Neopolen®
Designed for New Ideas.

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EN
Neopolen® is a polypropylene foam (EPP). Its expanded beads are predominantly closed-cell. It is supplied to molders in the form of loose beads, free from chemical blowing agents, for processing into a wide variety of foam parts on automated processing equipment. A molded density between 20 and 110 kg/m³ can be obtained with the standard product range. The foam beads are manufactured and processed in an eco-friendly manner without FCHCs.
Neopolen® Overview

Applications
The many properties of Neopolen® make it a versatile engineering material suitable for a wide range of applications. The main selection criteria are energy absorption, low weight and high thermal stability. The key applications are:

- Automotive construction
- Dunnage trays
- Packaging and transport containers
- Heating, ventilation and sanitary applications
- Fireproofing
- Furniture, sport and leisure

Distribution and production centers
BASF has production sites in Ludwigshafen and Schwarzheide, Germany. The company’s global distribution organization supplies products to customers all over the world.

Properties
Molded parts of Neopolen® exhibit a wide range of properties:

- High energy absorption with low weight
- High resilience following static and dynamic loading
- Essentially unchanged energy absorption after repeated impact load
- Isotropic deformation performance, independent of the direction of impact
- Negligible water absorption
- Reliable function over a wide temperature range
- Good resistance to chemicals and oils
- Molding density adjustable to meet specific requirements
- Good heat insulation
- Easy to clean and sterilize
- Environmentally friendly
- Can be recycled by a variety of methods
- Free from propellant gases and other chemical blowing agents
Due to its mechanical properties Neopolen® is particularly suitable for components subject to impact stress. The low weight, high energy absorption and good deformation performance of Neopolen®, even after repeated impact load, are outstanding qualities for components in automotive construction.

Neopolen® also has negligible water absorption, can be relied upon to function reliably over a wide range of temperatures, and is thus predestined for internal and external applications in automotive construction. Neopolen® does not contain any substances which are subject to declaration according to list 232-101 (GADSL) of the Association of the German Automotive Industry.

Safety
Examples of safety-relevant applications are foam inserts affording protection against lateral impact, energy absorbing bumper cores as well as knee pads and steering column casings. The resilient response of side impact protection pads made of Neopolen® is markedly delayed and thus meets essential safety requirements.

Shock absorber systems, door panels and other components fabricated using parts made of Neopolen® comply with the existing legal regulations.

Constantly rising safety standards can be achieved with these product properties. Since component weights can also be reduced, significant cost and energy savings are possible. With these properties and its easy recyclability, Neopolen® contributes greatly to preserving the environment and conserving resources.

Weight reduction
New automotive designs attach high priority to weight saving and recyclability. No other foam material meets these requirements to the same extent as Neopolen®.

Since it is easy to produce many different geometric designs, the material is particularly suitable for fabricating filler elements and tool caddies, with the low weight per unit volume providing a remarkable reduction in total weight. For instance, the use of Neopolen® in the back seat of VW’s Touareg translated into a considerable weight reduction. Composite systems of Neopolen®, solid polypropylene and polypropylene film are easy to create due to the material being identical. This also means it can be completely recovered without material separation operations.

Neopolen® in automotive construction

Opel OPC seat with Neopolen® reinforced backrest
New developments in pedestrian protection

The increased pedestrian protection requirements already defined in the major automobile markets can be met best using components made of Neopolen®.

Mechanical properties

The material in a high density grade can also be used as a structural element. High strength and good compatibility with other materials produces components distinguished by outstanding mechanical properties.
With Neopolen® dunnage trays, you can pile it on

The innovative and extremely robust packaging system is individually customized to the series component to be transported and provides safe protection against mechanical damage and weather conditions throughout the entire storage and transport process – usually throughout an entire series cycle.

Components can be precisely positioned in Neopolen® dunnage trays so that they can even be removed by robot systems.

Compared to other foam materials, Neopolen® is especially suitable for reusable packaging and reusable transport containers. Thanks to its high resilience after static and dynamic stressing and the excellent cushioning performance at low weight, Neopolen® contributes to reducing packaging and thus costs every day.

Conductive surfaces

During transportation, friction can cause electrostatic charges to occur on the surface of the packaging. When this is discharged, sensitive electronic components in parts such as display instruments or navigation and electronic entertainment devices can be damaged. For the production of safe ESD® packaging, Neopolen® P 9230 ESD offers an electrostatically effective brand which can be used to produce packaging systems with defined surface resistance.

