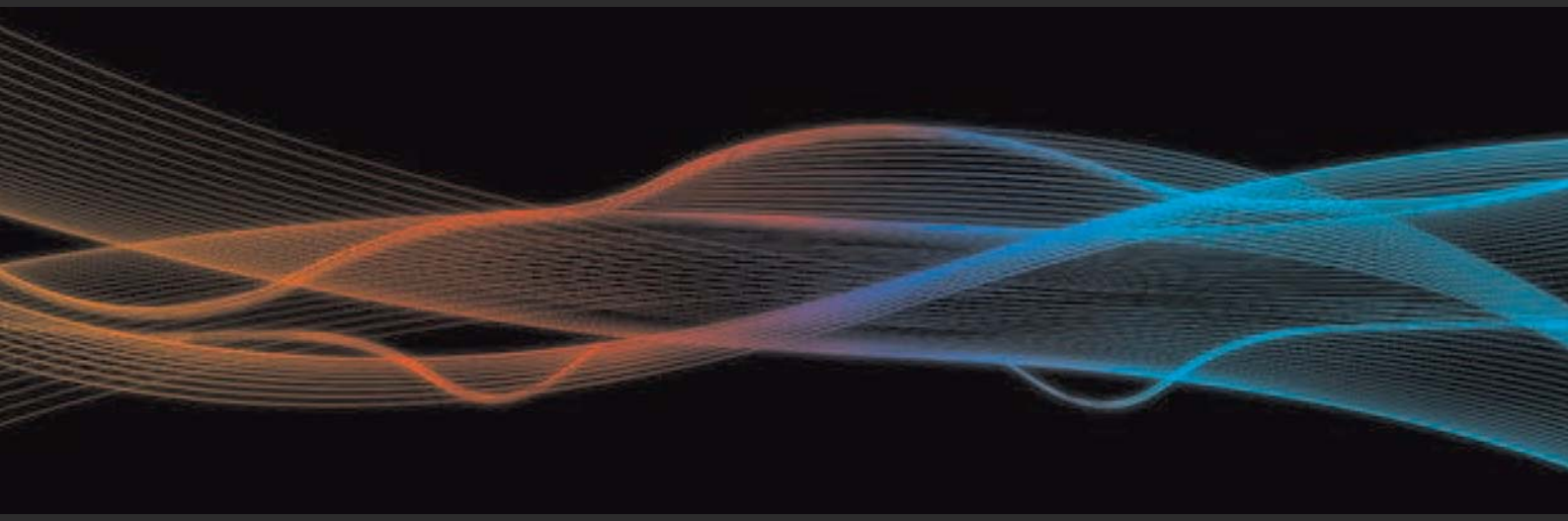
INSULATION AND SHIELDING TECHNOLOGY

FACTS





Culimeta | AUTOMOTIVE

QUALITY FOR MORE THAN 50 YEARS

Proven products for thermal, electrical and acoustic insulations

Started in 1926 in The Hague by Henri Cuylits, his son Alfons Cuylits in 1958 continued the company in Monheim as a trading business for thermal and electrical insulation hoses and gaskets made of glass fibre textiles.
In 1961, the conditions for the company to start its own production were created. Vincent and Diederik Cuylits now run the company in the third generation. Today, the group operates 10 production sites and two sales offices worldwide with a production space of more than 45 000 m² and 340 employees ensuring a wide product range within a powerful distribution network.

In Germany, Culimeta operates from two sites. With more than 70 employees at the parent plant in Bersenbrück and the site in Mölln, we master the basic technologies and processing methods which are essential for developing and manufacturing high-end glass fibre textile products.

INSULATION AND SHIELDING TECHNOLOGY

The products listed in this publication are an excerpt from our standard supply range specifically adapted for the insulation and shielding technology sector. Any customised versions and dimensions are available on request.

In this booklet we have compiled all important information on the following product groups:

- High temperature insulations
- Laminated heat protection textiles
- Heat shields, punched and formed parts
- Absorption materials for exhaust silencers

Below some areas of application where our products are used:

- Exhaust treatment systems
- Exhaust gas-carrying pipes of combustion engines
- Exhaust silencers of combustion engines
- Surface heat protection
- Machine and system engineering
- Pipe and cable insulation against heat and short-term flame impact

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RAW MATERIAL: E-GLASS

E-glass

Raw materials used, among others
E-glass yarns and threads, texturised E-glass yarns,
defined diameter 4 - 13 mμ

Application temperature

450°C, short term up to 550°C

Properties

- No health risks free of asbestos, basalt and ceramic fibers
- Fire-proof
- Non-ageing
- Good electrical insulation
- Good thermal insulation
- Oil and solvent resistant - chemical resistance (pH 3 - 9)
- Not hygroscopic
- Environmentally friendly

