



Custom-made
polyurethane systems
for a wide variety of
applications





Polyurethane systems house

Tradition meets innovation

RÜHL PUROMER GmbH is an established subsidiary of RÜHL AG & Co. Chemische Fabrik KG – a medium-sized group of companies with more than 70 years of experience in developing and producing chemical products. Creative ideas, mostly tailor-made and at the same time efficient products, high reaction rate and targeted customer service set the standard of our corporate orientation. We are only satisfied, when our customer's project is completed. Due to this attitude and a wide variety of services and products, we successfully operate in the most different markets.

Proximity to the customer and the end product

Centrally located in Friedrichsdorf, close to Frankfurt/Main, we serve our customers quickly and in a most uncomplicated way with technical advice, development, sales and production. Our global activities are completed by our sales and service office in Taicang, close to Shanghai/China. Most of the systems are tailor-made for our national and international customers, always focussed on the customers' end products.

Quality

With defined and well established processes and a 100 % outgoing inspection we can guarantee high quality and reliability. DIN ISO 9001 certification is self-evident. Quality is our life – from development to sales to production, guaranteed by a balanced quality management.



Experience, continuity and independence

More than half a century of practical experience makes RÜHL PUROMER to one of the leading independent system suppliers for the development and production of PU systems in central Europe. We – a classical medium sized enterprise – are characterized not only by inner continuity, but also by perseverance in a more and more volatile environment.

Based on a very close cooperation, we purchase our raw materials from the world's most competent chemistry producers. Hence, we can use the market's whole chemical product range in order to refine our systems formulations – always in our customers' interest.



PUre Diversity Applications

In accordance to our product philosophy "PUre Diversity" we serve a wide variety of applications and industries. Our products and services range from individual solutions to integrated material concepts, combining various plastic products for a concrete application. Fresh new ideas, constant innovation, continuity and sustainability are just as central as performance and efficiency.

The variety of applications and industries using our material solutions is just as diversified as our product portfolio and our know-how. We serve the most different industries with a product portfolio constantly growing according to increasing demands:

Surface applications

- » Integral skin foam
- » SkinForm/spray or cast skins
- » Compact systems
- » Coating systems for the technologies CCM/CLEARIM, ColorForm/clearmelt, DCDS and others

Composites / fibre composite technology

- » LFI, CSM, RTM, honeycomb technology

Comfort and safety products

- » Flexible foam applications
- » Flexible integral skin foam solutions

Insulation technology

Flame retardancy solutions

- » Construction industry
- » Transportation
- » Medical technology
- » Leisure industry
- » Electrical engineering

Various specialities





Single source service

From the product idea to serial production

In terms of a holistic approach, our portfolio offers an extraordinary service far beyond a simple material supplier.

Application technology / sales

In keeping with the motto "service from a single source" our experienced team of application technicians and developers offers an all-embracing, end-product oriented 360° service:

- » from the product idea
- » to the production of samples and prototypes
- » to consultancy in regard of the mould and process design
- » to the support of serial production.

Supported by the on-site purovation Center, proximity to the clients is our premise for all-embracing and quick technical support. Our products are specifically adapted to the end-product and your production – if necessary directly on site – to develop a tailor-made, competitive product for you. Enjoy the advantage of one single technician as main contact person for all product areas!





purovation Center Development

Whether for the short-termed solution or the medium- and long-termed perspective – continuous state-of-the-art development of our material systems is in the focus of our development department. All our formulations are based on our own material knowledge. For this, we have been fostering and continuously expanding our comprehensive knowhow for many decades. Choosing the best ingredients as well as identifying and qualifying new raw materials and additives are the key tasks to develop custom-made solutions.