This electrically conductive effect is guaranteed for the full lifespan of the molded part and is even maintained in the case of changing climatic conditions (humidity, heat), which is a particular advantage for use in company-internal transport containers.

(*electrostatic-sensitive-devices)
Colorful
Luscious red, deep blue or bright yellow — the color variety of Neopolen® offers a wide range of application options in the toy and leisure sector in particular. Leisure products made from Neopolen® are both light and highly resilient.

Diversity
Thanks to the material’s wide range of properties, there are almost no limits to its application. In the furniture sector, Neopolen® is put to use as construction foam. Even where visible, modern tool and processing techniques can significantly influence the quality of the surface.

Neopolen® is just as proven as a filling for bean-bags and lounge furniture as in medical positioning aids, where its good cushioning properties and easy washing at high temperatures are a particular advantage.

Neopolen® in furniture, sport and leisure
In today’s modern home construction industry, complete ventilation systems are already being made from this extremely resilient foam.

The intelligent use of Neopolen® even in the construction phase of a system can save significant production costs. Because the extremely stable and tough-elastic foam parts can accept components such as control boards, ventilators and filter units, which are not screwed into but merely inserted into the Neopolen® housing, the number of individual system components and thus the assembly time are reduced.

The high level of freedom in tool construction allows the devices’ watertight and airtight air channels to be foamed together with the device housing in “viewing quality” with Neopolen®.

Because the outstanding thermal insulation properties of Neopolen® in the systems means that less heat is lost, effectiveness is increased. This reduces consumption, saves resources and is kind to our environment.

Neopolen® opens up totally new construction options in apparatus engineering and component construction. The foam parts are stable packaging, elegant housing and reliable impact protection in one – while also ensuring optimum thermal and sound insulation.

Neopolen® is multifunctional in ventilation and sanitary applications
The multifunctional material Neopolen® is used as housing insulation and in transport protection where it insulates and protects the integrated components while reducing energy costs.

In the wide Neopolen® range, Neopolen® P 9335 MG (metallic grey) is characterized by even more improved thermal insulation properties compared to the standard products.

Neopolen® P reFlam can be used for applications with increased fire behavior requirements. The newly developed product type allows new fields of application for EPP.

**Thermal conductivity in accordance with DIN 52612**

![Thermal conductivity graph]

- EPP Standard
- Neopolen® P reFLAM
- Neopolen® P 9335 MG
Neopolen® has fireproofing under control

Neopolen® P reFLAM
With its special flame-protected additivation, the newly developed Neopolen® P reFLAM is excellently suited to applications with increased fire protection requirements, meeting the requirements of both REACh and the RoHS Directive and its supplements.

Product properties

<table>
<thead>
<tr>
<th>Bulk density</th>
<th>Average particle size</th>
<th>Average particle size</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>(kg/m³)</td>
<td>(mm)</td>
<td>(mg)</td>
<td></td>
</tr>
<tr>
<td>29–35</td>
<td>1.5–4.0</td>
<td>0.6–1.0</td>
<td>metallic grey</td>
</tr>
</tbody>
</table>

1) Determined according to BASF method PAA 1
2) Color variations may occur

Fire Behavior of Neopolen® P reFLAM

<table>
<thead>
<tr>
<th>Test method</th>
<th>Thickness</th>
<th>Material Density according to ISO 845 [kg/m³] (Core Density)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>DIN 4102-16</td>
<td>10–40 mm</td>
<td>B1</td>
</tr>
<tr>
<td>UL 94</td>
<td>3.5 mm</td>
<td>HF1</td>
</tr>
<tr>
<td>FMVSS 302</td>
<td>13 mm</td>
<td>fulfilled</td>
</tr>
<tr>
<td>DIN 4102-1</td>
<td></td>
<td>B, C, D</td>
</tr>
<tr>
<td>DIN EN ISO 11925-2</td>
<td></td>
<td>B, C, D</td>
</tr>
<tr>
<td>DIN EN 60695-2-11 /-12 /-13</td>
<td>5 mm</td>
<td>GWT: 960</td>
</tr>
<tr>
<td></td>
<td>10 mm</td>
<td>GWT: 960</td>
</tr>
<tr>
<td>DIN 5510-2</td>
<td>10–40 mm</td>
<td>53, SR2, ST2</td>
</tr>
</tbody>
</table>

1) Edge exposure, classification according to EN 13501-1
Neopolen® is ideal for packaging and transport containers

**Thermal stability**
Due to its high thermal stability, moldings made from Neopolen® can be sterilized, a particular advantage for medical applications and food containers.

