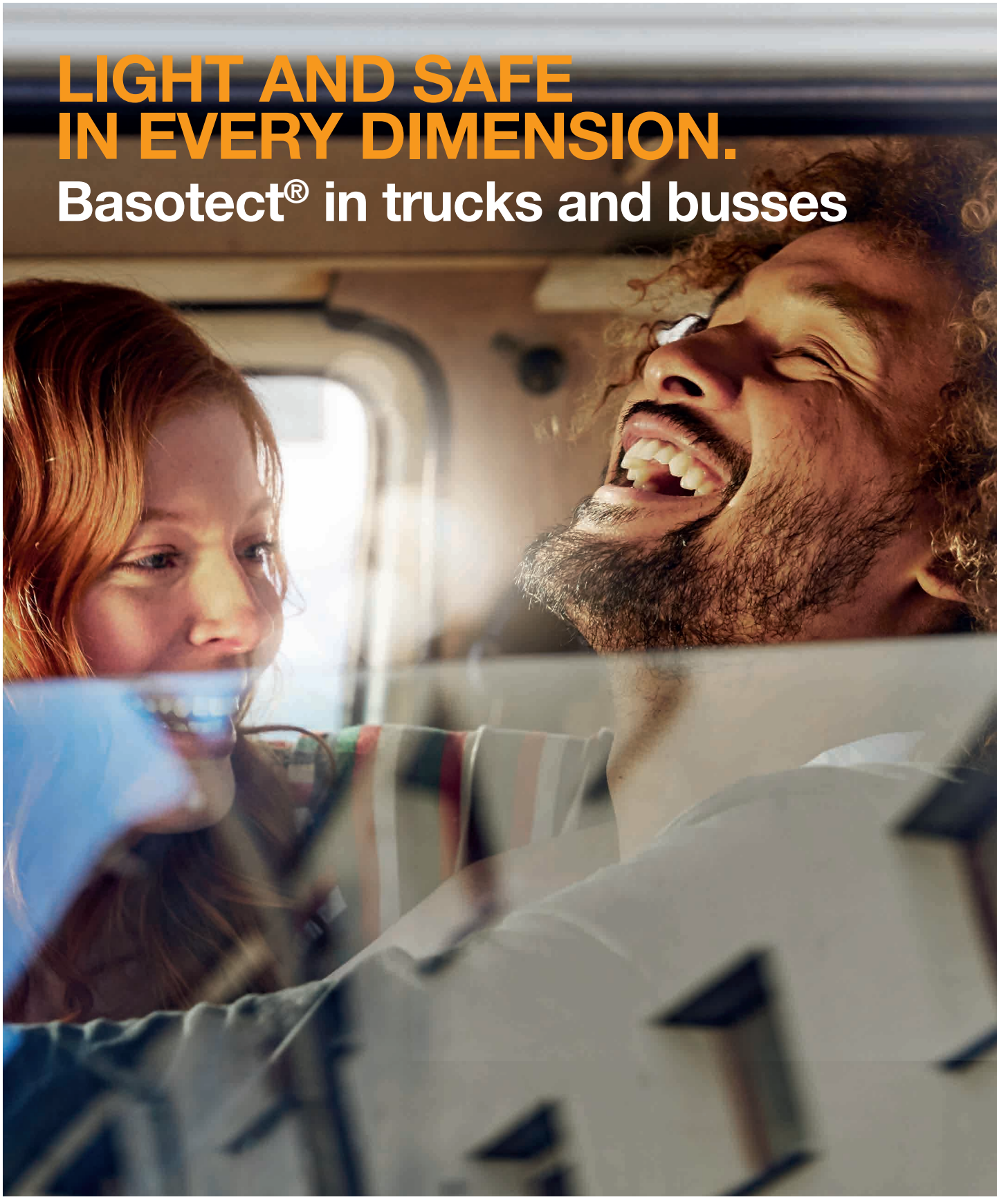
Due to the open-cell and fine structure, the sound **absorption** values of Basotect® G+ and TG in the medium and high frequency ranges are excellent. Thus, passengers can enjoy the typical engine sound – without disturbing ambient noise. The application of a fiber non-woven to the BASF foam protects the sound absorber from the effects of the engine and leads to an even better **noise damping** in all frequency ranges.