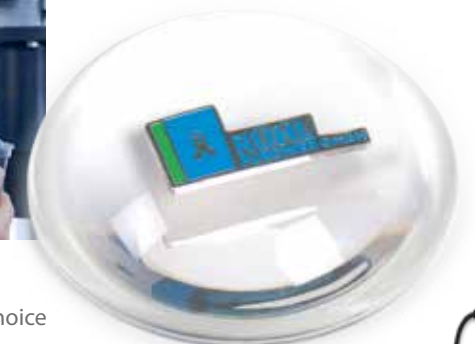


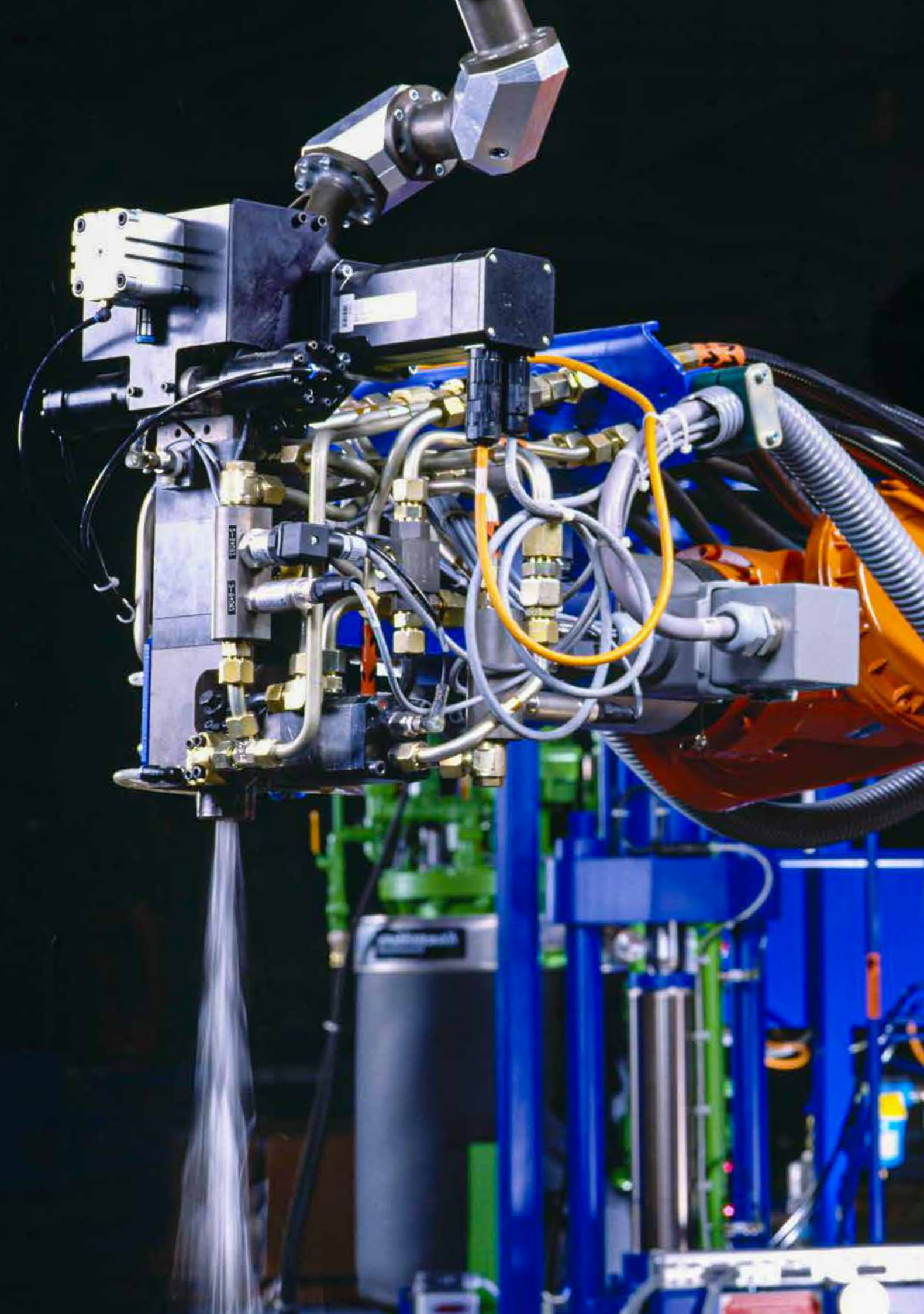
Thanks to our independence, we profit from a free choice of materials and suppliers. We benefit from a long-term partnership with various qualified raw material suppliers to formulate the best material solution – both technologically and economically. Last but not least, we ensure the highest possible availability for our customers.

Next to realising our customers' latest ideas, we also participate in sustainable innovation projects, which on a medium term open up new areas of application. Concerning these projects, we are partners of the leading German research institutes.

In our purovation center we provide the most modern laboratory facilities and the following measurement and testing possibilities:

- » ZwickRoell universal test machine with pneumatic sample grip (tensile strength, compression set, tear resistance, compression hardness, bending properties/elongation/flexural strength/modulus, compressive strength)
- » Indentation resistance testing acc. to Shore
- » Examination of ageing behaviour
- » Indicative fire testing
- » Atlas Xenon Xenotest 440 (UV Weathering)
- » Ballrebound test
- » NIR spectroscopy





purovation Center

Processing technology for the complete product portfolio

From the product idea to serial production, the product development, more than ever before, needs to be supported by further development of the handling process and corresponding samples and prototypes. In this connection, our experienced employees and our large machinery and technical facilities, equipped with processing techniques for our complete product portfolio, are at our customers' disposal:

- » Low-pressure machines for casting systems and PU elastomers
- » High-pressure machines for foam, compact and spray applications
- » Processing techniques for filled systems
- » Centre for fibre reinforced solutions: LFI, spray technique, RTM
- » Combination of injection moulding and PU high-pressure machine for integrated surface refinement (i. e. clearmelt/ColorForm)
- » Various mould carriers and experimental moulds

We consider ourselves as "extended workbench", to achieve, together with you and by using our application engineering, economic success as fast and effective as possible. The services of our purovation Center encompass:

- » Development of new technologies
- » Optimizing support for products, processes and moulds
- » Production of samples and prototypes
- » Pilot productions, pre-series, small batches, covering of utilization peaks





puroduction

Flexibility and diversity

According to the principles of lean production, our enterprise produces polyurethane formulations for various applications, tailor-made for our customers' requirements. We mainly produce "on demand" and therefore with a maximal level of flexibility. In different modern production areas and facilities we produce to order batch sizes from 50 kg to 20.000 kg. Taking the customer's needs into account, our production is kept up-to-date with the latest technical developments and adapted according to the market's demands.

All production facilities are designed for the highest possible flexibility and short set-up times. They allow a quick change-over and a customer-oriented production process. In many cases, we deliver directly, without interim storage, to the customer– either in canisters, barrels, containers or tank trucks. We keep a high sense of responsibility towards mankind and the environment; responsible care is self-evident for our day-to-day contact with various chemicals.



Know-how and experience of our team and close cooperation with other internal divisions guarantee a safe and quality-oriented production, short communication paths allow a prompt dispatch. For us, it is imperative to meet and exceed the Quality, Cost and Delivery (QCD) expectations of our customers.

PUre Diversity

- soft or hard
- foamed, compact or with an integral skin
- natural, coloured or transparent
- unfilled, filled or fiber-reinforced



puroflex®
Integral skin foam

puroflex®
Flexible foam

purotherm®
Rigid foam systems

purodur®
Rigid integral skin foam

puropreg®
Fibre composite systems

purocast®
Compact systems

purorim®
RIM systems

puroclear®
Coating systems

puroskin®
Cast elastomer systems

purovib®
PU high performance elastomers



puroflex®

Integral skin foam

Comfort features comply with pleasant haptics and nice optics

The typical properties of our puroflex® systems are determined by the soft porous foam core and a compact, dense boundary zone. This integral transition in density gave its name for the so-called integral skin foams.

The integral structure of puroflex® soft foams can on the one hand be realized by the usage of physical blowing agents which condense at the mould surface and initiate the skin formation. Water-blown systems on the other hand react differently and get their good surface qualities according to the choice of the raw materials.

The PU foam matrix can be adapted to the requirements of the final product: from pleasantly soft to catchy semi-rigid. Thanks to this combination of qualities – compact surface with nice haptics and optics and the classical good comfort properties from soft to semi-rigid PU foams – PU soft /semi-rigid integral skin foams cover a broad range of applications.



Applications

- » acoustic parts for engine compartments (i. e. engine covers)
- » cable sheathing
- » Arm rests and handles
- » Seat upholstery
- » Floor mats
- » Operating room rests
- » Shifter knobs
- » Safety pads
- » ...

Typical properties

- » Moulded part density of 220–600 kg/m³
- » Shore A hardness of 10–90
- » Good abrasion resistance

Special formulations and versions

- » Usage of physical blowing agents or water
- » Viskoelastisch
- » Antistatic
- » Hydrophobic
- » Usage of bio polyols possible

Flame retardant formulations

- » Automotive: FMVSS 302
- » Rail vehicle construction: DIN 5510, EN 45545-2
- » Aircraft construction: ABD 0031, FAR 25.853
- » Construction industry: DIN 4102 B2, EN 13501 E
- » Furniture and recreation industry:
California TB 117, BS 5852 crib 5,
NF P 92-504 M4, UNI 9172/87 class 1.IM





puroflex®

Flexible foam

Focussed on comfort

Polyether flexible foams are elastic PU foams with open pores which are used in different applications thanks to their excellent padding properties. The foam systems have good elastic properties and high recoverability and thus ensure a perfect seating, lying and also walking comfort.

Above that, the foam structure with its open pores and therefore very good acoustic performance is ideal for sound absorption and sound insulation, which can be increased by the use of filled materials and composite solutions with other (PU) materials. Comfort in terms of high-quality acoustic solutions thus is another broad field of puroflex® solutions.

Applications

- » Vehicle seats
- » Filled and unfilled acoustic components
- » Seat cushions for office chairs
- » Flame retarded seating elements for rail vehicles
- » Back-foamed textiles, foils and skins
- » Orthopaedic insoles
- » Medical rests
- » ...