E-GLASS: SPECIFICATIONS

Chemical composition

SiO_2	53 - 57 %
Al_2O_3	12 - 15 %
CaO + MgO	22 - 26 %
B_2O_3	5 - 8 %
F_2	0 - 0,6 %
$Na_2O + K_2O$	< 1 %
Fe_2O_3	= 0,5 %
Other	n/a

Physical properties

Density	2,60 g/cm³
Hardness	5,60 (Vickers 50 g-15 s)
Sound velocity	5680 m/s

Mechanical properties

Tensile strength virgin filament	3.400 MPa = 493 ksi
Tensile test yarn	2.400 MPa
Tensile modulus	10,5 msi
Tensile strength sized yarn	min. 50 cN/tex
Elongation at break for sized yarns according to binder	2,2 - 2,5 %
Elastic recovery	100 %

Electrical properties

Dielectric constant	6,40 at 1 MHz
Dielectric constant	6,13 at 1 GHz
Loss angle	0,0018 - 0,0039 bei 1 MHz
Loss angle	0,0039 at 1 GHz
Volume resistivity	1014 - 1015 W × cm
Surface resistivity	1013 - 1014 W × cm
Electric strength	8 - 12 kV/mm

Thermal properties

Softening point	840°C
Strain point	617°C
Linear coefficient of thermal expansion	5,3 × 10-6
Specific heat	@ 20° C 0,764 J/g °K
	@ 200° C 0,958 J/g °K
Coefficient of thermal conductivity	1,0 W/m × K

Thermal resistance Temperature in °C	Virgin filament Residual strength in %
-200	100
200	98
300	82
400	65
500	46
600	14

RAW MATERIAL: ECR-GLASS

ECR-glass

Raw materials used, among others

texturised ECR-glass yarns,
defined diameter 10 - 24 mµ

Application temperature

550°C, short term up to 650°C

Description

ECR-Glass (E-Glass Corrosion Resistant)
The product combines the excellent mechanical as well as thermal and electrical insulation properties of traditional E-Glass with the corrosion resistance of ECR-Glass. Therefore it features an exceptionally high / chemical resistance against acids and bases.

ECR-GLASS: SPECIFICATIONS

Chemical composition

SiO_2	54 - 62 %
Al_2O_3	9 - 15 %
CaO	17 - 25 %
MgO	0 - 4 %
B_2O_3	0 %
Na_2O +	0 - 2 %
ZnO	2 - 5 %
TiO_2	0 - 4 %
Fe_2O_3	0 - 0,8 %

Physical properties

Density	2,72 g/cm³

Mechanical properties

Tensile strength individual filament	3.400 MPa = 493 ksi
Tensile strength at -196°C	5.310 MPa
Tensile strength at 23°C	3.445 MPa
Tensile strength at 371°C	2.165 MPa
Tensile strength at 538°C	1.725 MPa
Dilation	4,8 %
Refraction index	1,579 %

Electrical properties

Dielectric constant	6,9 at 1 MHz
Dielectric constant	7,0 at 10 GHz
Loss angle	0,0028 at 1 MHz
Loss angle	0,0031 at 10 GHz
Volume resistivity	3,84 E + 14 ohm - cm
	1,16 E + 16 ohms
Surface resistivity	250 volts/mil

Thermal properties

Softening point	882°C
Strain point	720°C
Linear coefficient of thermal expansion	5,9 × 10-6
Specific heat	@ 200° C 0,97 J/g °C

HIGH TEMPERATURE INSULATIONS

Glass fibre flat gasket, woven

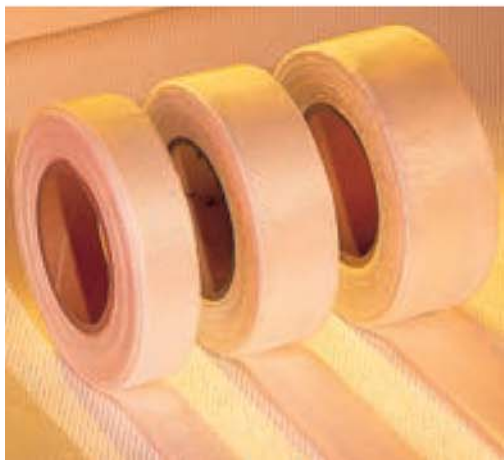
Available versions (examples)

Product no.	FB0004	FB3017	FB0011
Material type	E-glass	E-glass	E-glass
Colour	off-white	grey	off-white
Width	50 mm	50 mm	100 mm
Thickness	3,0 mm	3,0 mm	3,5 mm
Weight (g/m)	ca. 136	ca. 140	ca. 240
Heat resistance	450 °C	650 °C	450 °C