With a density of about 9 kg/m^3, Basotect® is lighter than glass wool, felt and other fiber materials that are typically used for engine hood covers. Thus, the BASF material helps to reduce vehicle weight.

Thanks to the exceptional properties of Basotect® a variety of further applications can be realized, e.g. cavity fillings for the A, B and C pillars, or engine covers with optimized pedestrian protection.

LIGHT AND SAFE IN EVERY DIMENSION.

Basotect® in trucks and busses



Modern high-tech materials are becoming increasingly important in global bus construction because of rising legal demands. Basotect® G+ is the ideal choice for insulating solutions both in the passenger and the engine areas. This leads to more comfort for passengers. It also means more quality of life for residents in towns and communities since the specialty foam complies with the demands on exterior noise as defined, for example, in the European Directive ECE R51.03: noise to the outside can be reduced by mounting the specialty foam on the inside of the throttle valves.

Weight saving also plays an important role in the continuous development of buses. In order to meet the high demands of the Euro 6 exhaust gas standard, the drive units of the new bus models have become much more sophisticated and heavier. Innovative, very light materials such as Basotect® can contribute to compensating for this negative effect on weight.

As a **flame-retardant foam**, Basotect® meets all demands of Regulation ECE R118, Annex 8, without containing flame retardant additives. Thus, the use of Basotect® increases passenger safety.

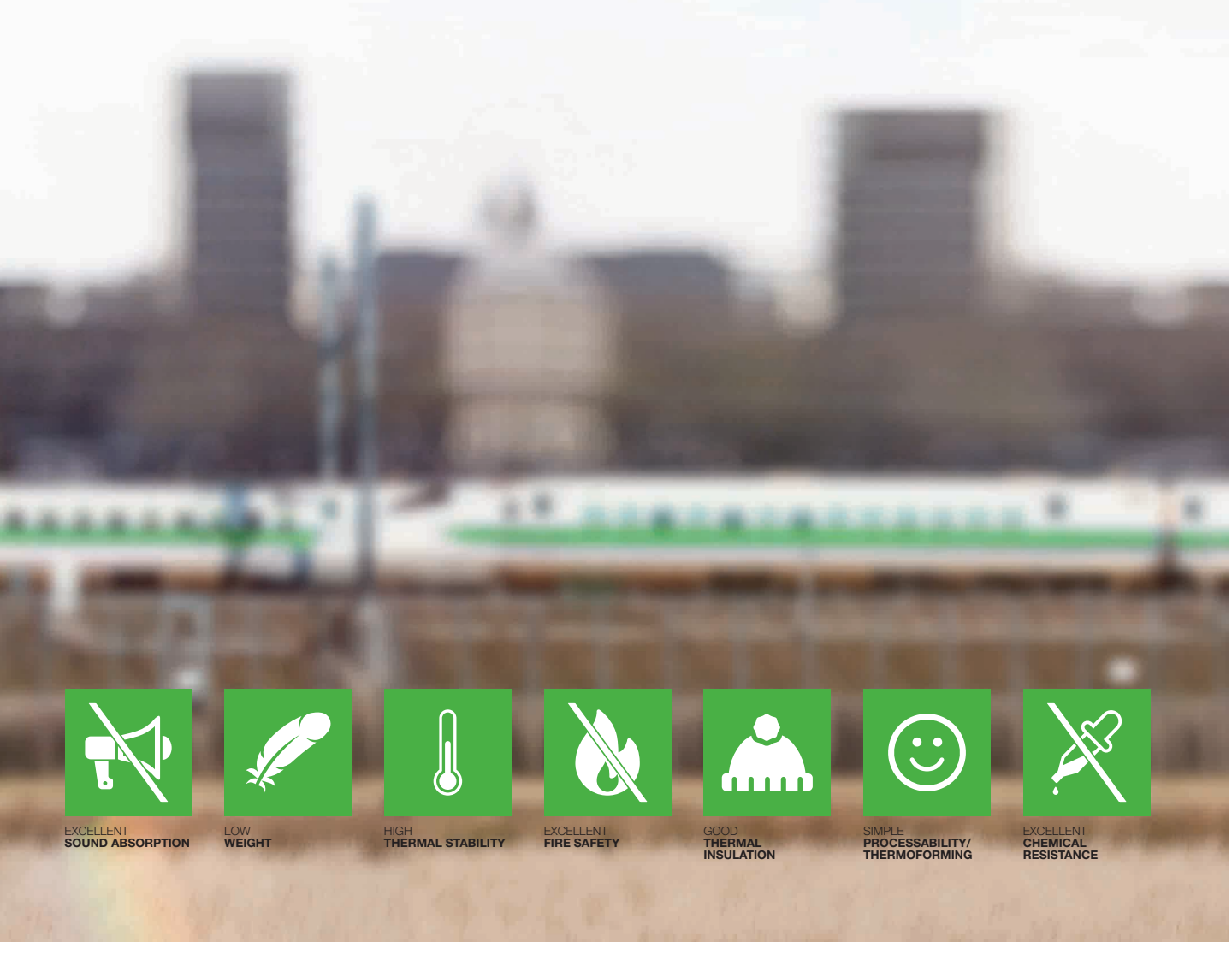
A crucial factor for the use of Basotect® near the bus engine is the very high **thermal resistance** of the foam. The various insulating components have to be shaped according to the position of the engine, the cooling system or the exhaust system. Basotect® can be manufactured to exact shapes by cutting, sawing and milling. In addition, the Basotect® parts can be equipped with self-adhesive, which further simplifies installation.