Typical properties

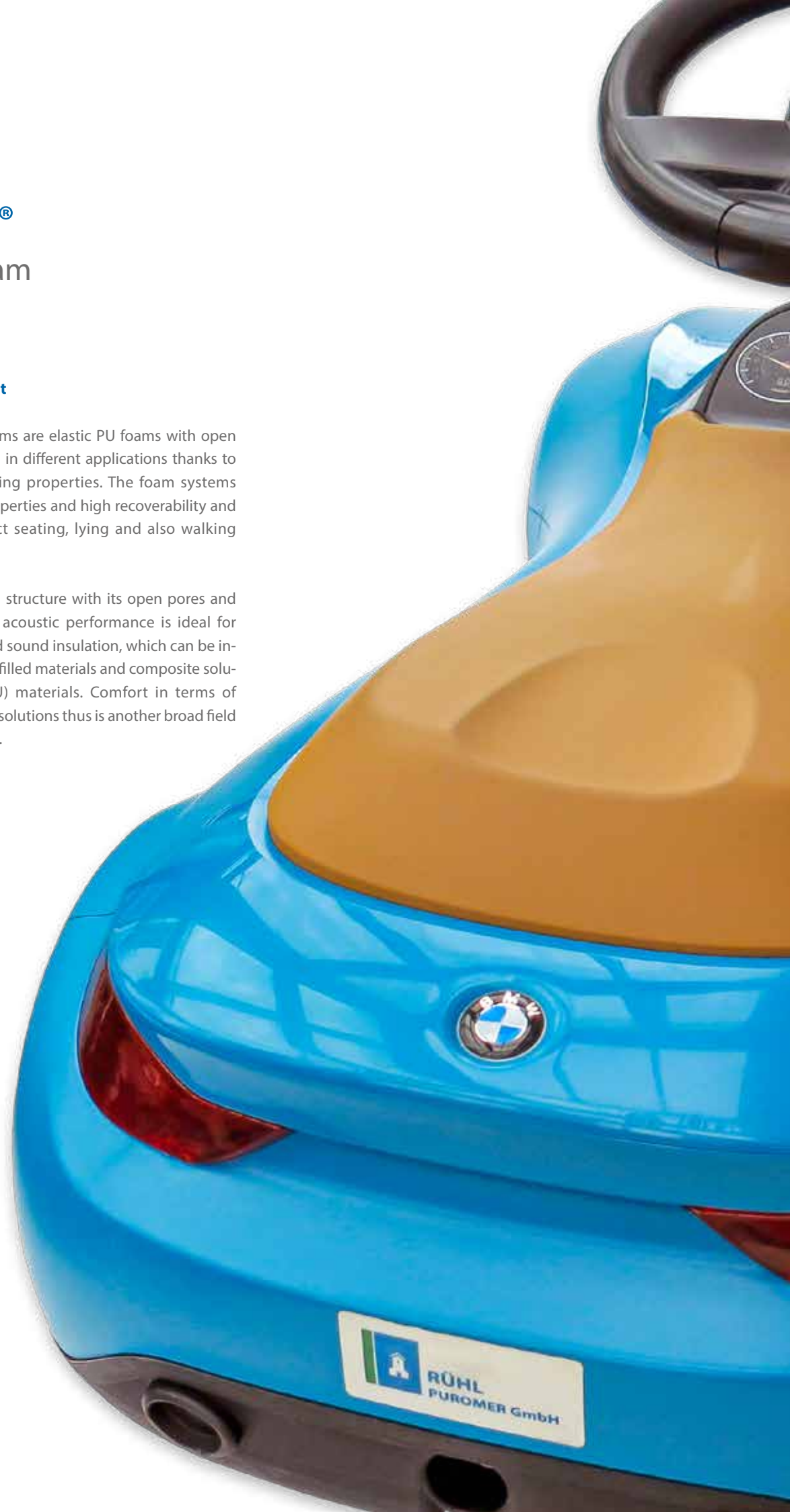
- » Moulded part density of 55–250 kg / m³
- » Adjustable compression hardness
- » Blowing agents: mostly water, but also liquid CO₂

Special formulations and versions

- » Viscoelastic
- » Filled with barite or chalk for acoustic applications
i. e. in the automotive sector
- » Heat distortion temperature up to 150°C
in special applications
- » Emission-free pursuant to RAL-ZU 38

Flame retardant formulations

- » Automotive: FMVSS 302/UL 94 HB
- » Rail vehicle construction: DIN 5510, 45545-2
- » Aircraft construction: ABD 0031, FAR 25.853
- » Furniture industry: California TB 117, crib 5





purotherm®

Rigid foam systems

Structure and insulation

The key areas of application for our purotherm® systems are determined by their excellent thermal insulation properties. These are based on the closed-cell structure of this group of material and are supported by the possibility of a low density setting. Good mechanical properties top off the property profile. In areas of higher density they can be used for applications with structural functions.