Glass fibre flat gasket, knitted

Available versions (examples)

Product no.	FB0108	FB3117W	FBS***
Material type	E-glass	E-glass	Silica glass
Colour	off-white	grey	off-white
Width	80 mm	80 mm	80 mm
Thickness	3,0 mm	3,0 mm	3,0 mm
Weight (g/m)	ca. 148	ca. 145	ca. 145
Heat resistance	450 °C	650 °C	1000 °C



Properties

- The woven flat gasket is especially resilient and hardwearing with high fibre densities
- The knitted flat gasket achieves superior insulation properties due to its characteristic open mesh and can be draped better
- Cost-effective
- Simple assembly

Silicone coated sleeving type HS8

Available versions (examples)

Product no.	HS8003	HS8011
Material type	E-glass	E-glass
Coating	High-performance silicone rubber	High-performance silicone rubber
Colour	reddish brown	reddish brown
Diameter	10 mm	51 mm
Weight (g/m)	ca. 140	ca. 710
Heat resistance	260 °C	260 °C

Product no.	HS8019	HS8021
Material type	E-glass	E-glass
Coating	High-performance silicone rubber	High-performance silicone rubber
Colour	reddish brown	reddish brown
Diameter	102 mm	128 mm
Weight (g/m)	ca. 1750	ca. 2100
Heat resistance	260 °C	260 °C

Available diameters

10 mm, 11 mm, 12 mm, 16 mm, 19 mm, 22 mm, 25 mm, 28 mm, 32 mm, 35 mm, 38 mm, 41 mm, 44 mm, 48 mm, 51 mm, 57 mm, 63 mm, 70 mm, 76 mm, 82 mm, 89 mm, 95 mm, 102 mm, 114 mm, 128 mm

Fields of application

- Wire, channel and cable insulation against heat and short-term flame impact
- Protection of hydraulic pipes

Properties

- Not affected by melt splashes
- No residue accumulating on the grid material, even if the surface of the insulating hose is destroyed
- No risk of burns when touching the material
- Resistance against hydraulic fluids, petrol and lubrication oils
- Continuous operation temperature: 260°C
- 15 - 20 minutes:1000°C
- 15 - 20 seconds: 1600°C

PIPE INSULATION SYSTEM

Thermolastic®

The Thermolastic® system consists of two main components: high temperature-resistant textile fibres which combined with a reflective metal foil form a flexible tape, and an outer protective mantle.
The combination of these materials enable it to dilate during installation, allowing to compensate shape-related irregularities and achieving a smooth surface. This is required to ensure a good fit in particular around pipe bends.
Thermolastic® tapes are used in layers depending on the prevalent application temperature. For most diesel exhaust systems, three layers are sufficient. The outer layer consists of a self-vulcanising and resilient high-temperature elastomer that is used to protect the insulating layers from exterior factors. The outer layer is self-vulcanised in order to achieve an oil and water-resistant protective outer mantle.
Flame retardant according to UL 94:V - 0.

Fields of application

Thermolastic® was designed to maintain the gas temperature in exhaust pipe systems with downstream emission control systems. Furthermore, Thermolastic® is also used as thermal insulation material.
The key benefits of Thermolastic®:
Reduces the engine compartment temperatures in agricultural, forestry and construction machines, reduces the fire hazard, exhaust pipe insulation in generator sets, locomotives and ships.

- **The Thermolastic® system is specially certified according to EC-Type Examination Certificate (Module B) as non combustible insulation material for marine industry applications.**
- **For approval in rail vehicle design, the material has been classified as M2 (flame retardant) according to the standard NF F 16-101.**

Thermolastic®

Insulation with heat-reflective foil

Available components (examples)

Product no.	HCS004	HCS013
Material type	E-glass	E-glass
Colour	off-white	off-white
Width	50 mm	100 mm
Thickness	5,0 mm	5,0 mm
Weight (g/m)	ca. 115	ca. 230
Application temperature	-40 bis +600 °C	-40 bis +600 °C

High temperature elastomer

Available components (examples)

Product no.	HCS005	HCS032	HCS016
Colour	grey	black	red
Width	75 mm	75 mm	75 mm
Thickness	1,0 mm	1,0 mm	1,0 mm
Weight (g/m)	ca. 117	ca. 117	ca. 117
Application temperature	-40 bis +200 °C	-40 bis +200 °C	-40 bis +260 °C

