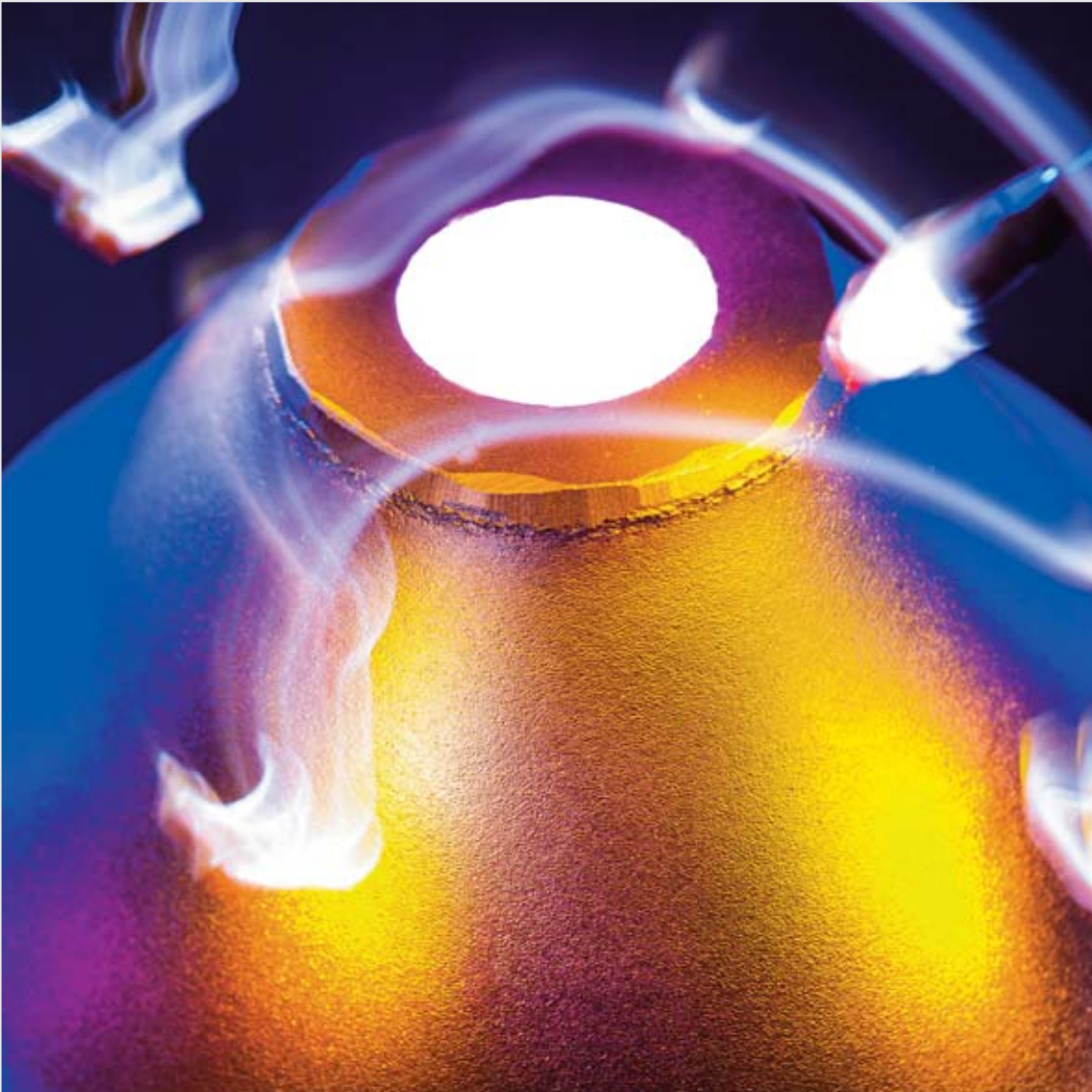


PTFE semi-finished products...

... with unrivaled properties



**Intelligent plastics solutions
for unmistakable results**

High-tech plastics solutions – if the customer wants something, we make it possible!



Beichler + Grünwald designs, develops and produces innovative plastics solutions in the material PTFE.

We are a medium-sized family business boasting extensive expertise and decades of experience in the production of customer-oriented semi-finished products, extrudates, coatings and special shapes for a wide range of industrial sectors and application fields.

An in-house design office combined with a superbly equipped production center with a high-end machine park allow us to produce large or small series of technically challenging finished parts based on a drawing or sample. Our committed team of experienced employees supports our customers with technical expertise and a high level of service.

We are always willing to take unconventional routes and to accept new challenges. By combining the unbeatable properties of PTFE with other materials and substances to form new high-performance products, for example.

We are happy to be guided by the challenging specifications of our customers in this respect. Our motivated and rigorous team develops chemical formulations, designs customized tools and employs a wide range of technologies to produce the required results.



Our goal is to exploit the huge versatility of PTFE and to derive benefit from this material.

Innovative spirit, creativity and the ability to implement ideas are always governed by the objective of creating a profitable and customer-oriented solution.

PTFE – a material with outstanding properties

PTFE belongs to the large group of thermoplastic plastics and to the subgroup fluoroplastics. PTFE owes its special position in the world of plastics to the fact that it unites several very special properties in a single substance:

- Chemical resistance to almost all media
- The proverbial "non-stick" (anti-adhesion) property towards other substances
- Continuous use in temperature ranges from -200°C to +260°C
- Lowest dynamic friction coefficient of all solids
- Absolute safety for applications in the food industry
- Very high insulation against high voltages
- Stable dielectric constant in the high-frequency range

Because it combines these advantages, PTFE is used in almost all industrial sectors. Furthermore, PTFE can be combined with other substances, thereby optimizing existing attributes and achieving additional properties, such as thermal conductivity, abrasion resistance, compressive strength and sealing effect.

