

SEMI-FINISHED PRODUCTS

Modern, versatile materials



LICHARZ engineering plastics –
EXACTLY YOUR SOLUTION



LICHARZ

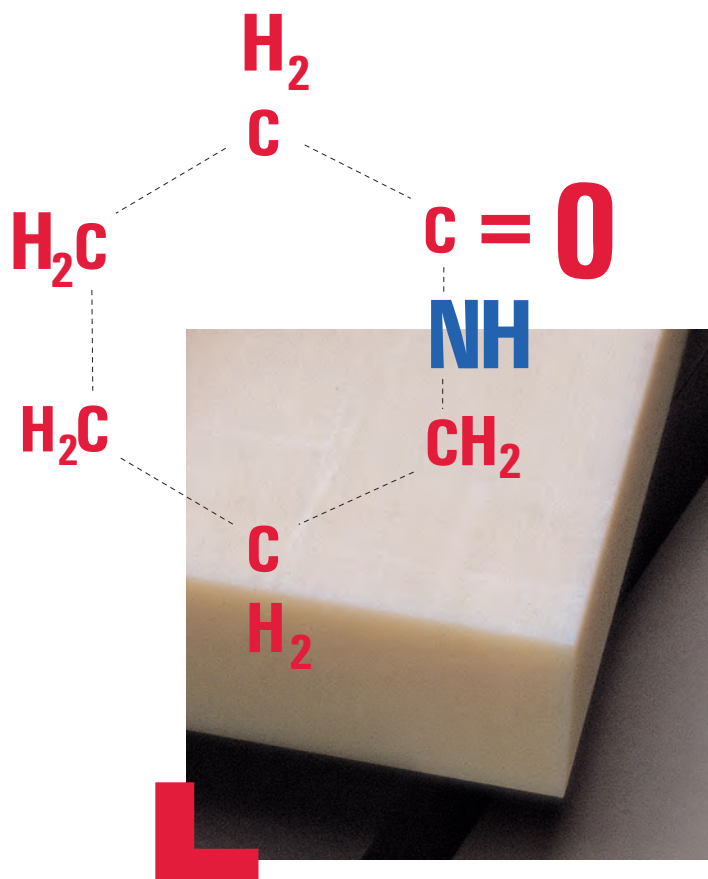
WE PUT PLASTICS ON TARGET:

Semi-finished products!

PA, POM and PET engineering plastics are modern and versatile materials for which a wide variety of engineered components for machines and equipment can be manufactured. Licharz develops particularly wear resistant and slide-friendly cast polyamides and produces a wide range of semi-finished products which can be machined well and fast.

With a broad, accessible stock of standard products, as well as customised offers and cut to size services, we provide flexibly and quickly a wide variety of requirements for different industries.

0,08^{kg/m}



Chemical formula for Caprolactam

LICHARZ

LONG-LIVED AND INNOVATIVE:

Performance in plastics!

1145

Our semi-finished products are available as rods, sheets and tubes in various dimensions and a variety of colours. They are also available in customised cut to size pieces. We have developed high quality LINNOTAM polyamide grades which are highly resistant to wear even where the loads are high.

LINNOTAM is available in four further variations:

LINNOTAMGLIDE: the best sliding properties over the entire product life.

LINNOTAMHiPERFORMANCE: the high-performance triple: dimensionally stable, durable and with excellent damping properties. There are versions for special requirements, for example with low water absorption, good hydrolysis resistance or high impact strength.

LINNOTAMDRIVE: perfectly suited for power and torque transmission.

LINNOTAMCUSTOM: your requirements are specific to you. Talk to us. We have the technical means, the experience and the capability to develop a solution tailored to you.