Properties

- Easy fitting -> no special tools required
- Fits all pipe diameters
- Insulation thickness can easily be varied along the pipe
- Stays permanently flexible, can accommodate expansion joints
- Efficient, high density insulation acts as heat store, reduces temperature fluctuation and heat loss
- Fully vibration-resistant
- Resistant to bio-diesel, urea and salt water spray
- Oil and water resistant coating
- Outer layer can be easily repaired or replaced
- Tough outer layer resists frost and stone chips
- Long-life, thus cost effective
- Tolerates steam pressure cleaners if used properly

Insulation jackets

All insulation jackets are customised items that are made to customers' specifications.
Determining factors are the dimensions of the component to be insulated as well as operating temperature, required exterior temperature and compartment space, among others.
The version for a pipe with a diameter of 90 mm and a length of 300 mm could look as follows:

Outer layer

Product no.	HBK002
Material type	E-glass textile, silicone-coated
Colour	black
Weight (g/m²)	ca. 580
Application temperature	
· maximum	550 °C
· of blanket	250 °C

Filling

Product no.	HSM***
Material type	Silica needle mat
Colour	white
Thickness	12 mm
Weight (g/m²)	ca. 2000
Application temperature	1000 °C

Inner layer

Product no.	HBH***
Material type	high temperature-resistant textile reinforced with V4A
Colour	grey
Weight (g/m²)	ca. 660
Application temperature	750 °C

Insulation jackets can either be sewn close as a hose or supplied with various locking systems.
Please contact us directly or fill in our Enquiry Form Insulation Jackets, which is available for download on our homepage **www.culimeta.de/publikationen.php**

Integral insulations

Integral insulation is a special insulation system that is tailored to the customer's technical requirements. Any specific requirements (e.g. Euro 6 or Tier 4) can be met with a defined insulation design.
As outer mantle, stainless steel foil is used in a defined thickness and embossing.

Outer layer

Material type	Stainless steel foil
Colour	silver or black
Embossing	e.g. cup embossing
Application temperature	1000 °C

Filling

Material type	Silica needle mat
Thickness	5 - 20 mm
Application temperature	1000 °C

Filling

Material type	E-glass needle mat
Thickness	5 - 20 mm
Application temperature	600 °C

Thermolastic® high temperature glue

Available versions

Product no.	HCS006	HCS033
Available quantities	82 ml tube	82 ml tube
Colour	grey	red
Heat resistance	200 °C	260 °C

Thermolastic® HT glue is a single-component silicone adhesive. It cures at normal room temperature and humidity to a resilient elastic rubber with lasting stability.

High temperature glue Thermic 1100°C

Properties

Thermic 1100°C is composed of various inorganic substances.
The product is suitable to apply insulating material to steel, glass, enamel or similar items. The object's surface should be free from dust, oil or similar substances and the glue should be applied as thin and even as possible. The glue is tack-dry after about 2 - 3 hours and fully sets after 24 hours at room temperature of 17° to 20°C. Do not store material below 0°C.
The product does not corrode steel due to its high PH-value. When in contact with aluminium a bit of corrosion is possible however.

Available versions

Product no.	HKP004A	HKP007
Available quantities	17 ml tube	500 g cartridge
Colour	beige	black
Heat resistance	1100 °C	1100 °C

Glass fibre adhesive tape

Available versions

Product no.	HBB002	HBB007
Substance / glue	thermosetting rubber glue	thermosetting rubber glue
Colour	beige	black
Width	50 mm	25 mm
Initial adhesive strength on steel	4.4 N/cm	4.4 N/cm
Heat resistance	130 °C	130 °C

➜ Widths of 25 - 100 mm available!

Aluminium adhesive tape

Available versions

Product no.	RHS011
Substance / glue	acrylate glue
Colour	silver
Width	90 mm
Thickness	aluminium foil = 50 m adhesive layer = 30 m
Heat resistance	180 °C

➜ Other products on request!

LAMINATED HEAT PROTECTION TEXTILES

Culimeta offers a wide range of textile products with different coatings, laminates and finishes. Apart from standard mass produced makes, our company is particularly associated worldwide with highly specialised niche products.

All types of our fabrics, meshs, needle mats and fleeces can be laminated with a single or double-sided aluminium foil and/or self-adhesive film. For laminating the materials, adhesive films and webs meeting the relevant requirements are used.