Handling high-grade material – professionalism gives you the edge

Unlike most thermoplastic plastics, PTFE cannot be processed to form semi-finished products or finished parts by means of casting, injection molding or transfer molding due to its very high melt viscosity. Because PTFE has a very high molecular weight of approx. 10 million g/mol, it forms extremely long molecular chains which cause the material to remain a solid even when it reaches its melting temperature of approx. 327°C. It requires different methods as compared with other thermoplasts for this reason. The manufacturers supply the raw material in the form of fine powder or free-flowing powder. Whereas the apparent density of the fine powder is around 300 - 500g/l, that of the free-flowing powder is approx. 700 - 950g/l. Homogeneous PTFE material is achieved through compression to around 2,100 g/l. Depending on the type of powder, this corresponds to a compression ratio between 2.2:1 and 7:1. Compression must take place at a rate that is slow enough to allow the air that is trapped between the powder particles to escape completely.

The B+G purity law

B+G works exclusively with high-grade materials from reputable and reliable global suppliers. This provides us with the best possible foundation for the production of first-class semi-finished products for our customers.



This is achieved with high specific pressures of 12 - 130 MPa. Tools capable of withstanding these enormous pressures are therefore needed.

These tools or molds are usually made of high-grade steel. Even relatively minor expansion of the mold can result in shearing and fissures in the material during the pressing process. The consequence is often partial or total loss of the unfinished part. At B+G, failures of this kind are minimized to a great extent thanks to the special geometry and design of the tools.

Complex manufacturing processes for pressed semi-finished products and finished parts made from PTFE

The PTFE powders are usually compressed using hydraulic presses specially adapted to the compression criteria of the material. Following compression into different shapes, such as plates, cylinders, hollow rods or custom shapes, the unfinished parts are still very fragile. The molded material does not attain the typical PTFE properties until the downstream sintering process in special furnaces is complete. The unfinished parts are generally sintered at approx. 375°C. Dedicated programs control the heating, the temperature constancy and the cooling of the unfinished part to ensure that thermally induced stresses do not produce any fissures or shrinkage cavities in the fragile unfinished part. This process takes between 12 and 90 hours depending on the molded component.

When sintering is complete, the unfinished parts usually undergo further machining in a turning or milling process. The component acquires the necessary dimensions and tolerances at this stage. As the volume of the unfinished parts shrinks by 2.5 to 5%, depending on the type of powder, during the sintering process and the resulting tolerances are too rough for most requirements, this post-machining is almost always necessary. The described processes also apply to PTFE containing fillers. The fillers ensure that the component obtains the required properties and degree of reinforcement. B+G advises you about the choice of the ideal mixture of raw materials based on experience and expertise, produces tools to suit your requirements and accompanies your product through to the pressed semi-finished product or finished part.

Laser branding

We use the latest laser techniques to label our PTFE products, thus ensuring that they are unmistakable and traceable. This allows our customers to reliably and conclusively verify the origin and quality of our semi-finished products and extrudates.



Pressed semi-finished product from B+G – diversity of form and application



PTFE properties...

... an overview

WA B-E-R-G.de/6./2015 engl.

| Property | Unit | PTFE pure white | | PTFE TFM 1600 | | PTFE + 25% glass fiber | | PTFE + 25% carbon | |
|------------------------------|-------------------|-----------------|--------------|---------------|--------------|------------------------|--------------|-------------------|--------------|
| | | Extruded | Pressed | Extruded | Pressed | Extruded | Pressed | Extruded | Pressed |
| Tear strength | N/mm ² | >22 | >23 | >25,5 | >28,5 | >11 | >14 | >11 | >13 |
| Tensile elongation at break | % | >230 | >260 | >300 | >300 | >140 | >160 | >90 | >100 |
| Hardness | Shore D | >54 | >54 | >56 | >56 | >59 | >59 | >63 | >63 |
| Elastic modulus | N/mm ² | 550 | 550 | 650 | 650 | - | - | - | - |
| Continuous thermal stability | °C | -200 +260 | -200 +260 | -200 +260 | -200 +260 | -200 +260 | -200 +260 | -200 +260 | -200 +260 |
| Density | g/cm ³ | 2,12 - 2,20 | 2,12 - 2,20 | 2,12 - 2,20 | 2,12 - 2,20 | 2,19 - 2,27 | 2,19 - 2,27 | 2,05 - 2,13 | 2,05 - 2,13 |



Our certifications

Beichler + Grünenwald has been certified according to the DIN EN ISO 9001 quality management system since 1996. Our products comply with nearly all quality standards and norms. Our archive organization allows us to create 3.1 inspection certificates according to DIN 10204 and/or declarations of conformity at any time - even retrospectively - at the customer's request based on the material certificate and the material inspection number. Moreover, we will be one of the first PTFE processors with this specific certification once the migration tests that are currently in progress for approval according to EU 10/2010 are complete.

It's all in the mix!

Beichler + Grünenwald employs innovative methods to design, develop and produce extrudates, semi-finished products, coatings and special shapes for customers worldwide. Leading plastics technology is born out of Swabian inventiveness combined with a commitment to the location and the people of the region.

Extrudates/Semi-finished products



Coatings



„There is Pow(d)er inside“

We advise you...
...develop with you...
...produce results...

in accordance with the B+G PTFE purity law.

Special shapes



Special mixtures