In order to achieve **very good noise damping** over the entire frequency range, Basotect® can be coated with a specific polyurethane film. The film, covered with an additional non-woven layer, protects the foam from water and oil.

Trucks and agricultural machinery also profit from the unique property profile of the BASF specialty foam. For example, Basotect® inserts reduce the noise level in driver cabins. Thus, Basotect® significantly contributes to the occupants' health.

BASOTECT® ON RAILS.

TRAIN



EXCELLENT **SOUND ABSORPTION**

LOW **WEIGHT**

HIGH **THERMAL STABILITY**

EXCELLENT **FIRE SAFETY**

GOOD **THERMAL INSULATION**

SIMPLE **PROCESSABILITY/ THERMOFORMING**

EXCELLENT **CHEMICAL RESISTANCE**

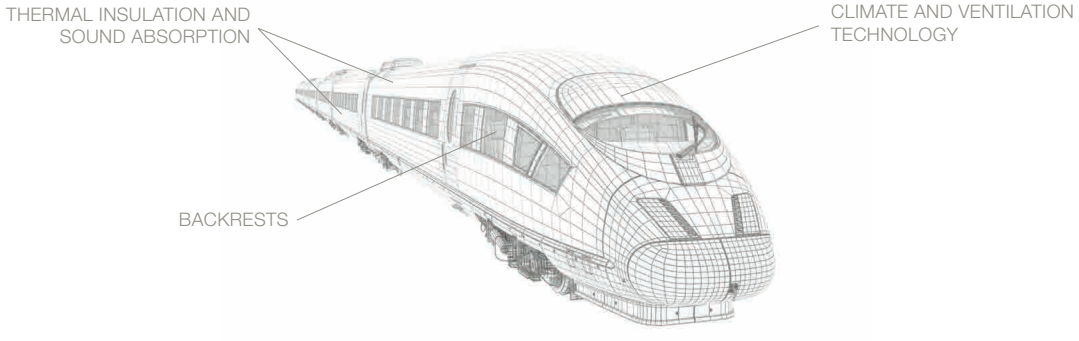
ARRIVING QUIETLY AND COMFORTABLY.

Basotect® in rail vehicles

Given a growing global population, rising traffic density and increasing urbanization, the extension of local public transport, particularly of the railway, tram, subway and local train networks, is essential. Rail vehicles have to meet high demands: On the one hand, they are to offer comfort and safety. On the other hand, they are to convey the passengers with maximum efficiency, i.e. rapidly and with low energy consumption. Energy efficiency in particular will play a crucial role in the reduction of CO_2 emissions. This means that the selection of the right insulating material will become more and more important for rail vehicles.