The main foaming agent for purotherm® systems is water, but also physical blowing agents and pentane are used. The continuous development of water-blown products led to systems with insulation properties comparable to physically blown foams.

The various fields of application can be found in the construction industry, sanitary industry, medical industry and also in the refrigeration industry.



Applications

- » Thermo-containers
- » Structural foam for bath tubs and shower trays
- » Wooden beam replications
- » Beer barrel coverings
- » Water fittings
- » Centrifuge insulation
- » Filling foam for window profiles
- » ...

Typical properties

- » Moulded part density of 35–120 kg/m³
- » Packaging foams with RG 5 kg/m³
- » Blowing agents: mainly water, but also pentane and other physical blowing agents

Special formulations and versions

- » Good thermal insulation (lambda value from 22 mW/mK)
- » Usage of recycling and bio polyols possible

Flame retardant formulations

- » Construction industry: DIN 4102 B2
- » Swiss V
- » UL 94 V



purodur®

Rigid integral skin foam

High strength – low weight

Using our purodur® systems leads to components with sandwich material structure, produced in one step. The reaction mixture foams in the closed mould and produces a foam core with fine pores and a massive edge zone due to specific compression and temperature ratio. Density is integrally distributed in the component's cross-section.

According to density, hardness adjustment and degree of compression different weight specific material properties can be achieved. This provides product solutions which meet the individual customer's needs from light-weight construction to structure functions to high-quality class A surfaces.



Applications

- » Trim parts / housings / covers
- » High-quality heat-insulating energy-saving windows with high stiffness
- » Clamps and pipe supports
- » Decor and furniture elements (stable in shape and extra light) for caravans and other camping cars
- » construction bars
- » ...

Typical properties

- » Moulded part density of 220–900 kg/m³
- » Shore D hardness of 35–85
- » Tensile strength 3–16 N/mm²
- » Blowing agents: mainly water, but also pentane and other physical blowing agents

Special formulations and versions

According to the field of application and production conditions, purodur® formulations can be tailored to certain properties:

- » Maximal mechanical performance
- » Good thermal insulation
- » Self-releasing setting possible
- » Good for painting and laminating
- » Usage of bio and recycling polyols possible

Flame retardant formulations

- » Electronic industry: UL 94 VO
- » Rail vehicle construction: DIN 5510
- » Construction industry: DIN 4102 B2, EN 13501 E



puroreg®

Fibre composite systems

Lightweight construction with PU composites

In times of climate protection, energy saving and resource conservation, the subject lightweight construction has become a mega-trend during the last years. With smart material combinations i. e. sandwich composites of puroreg® matrix systems and glass fibres combined with paper honeycomb cores, components with high bending stiffness and low weight can be realized using spray technique. LFI processing is an additional production version, with or without core material. High-end lightweight solutions can be achieved by compact puroreg® matrix systems and their processing via spraying, wet pressing or RTM technique. Also a combination with carbon fibres is possible.

Sophisticated surface refinement of such composite components is supported by multimaterial/hybrid solutions with appropriate PU casting systems i. e. puroclear® or purorim® in combination with high-quality moulds.

PU composites with puroreg® can be applied in various fields – next to the automotive sector also in the areas of commercial vehicles, construction and agricultural machines and, with appropriate flame protection, in railway vehicle manufacturing.



Applications

- » Honeycomb sandwich components for light-weight and at the same time stiff rear shelves, sunroofs and load floors
- » Sandwich components with waterproof honeycombs for exterior applications (i. e. bonnets)
- » Monolithic fibre composite components combined with thermoplastic foils for body parts
- » High-performance fibre composites with glass fibre, natural fibre but also carbon fibre reinforcements (in RTM technology)

Typical properties

- » Moulded part density of 450–1100 kg/m³
- » Fibre content from 30 % by weight to > 50 % by volume
- » Blowing agents: usually water
- » Reinforcing materials
 - Glass fibre rovings
 - Glass fibre mats, woven and non-woven fabrics
 - Carbon fibres
 - Natural fibres (hemp, sisal, etc.)

Special formulations and versions

- » Honeycomb materials for sandwich structure components
 - Paper honeycombs
 - Waterproof paper honeycombs
 - Flame protected honeycombs
 - Plastic honeycombs
 - Aluminium honeycombs
- » Foam cores (i. e. purotherm® rigid foam)
- » Systems with a wide processing window for big components
- » Usage of polyols based on renewable resources
- » Self-releasing with good lamination properties at the same time
- » UV stability for dark colours

Flame retardant formulations

- » Automotive: FMVSS 302
- » Aircraft construction: FAR 25853, ABD 0031
- » Construction industry: DIN 4102 B2, E 13501 E



purocast®

Compact systems

Compact material solutions for special applications

Compact PU systems reacting under exclusion of blowing agents are used in case a foam structure would be disadvantageous for the product performance.