Specifications of aluminium foils:

- Maximum contact temperature: 180°C
- Aluminium purity 99.5%
- High resistance to cracks and abrasion
- Mechanical properties according to DIN EN 546-2
- Water vapour permeability < 0.05 g /24 h/m²/1Mpa
- Thicknesses between 0.010 to 0.150 mm
- Depending on requirement soft, hard, embossed or perforated

Product example: Textile

E-glass textile with aluminium foil and self-adhesive film

Product no.	FBO023ADK
Material type	E-glass
Width	1000 mm
Thickness	0.85 mm
Weight per unit area	ca. 610 g/m2
Heat resistance	
· E-glass textile	450°C
· Adhesive film	-40°C to +140°C 180°C (short time)

Finishes

- Desized
- Caramelised
- Vermiculite

Coatings

- Polyurethane
- Silicone

Laminations

- Aluminium foil
- Metallised polyester film
- Self-adhesive film

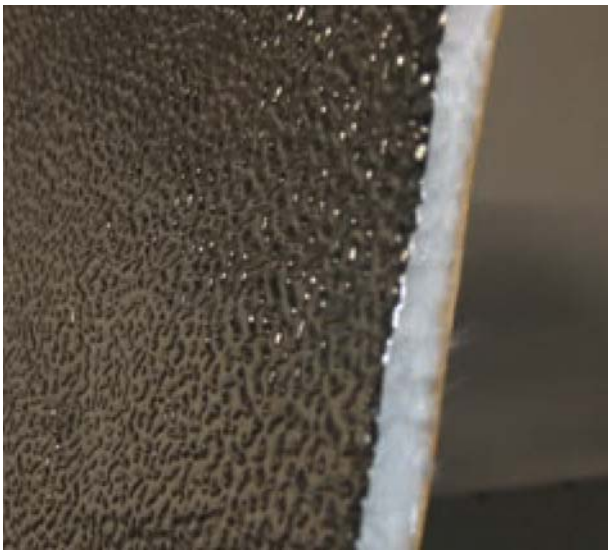
Product example: Needle and stitch-bonded mats

E-glass needle mat with aluminium foil and self-adhesive film

Product no.	FNMB021ADk2
Material type	E-glass
Width	1000 mm
Thickness	3.0 mm
Weight needle mat	ca. 650 g/m2

Heat resistance

- E-glass needle mat 450°C
- Adhesive film 85°C



E-glass stitch-bonded mat with aluminium foil

Product no.	FNMB041BAL
Material type	E-glass
Width	1000 mm
Thickness	12.0 mm
Weight stitch-bonded mat	ca. 2900 g/m2

Heat resistance

- E-glass stitch-bonded mat 450°C
- Adhesive film 85°C

Available thicknesses:

- E-glass needle mats 3, 6, 10, 12, 15, 20, 25 mm
- E-glass stitch-bonded mats 6, 10, 12 mm

Available weights

- E-glass needle mats 400 - 4.500 g / m^2
- E-glass stitch-bonded mats 1.500 - 2.900 g / m^2

Other product example

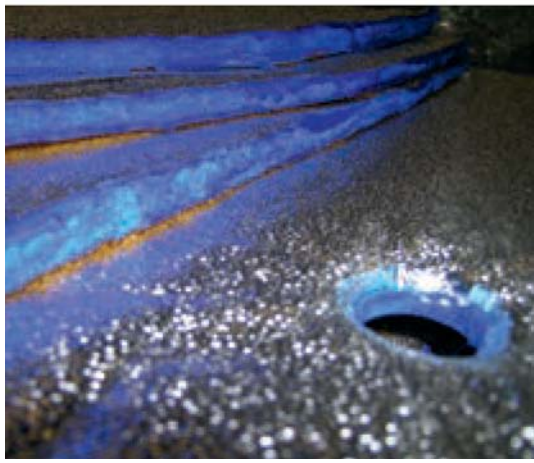
E-glass mesh fabric with aluminium foil

Product no.	FLL*
Material type	E-glass
Width	500 mm
Unit area weight	ca. 140 g/m²
Heat resistance	
• Adhesive film	-40°C bis 80°C

➜ Other widths or unit area weights on request!

Additional features

- Cut finish on both edges
- Edge-sealing of needle or stitch-bonded mats
- Punch manufacturing for mass production



Availability

- As rolls or plates
- Joined widths of up to 1500 mm on request

ABSORPTION MATERIALS FOR EXHAUST SILENCERS

Acousta - fil®

Acousta-fil® is a new absorption medium for use in exhaust silencer systems on combustion engines.

The manufacturing process allows different
- Fibre types
- Densities / weights
- Thicknesses
- Texturing levels
- Dimensions

Advantages of the absorption material Acousta-fil®
+ Cost-effective
+ Excellent sound-absorbing properties
+ Not water-soluble
+ Chemically resistant
+ Mechanically stable
+ No health risk
+ Easy handling and fitting
+ Special fibre mix optimised for application possible
+ No binding agents

Acousta-fil® consists of voluminised endless fibre glass filaments. These fibres are compacted and set on specially manufactured machines.

The raw material used is texturised glass fibres that are processed with a thermoplastic yarn into a freely definable structure with any size and shape. Acousta-fil® can be supplied in densities between 75 kg/m³ and 650 kg/m³ – depending on the required expansion.