The **excellent acoustic properties**, the safe fire behavior and the low weight support the use of Basotect® UF+ and G+, e.g. in the insulation of the vehicles, directly on the inside of the outer walls in laminated wall and roof systems. Thus, the noise level in the vehicle interior can be reduced.

For applications in walls, roofs and air conditioning ducts, the good **thermal insulation**, as a result of the low thermal conductivity of less than 0.035 W/m·K, is a further argument for the use of Basotect® in air and ventilation systems.



The low weight of Basotect® contributes to energy savings during driving operation. The **weight reduction** in roofs and walls lowers the center of gravity of the carriage and hence increases safety and comfort when traveling around bends. This is of particular significance for narrow-gauge railways. Because of the **high flexibility** and **easy processing** of the BASF foam even complex installation can be carried out economically.

The use of Basotect® as cushion material in **backrests** of train seats combines weight savings with fire protection. The total weight of the cushioning can be reduced by up to 90 % compared to conventional foam cushioning.

Basotect® fulfills the **fire safety standards** for rail vehicles, both in Europe and in North America. Basotect® UF+ meets the high level of the new EU fire protection specification HL3 according to EN 45545. Thus Basotect® UF+ can be used in all vehicle categories from tram cars to high-speed and sleeping cars. In the US, Basotect® meets the standard NFPA 130: this specifies flame spread according to ASTM E 162 and smoke gas density according to ASTM E 662 for components in acoustic damping and thermal insulation.

BASOTECT® IN THE AIR.

AVIATION

AEROSPACE

EXCELLENT **SOUND ABSORPTION**

LOW **WEIGHT**

HIGH **THERMAL STABILITY**

EXCELLENT **FIRE SAFETY**

GOOD **THERMAL INSULATION**

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UP IN THE AIR – WITH EASE.

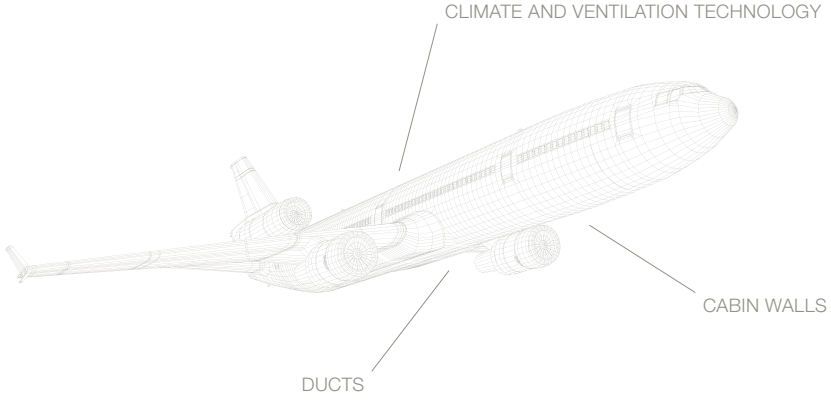
Basotect® for aerospace

BASF has especially developed Basotect® UL for the insulation of aircraft. It weighs only 6 g/m³ and is thus 30 % lighter than e.g. Basotect® G+. So it is possible to comply with increasing requirements on high noise absorption and **low weight** in aviation. At the same time, Basotect® UL fulfills the strict fire safety standards of the aviation authorities.

Because of its filigree, three-dimensional network structure of easily deformable filaments, pre-cut parts made of Basotect® UL can be more easily mounted than, for example, glass fiber cushions, with which aircraft manufacturers usually insulate their machines. The foam retains its **flexibility** both at extremely high (up to +240° C) and at very low temperatures (down to -200° C) without becoming brittle. Basotect® UL is used for **sound damping** and **thermal insulation** in cabin walls and pipes. Because it is free from fibers, the melamine resin foam is suitable for use in heating, ventilation and air conditioning technology.