(For an exact description of the products see page 10)



1,04 kg/m

13⁴⁵

1,5 kg/m

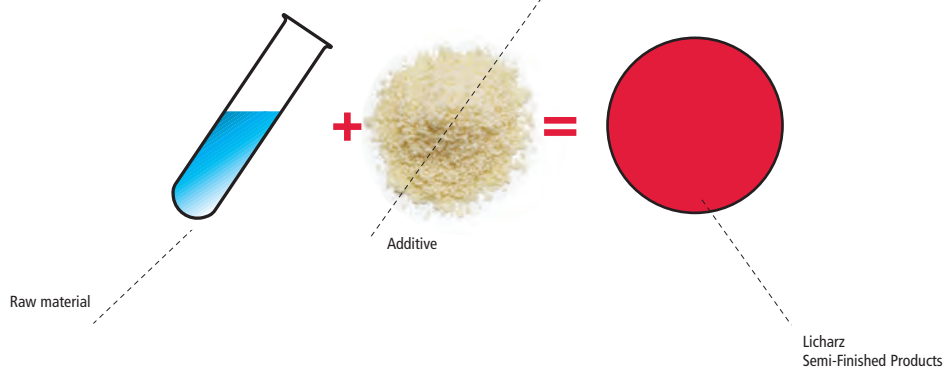


Whether its a
standard product or
customised production:
We simplify your
fabrication process!

0,9 kg

1,02 kg/m





2,08 kg/m

LICHARZ INDIVIDUAL AND FLEXIBLE:

We make your work easier!

You need semi-finished products with special dimensions? You need small or large quantities? You need a material which can be produced quickly and without complications? We will provide your semi-finished product exactly how you want it:

- In a wide variety and available from stock
- Custom cut to size pieces
- With customised formulae
- In various colours
- from stock
- Very durable
- Easily machined
- No tempering necessary
- For various application environments
(impact resistant, good sliding properties, antistatic)



DIN EN ISO 9001:2008

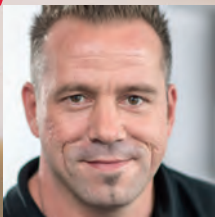
LICHARZ

PERFECTLY FITTED AND PRECISE:

We bring your product to the front!

3,7^{kg/m}

The art of producing cast polyamide and semi-finished products is in the perfect match between a good formula and the production equipment. With our equipment we manufacture batches of very different sizes: Always quickly, accurately, cost-effectively – and with consistent quality. Our volume of engineering plastics is over 7000 tonnes a year. We are among the top manufacturers worldwide.



We ensure a smooth transaction process – from fast order processing to on time delivery. As a mid-sized-company we emphasise unbureaucratic processes and are whole-heartedly dedicated to you with all our heart. Our processes are certified to DIN EN ISO 9001:2008

3,73 kg/m

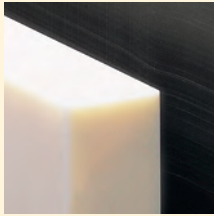
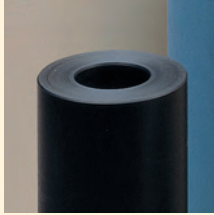
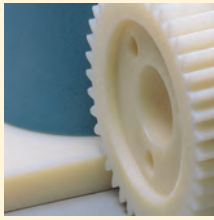
4,02 kg/m



THE STRONG BRAND FOR CAST POLYAMIDE

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LICHARZ
ENGINEERING PLASTICS:

Polyamides, POM and PET



Polyamides are subdivided into various basic types. The most important for technical applications are PA 6, PA 66, PA 6 G and PA 12 and these have established themselves as the most important representatives of the polyamide materials. Apart from the standard versions there are a large number of polyamides from which the basic types are treated with additives for the demands of special applications.

In the production of semi-finished products, a distinction is made between the manufacturing processes of extrusion and casting. The performance of extruded polyamide semi-finished products, however, has various disadvantages. The limits of manufacturing size are quickly reached. Also the properties of the extruded materials are negatively affected, since this process deforms the materials under temperature and pressure. The extrusion screw and tooling also leads to shearing stress and thus to breaks in the polymer matrix.

Polyamides manufactured in monomer casting show a higher degree of crystallinity and thus have much better material properties than the extruded types.