The absorption material “extends” during its first heating as the synthetic yarns will weld due to the exhaust gas temperature (with the optional low temperature version at 130°C or 80°C). Through the “resetting forces” of the glass filaments, the silencer chamber will be filled out.
For application in silencers with shell design (half-shells), Acousta-fil® can be knitted into a freely designed shape. This can subsequently be folded into a “3-D bundle” according to the half-shell to be filled.

Availability

- in defined width as endless roll
- in defined width as roll with specified cutting points
- in pre-cut lengths (for small mufflers)
- ready-made as “pack”

Acousta-fil®

HEAT SHIELDS

Heat shields reflect any heat radiation from e.g. catalytic convertors and exhaust systems, divert the heat sideways and insulate against heat permeation.

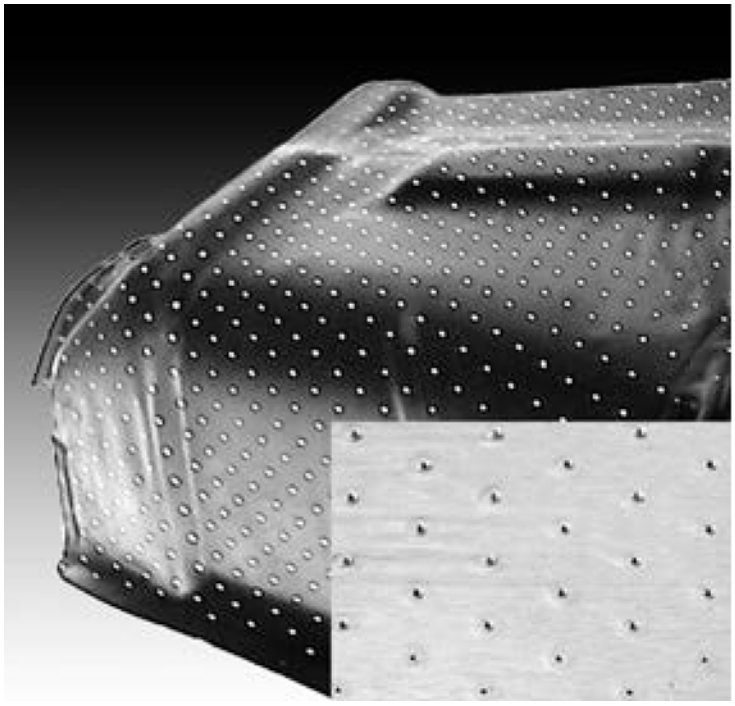
Heat shields with acoustic functionality additionally have the property of absorbing sound. The absorbing layer can consist of various materials and designs. The aluminium carrier sheet is perforated.

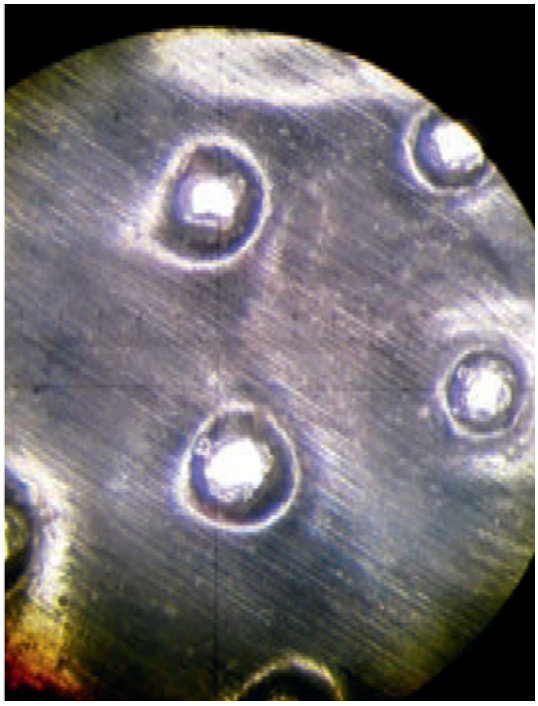
Applications

- Fuel tank systems
- Chassis / underbody panels
- Exhaust gas systems
- Shock absorbers
- Components in the engine compartment

Industries

- Automotive
- Compressor engineering
- Electrical industry
- Engineering industry
- Household appliances industry