Basotect® UL meets the **fire safety demands** on components for interior compartments according to the international standard FAR 25.853(a)(1)(ii) by the aviation authorities, and the specifications of the aircraft manufacturers Boeing, Airbus and Bombardier.

AVIATION AEROSPACE

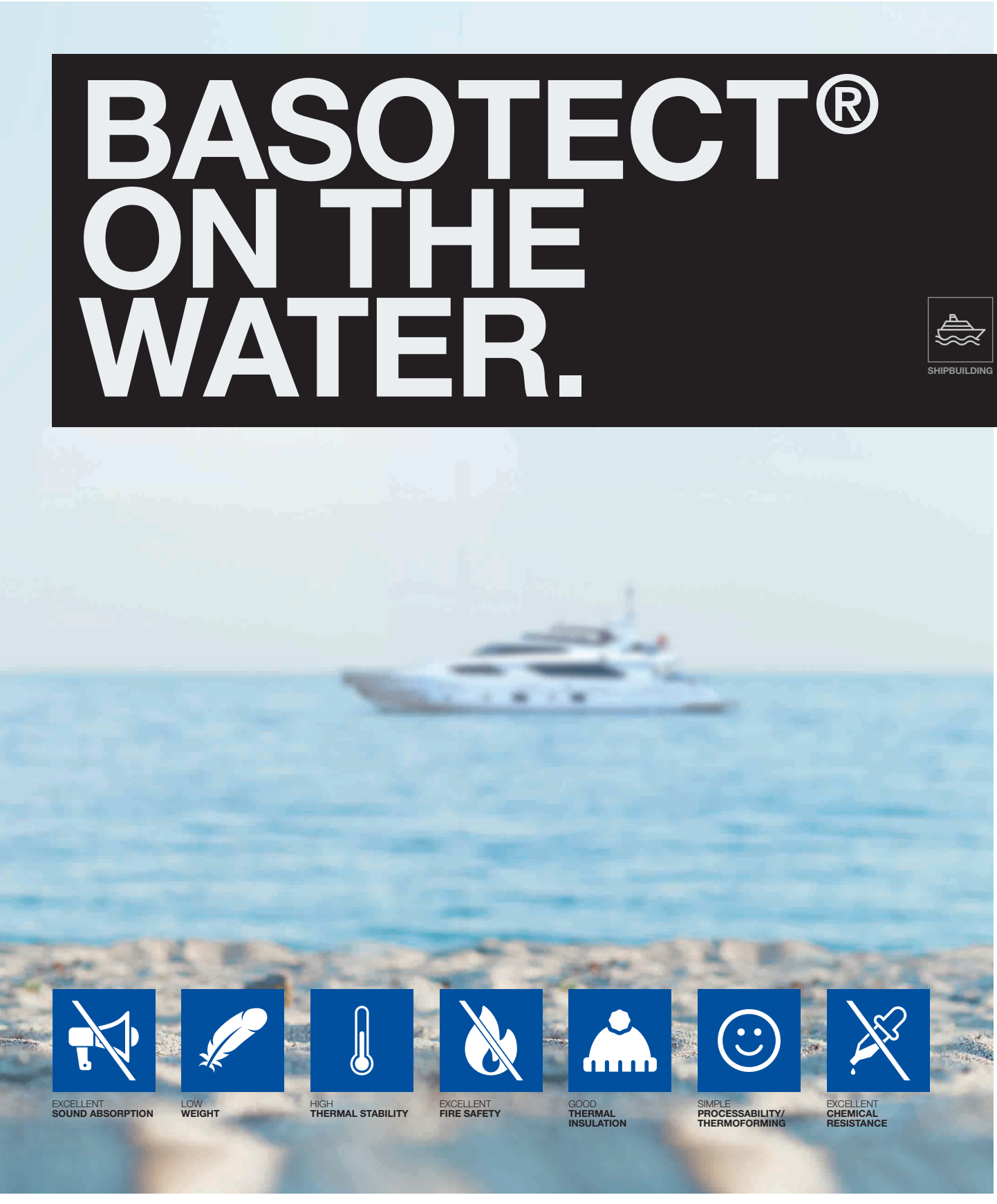


In helicopters, Basotect® UL can be mounted to noise-intensive spots and covered with a water-repellent non-woven. Thus, pilots can do without hearing protection because the noise level is lowered considerably. Since Basotect® UL weighs only 6 g/m^3, the weight of the noise damping system can additionally be reduced. This has a positive effect on the range and passenger capacity of helicopters.