But apart from the type specific properties, all polyamides share, independently of their manufacturing process, a great number of basic properties specific to the material.

These are:

- High mechanical strength, hardness, stiffness and toughness
- High mechanical damping characteristics
- Good fatigue resistance
- Very high wear resistance
- Good slide and emergency running properties
- Good machining properties

LiNNOTAM

LiNNOTAM

Standard grade for wear parts in machinery and equipment design.

Colors: natural, black, blue

This standard quality manufactured in a monomer casting process, due to its balanced mechanical properties and its excellent mechanical features, is the ideal construction material for a wide range of applications.

LiNNOTAM is superior to extruded Polyamide 6 in its:

- Better mechanical stability
- Lower water absorption
- Better creep resistance
- Better dimensional stability
- Higher wear resistance

Very good sliding properties

mean that **LiNNOTAM** is the classic slider material for highly loaded machine components. Among these are bearing bushes, slider pads, guide pads as well as gears and sprockets. Because of the low coefficient of friction only an initial lubrication is generally needed. Often lubrication can be dispensed with altogether.

High wear resistance

at low and medium speeds, in particular under rough conditions (e.g. dust or sand contamination in the bearings) are further characteristics of **LiNNOTAM** as a sliding material for bearings. Contrary to conventional bearing materials such as cast iron, steel or bronze a much longer running life can be achieved under rough conditions.

Good damping properties

for the reduction of vibration and noise, particularly in the case of wire rope and conveyor rollers are of particular interest. **LiNNOTAM** reduces vibration which is transferred from metallic rollers to shafts, bearings and machine frames. In the same way, use of friction bearings of **LiNNOTAM** allows reduction of the vibration affecting the machine frame. This way the life of machines and their parts can be extended. Furthermore a contribution is made to lowering machine noise.

Low specific weight

reduces component weight compared to that of metallic materials. This is of particular interest where parts rotate and centrifugal force is generated. This is considerably reduced due to the lower weight, and also reduces the associated imbalances and vibrations. The greatly reduced weight often reduces even the required drive power. Furthermore, handling and assembly of large parts is made much easier.

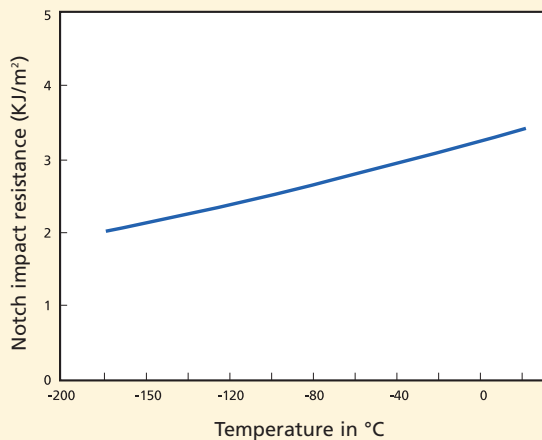
Good machining, dimensional stability, low residual stress

allow production of complex engineered components and application in all design areas. Machining can be performed with standard tools and conventional machines for wood and metal working. High feed rates and cutting speeds promote cost-effective production.

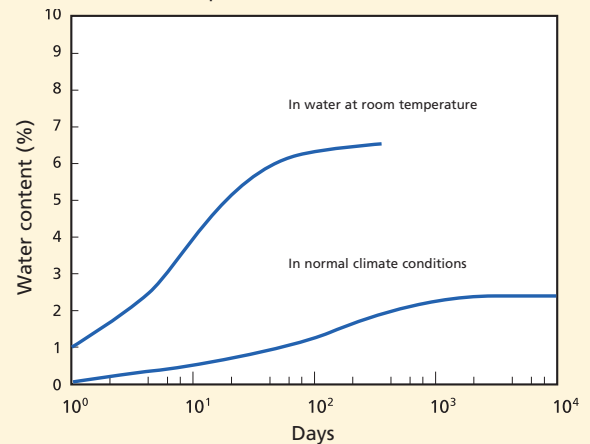
Changes in material properties

due to temperature, environmental influences and dampness must be taken into account. At increased temperatures and humidity the material becomes more elastic. Tension and pressure resistance, Young's modulus and hardness are reduced. Simultaneously impact resistance and elongation increases. The material adopts a strong elasticity. Furthermore, in case of increase in temperature or humidity, a change in length must be taken into account. The following graphs show the relations:

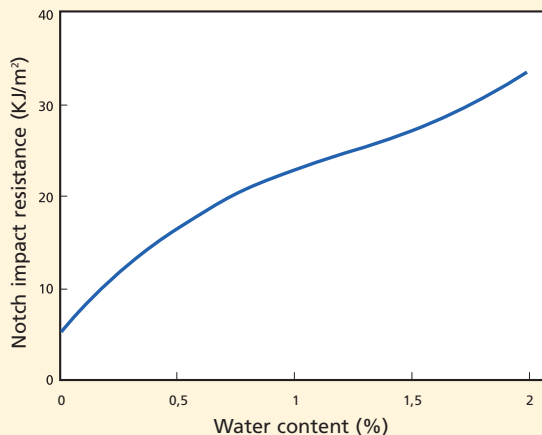
Notch impact resistance
Of **LiNOTAM** at low temperatures



Water absorption
at room temperature and at normal climate conditions (inspection tool: norm short rod)



Notch impact resistance
Of **LiNOTAM** at different water contents



LiNOTAM WS

Basically comparable with standard quality but with heat stabiliser to protect better against thermal oxidative degeneration. Colours: black

LiNOTAM MoS

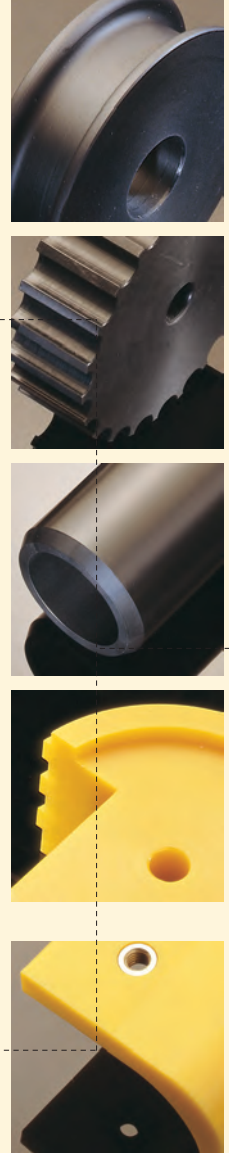
Comparable to the standard grade, **LiNOTAM MoS** achieves a higher crystallinity through the addition of Molybdenum Disulfide which makes it especially hard and wear resistant. Color: anthracite

LiNOTAMGLiDE

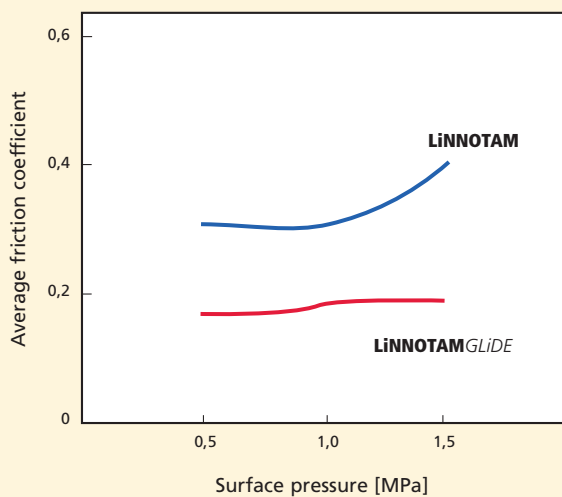
LiNOTAMGLiDE is a high crystalline modification of **LiNOTAM**, manufactured in the monomer casting process which, through the addition of oil and stabilisers, is specially designed for sliding applications. Contrary to the standard quality **LiNOTAM**, **LiNOTAMGLiDE** features a good combination of properties.