Such purocast® compact materials are used for very hard settings, i. e. when high impact stress or high inherent stability is needed. Additionally, softer qualities can be provided i. e. to combine pleasant haptics with high abrasion resistance or to achieve high elasticity. Between hard and soft system formulations, the properties of these PU materials are often application-orientedly adjustable.

Non-foamed polyurethanes are used for a variety of cast and spray applications where usually excellent surface characteristics with regards to optics and/or robustness are important.

Applications

- » Furniture / door edges
- » Flooring systems
- » Stairs
- » Filter casting
- » Electro casting
- » Protectors
- » Concrete formwork
- » ...

Typical properties

- » Moulded part density of about 1000 kg/m³
- » Hardness from shore A 10 to shore D 85
- » Tensile strength 2–60 N/mm²

Special formulations and versions

- » FDA and foodstuff approval
- » Anti-static
- » Hydrophobic
- » Impact resistant
- » UV resistant, lightfast
- » Sprayable – purospray®

Flame retardant formulations

- » Automotive industry: FMVSS 302
- » Rail vehicle construction: DIN 5510, EN 45545-2





purorim®

RIM systems

Functionality, surface, strength

The abbreviation RIM stands for Reaction Injection Moulding and thus applies for any liquidly injected PU materials. As a generic term though, RIM is mainly established for thin-walled, impact resistant, energy-elastic components. Various adjustments of hardness are possible.

Almost compact micro cellular components, often reinforced with fibres / fillers, are produced out of a slightly foaming mixture of raw materials. The classical hardness ranges from 50 to 70 Shore D for stable components with good strength, high surface qualities and low abrasion.

Conventional purorim® systems are set to short cycle times and therefore have a short potlife of a few seconds. If the existing machinery only allows longer, less reactive adjustments, appropriate formulations are available.

Above that, purorim® systems are also used in the composites technology. Here, too, the focus lies on the high surface qualities, i. e. to make fibre reinforced components paintable in one step by overflowing them with a thin purorim® layer.



Applications

- » Bumpers
- » Fenders
- » Automotive roof modules
- » Housing parts
- » Belt covers
- » Glass encapsulations
- » Covering parts
- » Saddle trees
- » ...

Typical properties

- » Thin-walled and large components possible
- » Hardness Shore A 40 to D 80
- » Rigidity 5 to 50 N/mm²
- » Adjustable reaction profile

Special formulations and versions

- » Applications with fillers, i. e. short glass fibre, wollastonite or barium sulfate
- » Self-releasing setting possible
- » systems for overmoulding using RIM technique to create paintable surfaces (i. e. on composite substrates)

Flame retardant formulations

- » Rail vehicle construction: DIN 5510
- » Automotive industry: FMVSS 302
- » Floor covering: DIN 4102 B-1
- » UL-94-V0, DIN 4102 B-2, EN 13501 E





puroclear®

Coating systems

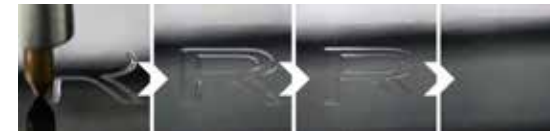
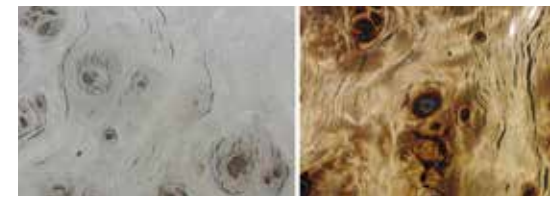
Efficient, high-quality surface refinement

puroclear® products are used as casting materials in the automotive industry, i. e. as transparent or coloured coatings for the tool-related refinement of wooden trim parts or thermoplastic parts.

Advantages

- » UV-stability
- » Easy processing/economic production, i. e. by self-releasing adjustment
- » High scratch resistance/self healing effect/ unique suitability for everyday use
- » Custom-made differentiated surface solutions
 - High gloss level and brilliant 3D effect
 - Detailed impression of finest surface structures
 - Combination of both
- » Production of functional, 3-D-touch or anti-reflective coatings possible
- » Durable performance
- » Proven in large scale production
- » OEM approved

To refine the surface of injection moulding components, the combination of puroclear® with thermoplastic injection moulding is an efficient and low-emission alternative to cost-intensive painting. Besides that, the high-quality surface coating scores by covering small defects of the substrate, with brilliant 3D depth effects.