The low density and excellent sound absorption of Basotect® enable system applications in space travel. Basotect® is being used, for example, in the Ariane 5 launcher of the European Space Agency ESA for the payload fairing at the rocket tip. Thus, the sensitive satellites are protected from the high acoustic pressure during lift-off. Here the material's unique combination of **flexibility and dimensional stability** pays off: The foil-coated Basotect® sheets can be mounted accurately to the cone-shaped inside of the payload fairing. The melamine resin foam retains this property even at the extreme temperature variations usual in space travel.

BASOTECT® ON THE WATER.

SHIPBUILDING



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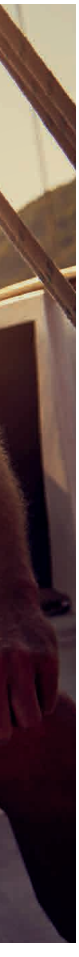
EFFICIENT AND SAFE ON BOARD.

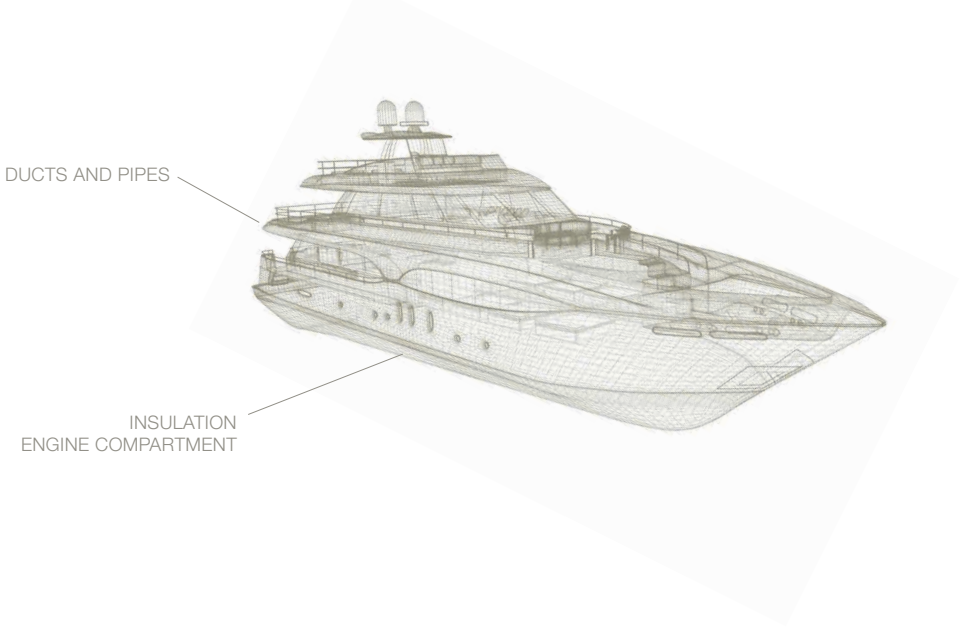
Basotect® at sea

Basotect® is used as an acoustic system solution in yachts and tanker ships. In yachts, Basotect® is especially useful for **noise damping**. It is employed on the side walls of the engine where engine noise heavily penetrates outwards. It is also possible to effectively protect the sleeping cabins from loud engine noise.

Since Basotect® is **flame retardant** and **thermally stable** up to 240 °C, it can withstand the high temperatures near the engine without difficulty. Because it is free from fibers, it does not cause any damage to the ship's engine by fine dust particles. Basotect® ensures not only pleasant and quiet travelling conditions, but also greater safety on board. The foam is particularly light and so has a positive effect on the driving performance of ships and yachts. Because of the overall **weight reduction** by the installation of Basotect® it is possible to lower CO_2 emissions and fuel consumption.