Excellent sliding properties

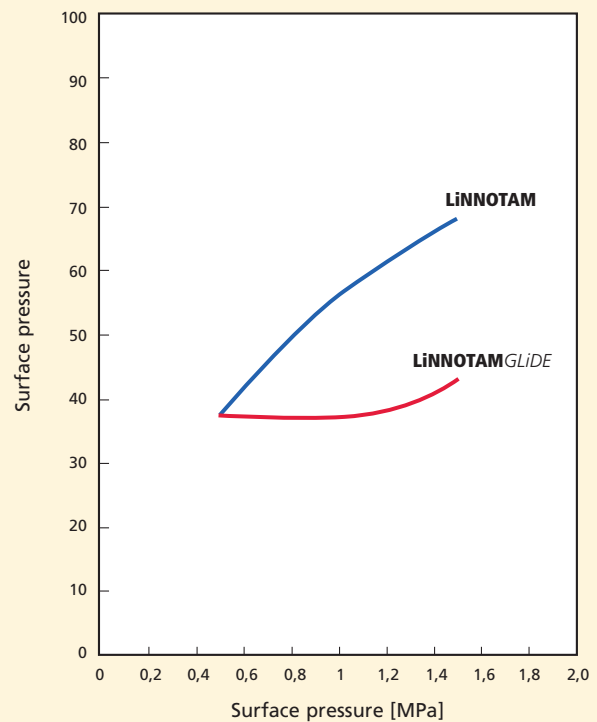
make **LiNOTAMGLiDE** a special friction bearing material for highly loaded slide and wear parts in machines and equipment. Due to the lubrication and additives in the material, a sustainable lubricating effect is achieved given for the whole life cycle. Compared to the standard quality, a 50 % reduction in friction is achieved, thus producing less frictional heat and considerably higher peak load capacity. Also the undesirable stick-slip tendency is reduced.



Coefficient of sliding friction of LiNOTAM and LiNOTAMGLiDE
Friction ring ST 50 K ($v = 1\text{ m/s}$)



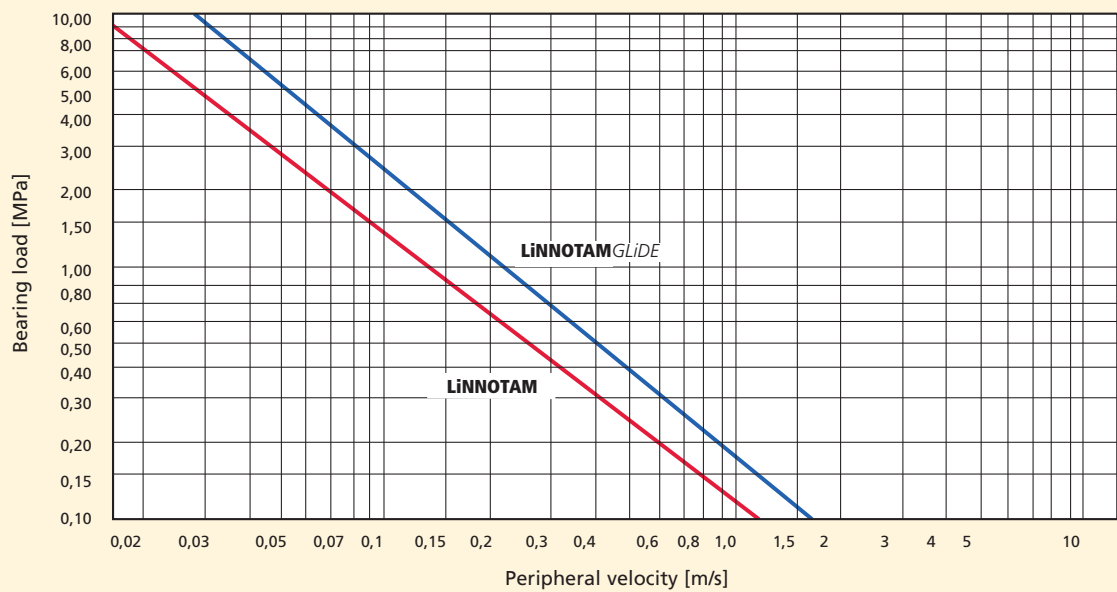
Surface temperature after 1 hour
Sliding friction of **LiNOTAM** and **LiNOTAMGLiDE** friction ring ST 50 K ($v = 1\text{ m/s}$)