Perforated and sound-absorbing

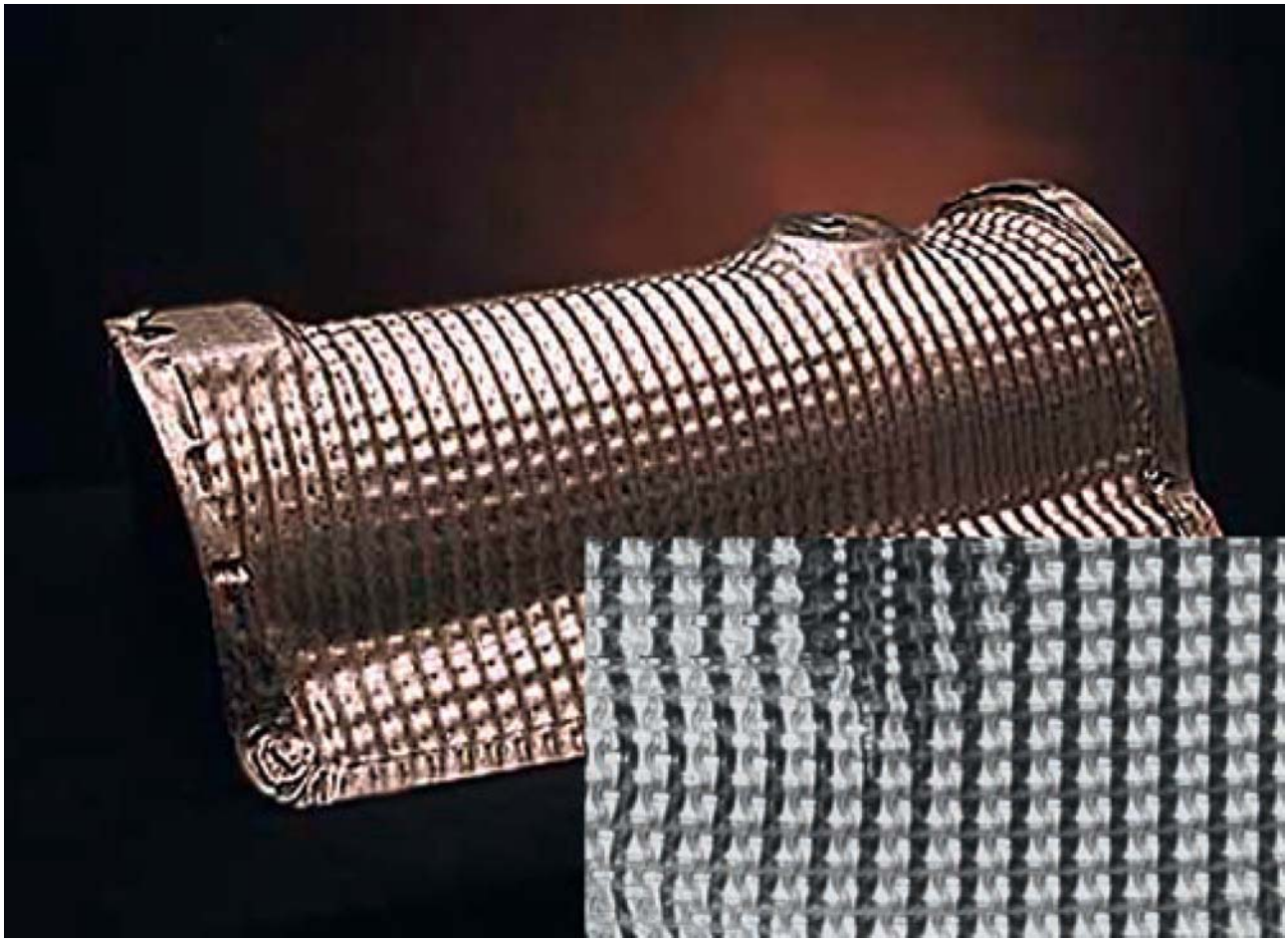
Specifications

Material:	Aluminium sheeting 99.5 W7 0.05 … 0.8 mm
	Stainless steel foil 1.4828 0.1 …
Insulation layer:	Aluminium insulation, glass mat or similar

NOPAL®
(EMBOSSED SEMI-FINISHED PRODUCT)