Basotect® exhibits excellent **cold temperature resistance** and is suitable for the insulation of cryogenic liquefied gas containers on tanker ships and around the corresponding pipe systems in the tank terminals on land. Since the temperature of cryogenic liquefied gas must be kept constantly below -162 °C, effective insulation of the pipes is necessary. Basotect® retains its **flexibility** and **thermal insulation capacity** even





at -200 °C without becoming brittle. Moreover, pipe covers made of Basotect® are more energy-efficient because they are 20 % thinner and offer 50 % better thermal insulation than conventional insulation foams. Furthermore, Basotect® can be mounted easily and cost-efficiently. In contrast to other insulation materials, it is even reusable after checking the pipe for leaks.

For further questions on the use of Basotect® in shipbuilding, please contact us – we will be happy to advise you.

BASOTE IS GLOBAL AVAILABLE.

TECHNICAL DATA

ECT®

LY

VERSATILE PROCESSING POSSIBILITIES

Machining

Basotect® is supplied in the form of foam blocks for further processing. Processors cut Basotect® in different shapes or process it by milling, sawing and stamping to form the required shapes.

Hydrophobing and oleophobing

Basotect® is an open-cell foam with highly hydrophilic and oleophilic properties. Pre-cut Basotect® parts can be rendered water-repellent by impregnating them in silicone emulsions. Fluorocarbon resins allow hydrophobing and oleophobing in one single step. It is practical to carry out the hydrophobing and oleophobing in an impregnation procedure.

Thermoforming

It is possible to produce material composites consisting of a Basotect® core and non-woven, fabric, metal or plastic laminates by thermoforming. Pre-cut Basotect® TG can be pressed to three-dimensional components at a temperature of >200 °C.

CT®

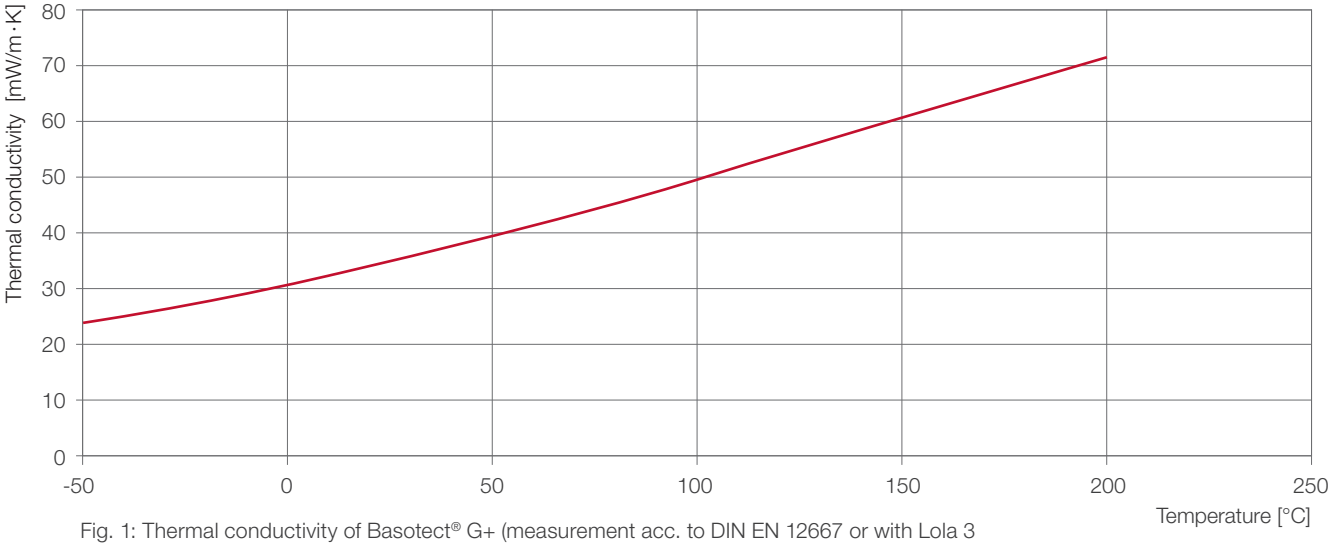


Fig. 1: Thermal conductivity of Basotect® G+ (measurement acc. to DIN EN 12667 or with Lola 3 two-plate apparatus from the Zentrum für Angewandte Energieforschung Bayern, Würzburg)