Applications

- » Wooden trim parts in vehicle interiors
- » Exterior applications (i. e. pillar panels of cars)
- » Decorative and functional components
- » Coating of composite components and other substrates
- » Refinement of furniture components/tables
- » Decorative elements
- » ...

Typical properties

- » Usability in CCM/CLEARRIM, ColorForm/clearmelt/ DCDS and other technologies
- » Hardness/haptics: from soft to hard (70 Shore A – 85 Shore D)
- » Good adhesion to substrates with self-releasing adjustment
- » Very good abrasion and scrub resistance
- » System versions with self-healing effect
 - Also at room temperature
 - Scratch resistance acc. to Erichsen tested up to 20 N
- » Complies with OEM specifications i. e.
 - Sun simulation: 24h – DIN 75220-D-IN1-T
 - Xenon weathering (artificial Florida and Arizona climate)
 - Heat ageing
 - Climatic cycle test
 - Chemical resistance: sun cream, hand cream, bird droppings, tree resin etc.
 - VOC/FOG: 70 ppm/125 ppm
- » Cure time: 40–100 s (acc. to application and size of component)
- » Transparent or (translucently) dyed coatings (i. e. piano-black)
- » Coating possible of parts with thicknesses from 0,2 mm to 10 mm

Special formulations and versions

puroclear® IT (= self releasing) is a system providing up to 1.500 demoulding processes without external release agent and thus enabling an almost off-tool production. Rework and scrap rate are significantly reduced, and impressions of high-glossy or rough surfaces with an impressive degree of repeatability are made possible.

puroclear®-systems with self-healing properties are hard coating materials characterized by an extraordinary suitability for everyday use. The self-healing effect can be adapted according to the application.

Leatherlike haptics, which can be used as an alternative to purosikin® also for light colours, are possible with puroclear® in soft adjustment.



puroskin®

Cast elastomer systems

Leather-like haptics – foamable or compact

puroskin® is an aromatic water-blown 2K cast elastomer system and the perfect system for soft-elastic foamed or quasicompact applications. The number of possible surface solutions is almost unlimited.

But puroskin® does not only allow maximum flexibility in regards to the design: also most different requirements of the production process can be met (i. e. combination with injection moulding) – suitability for large scale production in the automotive industry and well-known OEMs

inclusive. A unique haptic experience is provided by the soft touch effect which can be used partially or extensively depending on different wall thicknesses. The comfortable and catchy soft touch effect is ideal i. e. for vibration damping of handles of electric machines.



Applications

- » Head rest covers
- » Door cladding
- » Arm rests
- » Other cladding components in vehicle interiors
- » Seating elements
- » Handle elements of all kinds (construction machines, household appliances, sports equipment etc.)
- » ...

Typical properties

- » Partial unique soft touch effect
- » Variations in wall thickness possible
- » Leather-like haptics
- » High abrasion/scratching resistance
- » FOC/-VOG emissions requirements fulfilled
- » Economic component costs
- » Very good adhesion to PA, PA-ABS, PC-ABS
- » Dyeing in almost any colour shades possible
- » UV-resistance at dark colours
- » puroskin® can be handled in SkinForm® process, but can also be used for standard PU cast skin applications with all named advantages
- » Excellent optics, warping-free detailed imaging of the surface
- » Physical tests according to the OEM's standards for overmoulded skins in vehicle interiors are passed

Special formulations and versions

- » Compact systems based on aliphatic isocyanates for UV-resistance at light colour shades (see puroclear®)





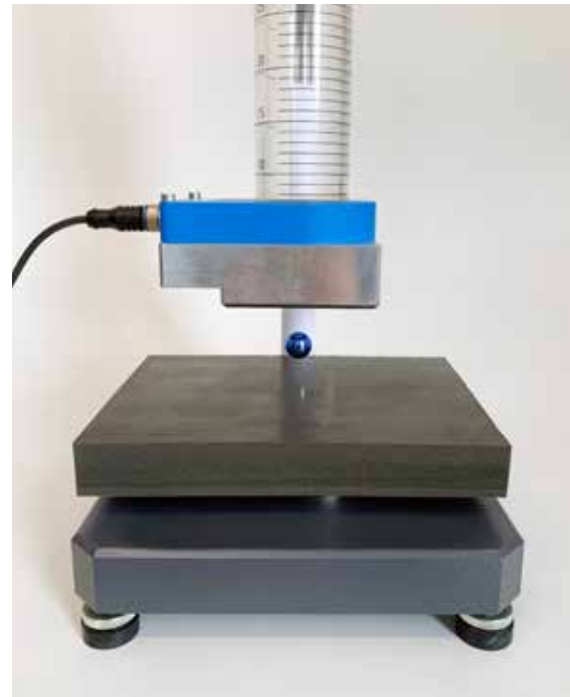
purovib®

PU high performance elastomers

PU high performance elastomers for special requirements

For many applications our polyurethane elastomers are an excellent alternative to rubber or other caoutchouc materials. purovib® withstands high pressures, solvents, chemicals, temperatures and mechanical shocks and is characterized by good abrasion resistance as well as an outstanding resilience. Compared to other materials, purovib® components have an above-average service lifetime. Apart from that, special characteristics can be designed in regards to vibration and sound isolation.