**Multiple impact protection**
Thanks to its outstanding resilience and high energy absorption, packaging made from Neopolen® can withstand multiple stresses from impacts or strikes. They reliably protect the transported goods against damage and can then be reused or recycled. This protects the environment and saves costs.

**Warm stays warm – cold stays cold**
The insulating properties of our particle foam offer additional benefits when used in catering and food boxes, or wherever warm things need to stay warm and cold things cold.

Flip-Box made from Neopolen® (photo: Overath GmbH) – winner of the reddot design award 2011
Thanks to its wide-ranging spectrum of properties, hardly any other material offers so many options for construction, application and design.

**Production engineering**
Modern production techniques such as backfoaming, in-mold skinning and embossing/stamping are being constantly further developed, allowing complex components and applications with sophisticated surfaces to be manufactured. Novel tooling engineering techniques allow the production of surfaces suitable for use as visible parts in different applications. Thermal embossing or in-mold skinning, for example, can create high-quality surfaces on molded parts.

Inserts can be placed in the mold for the securing and reinforcement of foam material systems.

**Colors**
Striking red, deep blue, luscious green and bright yellow; those are the colors in the Neopolen® color range.

All color brands are produced with premium BASF pigments and allow use in a wide range of applications.
Recycling
Neopolen® is manufactured without using halogenated hydrocarbons or compounds containing lead, cadmium or chromium. The regrinded foam scrap from Neopolen® can be recycled into the molding production process. Where this process is not economical or not feasible for other reasons, scrap can be returned to the raw materials cycle by feedstock recycling. Thermal recovery of Neopolen® is sensitive due to its high calorific value and extremely low flue gas toxicity.

Environment
Neopolen® is not hazardous to water and is certified in accordance with the Oeko-Tex® standard. The product does not contain any blowing agent on delivery and is not subject to labeling according to the Hazardous Materials Regulations. When processed in the proper manner, there are no objections to the use of Neopolen® in the manufacturing of toys covered by the German Food and Feed Code (LFGB).
### Physical properties of Neopolen® molded parts (guideline values)

<table>
<thead>
<tr>
<th>Properties</th>
<th>Unit</th>
<th>Material Density according to ISO 845 [kg/m³] (Core Density)</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>[kPa]</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>Elongation at break</td>
<td>[%]</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>Composite stress at 10% strain</td>
<td>[kPa]</td>
<td>70</td>
<td>180</td>
</tr>
<tr>
<td>Composite stress at 25% strain</td>
<td>[kPa]</td>
<td>80</td>
<td>220</td>
</tr>
<tr>
<td>Residual compressive strain (50%, 22 h, 23 °C)</td>
<td>[%]</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Compression hardness CV</td>
<td>[kPa]</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Dimensional stability at heat</td>
<td>[%]</td>
<td>&lt; 2</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>[W/(m·K)]</td>
<td>0.036</td>
<td>0.038</td>
</tr>
<tr>
<td>Water uptake 1 day</td>
<td>[Vol.-%]</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Surface resistance (23 °C, 50% relative humidity)</td>
<td>[Ohm]</td>
<td>≤10⁶</td>
<td>≤10⁶</td>
</tr>
<tr>
<td>Cushion factor C</td>
<td></td>
<td>2.8</td>
<td>2.7</td>
</tr>
<tr>
<td>Specific energy at f/h = 10</td>
<td>[kWh/m³]</td>
<td>90</td>
<td>320</td>
</tr>
<tr>
<td>Static area loading 5%, 100 d</td>
<td>[kPa]</td>
<td>12</td>
<td>23</td>
</tr>
</tbody>
</table>

You will find detailed technical data in the general technical information and the respective technical product information sheet.