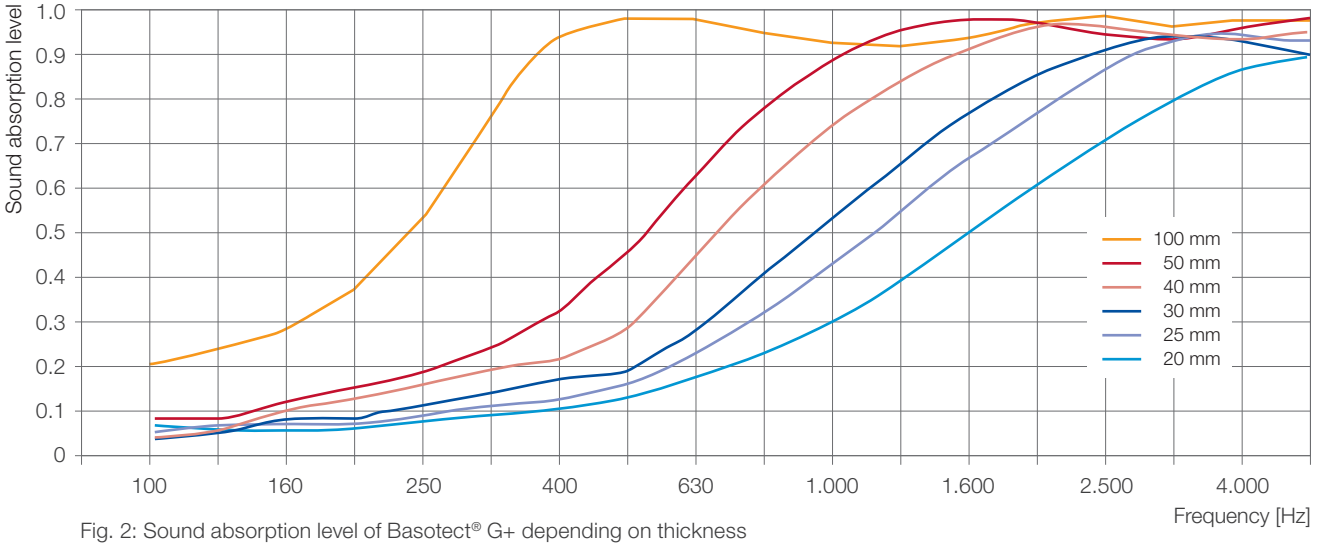


Fig. 2: Sound absorption level of Basotect® G+ depending on thickness acc. to DIN EN ISO 10534-2 (impedance tube)

Benefits	Norms	Basotect® G+	Basotect® TG	Basotect® UF+	Basotect® UL
Density [kg/m³]	EN ISO 845	9 +/- 1.5	9 +/- 2	7 +/- 3	6 +/- 2
Average compression hardness [kPa]	EN ISO 3386-1	>9	>5	>4	>3
Thermal conductivity [W/m·K]	DIN EN 12667	≤0.035	≤0.036	≤0.04	≤0.04
Thermal resistance* [°C]	DIN EN ISO 2440	240	240	240	240
Fire behavior					
Europe	EN 45545	HL2	-	HL3	-
	ECE R-118, App. 8	passed	passed	-	-
USA	UL 94	V-0; HF-1	V-0; HF-1	V-0; HF-1	-
	FMVSS 302	passed	passed	-	-
	ASTM E 162, 662, 1354	on request	-	on request	-
International	FAR 25.853(a)(1)(ii)	-	-	-	passed

Fig. 3: The most important properties of the different Basotect® grades

** defined acc. to DIN EN ISO 3386-1 (change of initial value after heat build-up for 22 h: <50 %)*

Further information on Basotect®
can be found on the internet:
www.basotect.basf.com

Or write to us at:
basotect@basf.com

PMFSM 1801 BE

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (July 2021)