As the properties of the material such as density and elasticity can be flexibly adjusted, purovib® elastomers can i. e. be used for vibration and sound isolation in the construction industry. Above that, there are lots of other application areas, also consumer goods such as acoustic decoupling of fitness machines. As special the characteristics are, as special and diverse are the applications – in fact far beyond the topic sound insulation. The application of purovib® elastomers is always inspired by special challenges.



Applications

- » Guide bars
- » High performance sealings
- » Transport protection
- » Formwork surfaces and matrices for moulded concrete components
- » Sound insulation and shock absorption elements, i. e. footfall sound insulation

Typical properties

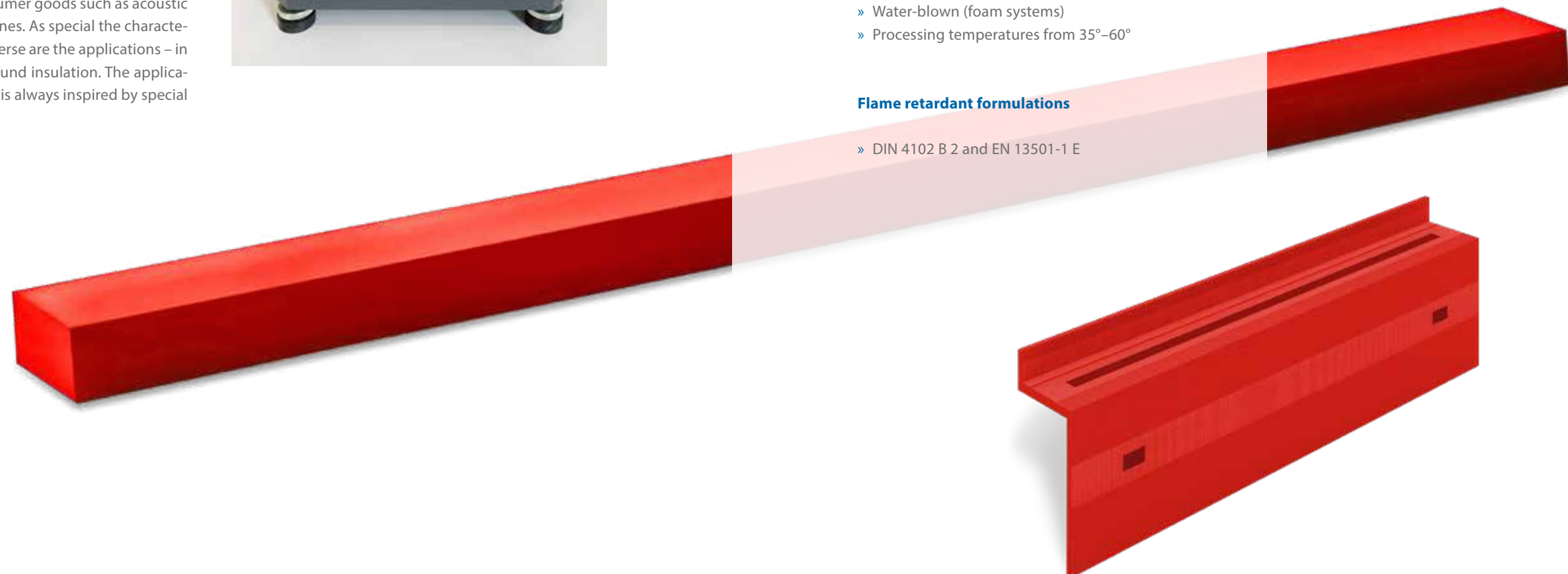
- » Component density from 450–1050 kg/m³
- » Excellent abrasion resistance
- » High resistance to chemicals
- » Very good elastic properties
- » Hardness adjustable from Shore A 50–85

Processing

- » Low and high pressure machines
- » Open processing and component production in closed moulds
- » Water-blown (foam systems)
- » Processing temperatures from 35°–60°

Flame retardant formulations

- » DIN 4102 B 2 and EN 13501-1 E





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