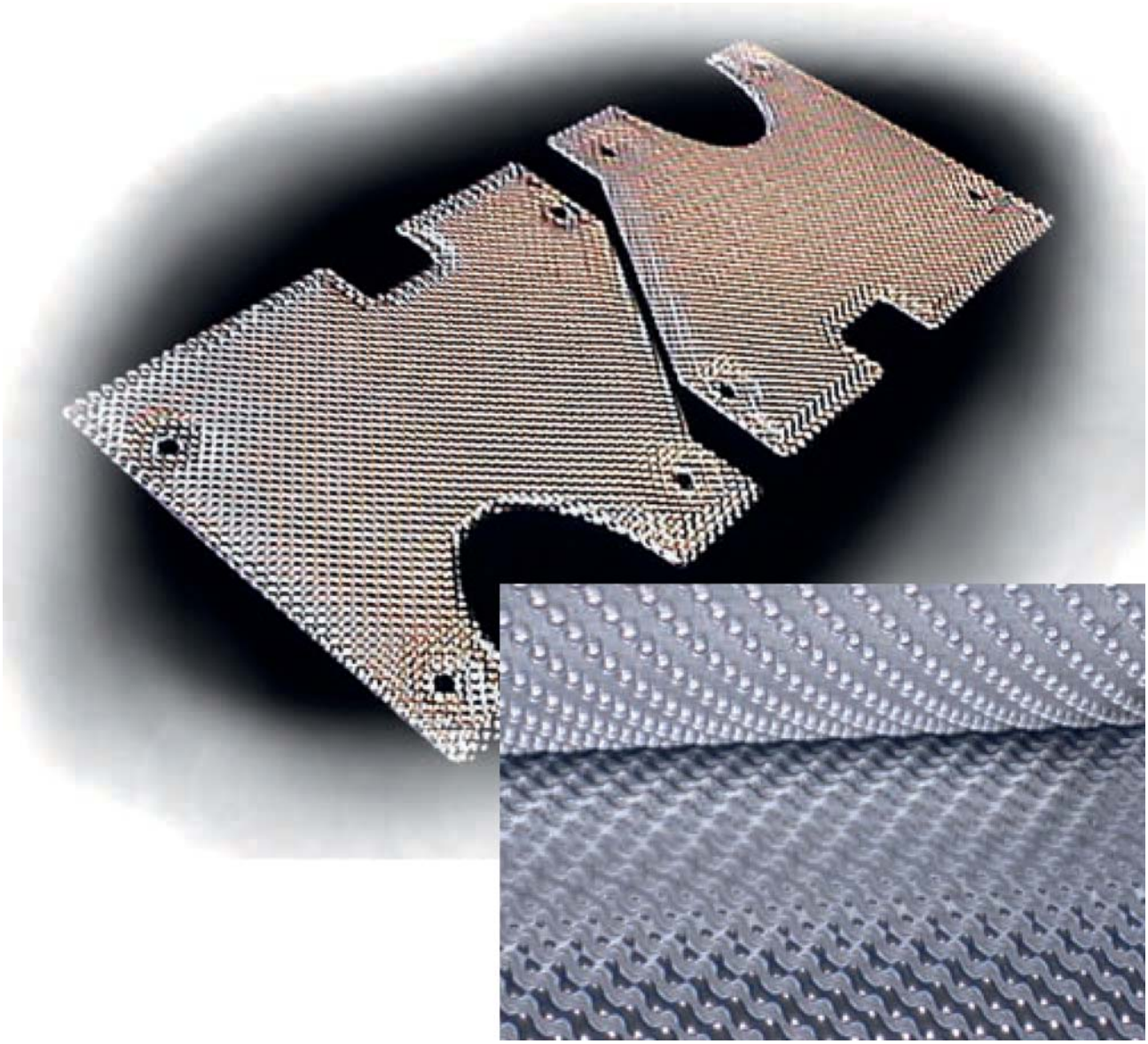
Aluminium with Nopal® embossing has a much higher rigidity than flat sheeting due to its structure. This allows to reduce the thickness of the sheeting and thus the weight while maintaining the same mechanical rigidity. Due to the special structure of the material, appealing components can be produced in simple forming tools, reducing undesirable distortions and creases in the material.

This structure causes a significant TORSIONAL STIFFNESS. By arranging the studs in alternating and homogeneous fashion and by a varying structural elevation, this effect is further enhanced.



CALOTTE EMBOSSING (SEMI-FINISHED PRODUCT) / SILOPAL®

The calotte (spherical) embossing optimises aluminium and stainless steel foils. It makes them more resilient, easier to form and covers up slight bumps.
This structure is shallower than the one of Nopal® and is also available with perforation.



Products of the Silopal® range are manufactured both with Nopal® and with calotte embossing with or without perforation. This includes aluminium sheets or foils coated with polypropylene or polyethylene which additionally can also be perforated. Our product range comprises semi-finished products and customised 2-D / 3-D components.

PREFORMED BIOSOLUBLE MINERAL WOOL OR GLASS FIBRE PARTS

Basalt wool absorption parts

Glass fibre absorption part

Mulitcomponent preformed part

TAILOR-MADE BAGS AS FILLING OF SILENCERS

Bag material: Polypropylene (PP)

Net bag material: Biodegradable polymer

PRE-CUT AND STAMPING PARTS / NC WELDING TECHNOLOGY

Pre-cut and stamping parts of high temperature resistant insulation mats

NC welding technology for silencers and mufflers