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### Standard grades

**Achievable molding densities**: 20–110 kg/m³

**Bulk density range**: 15–80 kg/m³

**Bead diameter**: 2–6 mm

### Special grades

- **9230 ESD**: Surface resistance: ≤ 10⁷ Ohm
- **Metallic grey**: Thermal conductivity: 0.035 W/(m · K)
- **reFLAM**: Improved flame resistance properties

### Neopolen® – processing ranges (selection)

<table>
<thead>
<tr>
<th>Product</th>
<th>Bulk density</th>
<th>Color</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neopolen® P 9225 K</td>
<td>22–26 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9230 K</td>
<td>26–30 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9235</td>
<td>30–36 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9255</td>
<td>50–60 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9270</td>
<td>63–77 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9280</td>
<td>73–87 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9230 ESD</td>
<td>26–30 g/l</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9335 MG</td>
<td>29–35 g/l</td>
<td>metallic grey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neopolen® P 9435 Color</td>
<td>30–36 g/l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Determined according to BASF method PAA 1
2) Color variations may occur
3) Surface resistance: ≤ 10⁷ Ohm
4) Thermal conductivity: 0.035 W/(m · K)
5) with pre-pressurization
6) without pre-pressurization

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### Fire Behavior of Neopolen® (standard)

<table>
<thead>
<tr>
<th>Material Density according to ISO 845 [kg/m³] (Core Density)</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>DIN EN ISO 11925-2</td>
<td>10 mm</td>
</tr>
<tr>
<td>20 mm</td>
<td>–</td>
</tr>
<tr>
<td>DIN 4102-1</td>
<td>10 mm</td>
</tr>
<tr>
<td>30 mm</td>
<td>B3/B2</td>
</tr>
<tr>
<td>FMVSS 302</td>
<td>13 mm</td>
</tr>
<tr>
<td>13 mm</td>
<td>–</td>
</tr>
<tr>
<td>ULS4</td>
<td>8.4 mm</td>
</tr>
</tbody>
</table>

1) Edge exposure, classification according to EN 13501-1
2) Edge exposure failed, surface exposure passed with E
3) B3 (easily flammable), the classification B2 (flammable) applies if the edges of the plate are covered

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### Processing and technical data

**Formteildichte (g/l)**

- Neopolen® – processing ranges (selection)
  - Standard grades
  - Special grades

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**Product Bulk density**

- Neopolen® P 9225 K: 22–26 g/l black
- Neopolen® P 9230 K: 26–30 g/l black
- Neopolen® P 9235: 30–36 g/l black
- Neopolen® P 9255: 50–60 g/l black
- Neopolen® P 9270: 63–77 g/l black
- Neopolen® P 9280: 73–87 g/l black
- Neopolen® P 9230 ESD: 26–30 g/l black
- Neopolen® P 9335 MG: 29–35 g/l metallic grey
- Neopolen® P 9435 Color: 30–36 g/l black

**Formteildichte (g/l)**

- Neopolen® – processing ranges (selection)
  - Standard grades
  - Special grades

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**You will find detailed technical data in the general technical information and the respective technical product information sheet.**
From the silo, Neopolen® is sucked pneumatically into the pressure filling device of the shaped part machine.

In the pressure filling device, the particles are compressed with compressed air and blown into the shaping tool.

The foam particles are conveyed into the shaping tool in compressed form. The conveying pressure selected sets the shaped part density of the end product (back pressure process). The back pressure is between 1.5 and 3.5 bar, depending on the density.

Because Neopolen® does not contain a propellant for foaming, the foam particles are conveyed into the shaping tool in compressed form. The conveying pressure selected sets the shaped part density of the end product (back pressure process). The back pressure is between 1.5 and 3.5 bar, depending on the density.

The foam particles are welded into a shaped part using water vapor as a heat carrier. Depending on the shaped part density, the evaporation pressure is between 2.5 and 3.5 bar.

After welding, the foam pressure in the shaped part must be reduced so that it can be removed from the mold. To do this, water is sprayed from a cooling system onto the tool. The cooling time depends predominantly on the density of the shaped part and the thickness of the component.

The part is removed from the mold using mechanical extractors and/or compressed air. To eliminate surface water and stabilize the dimensions, shaped parts with low pressure ranges (<50 kg/m³) must be tempered after removal from the mold. This tempering is ideally performed at 80 °C.

Neopolen® is supplied in the form of propellant-free foam particles in large capacity trucks with approx. 100 m³. The processor must have appropriate and suitable storage silos for storing Neopolen®. The foam particles are conveyed from the truck’s loading space into the silo system using conveying blowers intended for this purpose.
Note
The data contained in this publication are based on our current knowledge and experience. In view of many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their 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. (October 2016)