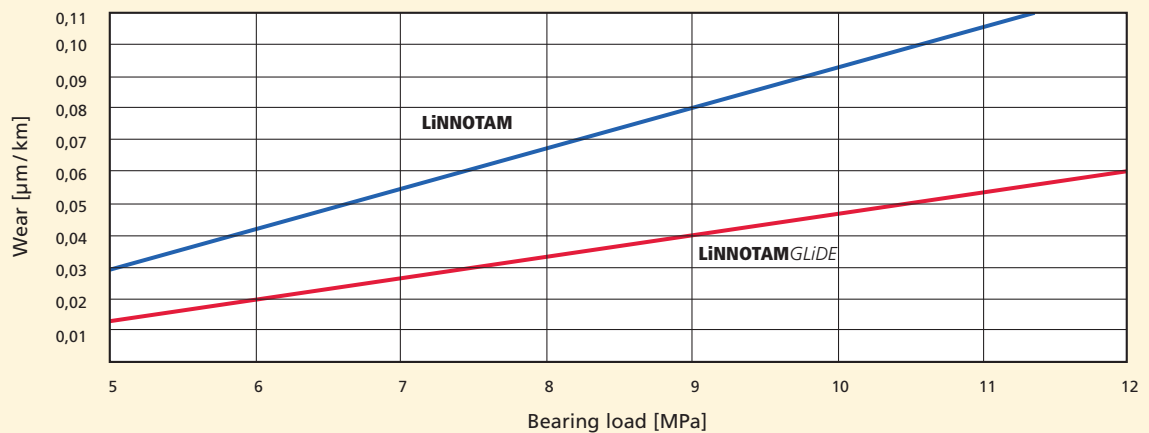
Extraordinary wear resistance

Is achieved by the fine crystal microstructure of **LiNNOTAMGLiDE** generated by the additives. Compared with standard quality, the reduced frictional heat as well as the reduced friction coefficient makes application possible at higher speeds and surface pressures. This applies not only for dry running but also for running under emergency conditions.

Load limit of **LiNNOTAMGLiDE** / **LiNNOTAM**



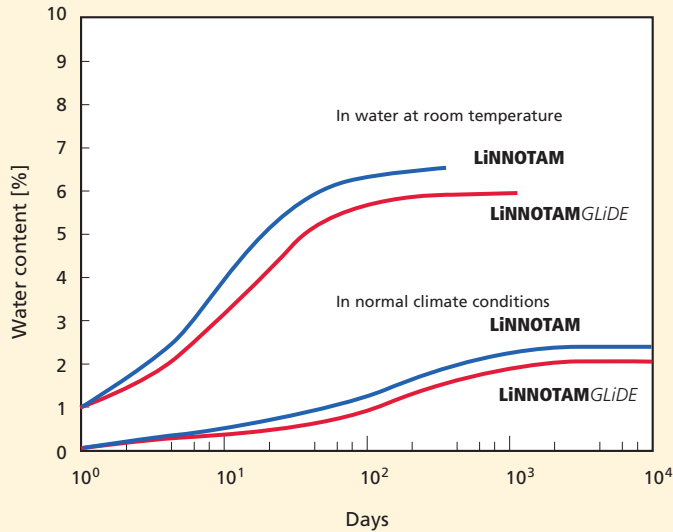
Wear rate of **LiNNOTAMGLiDE** / **LiNNOTAM**



Lower moisture absorption and dimensional stability

are the result of **LiNNOTAMGLiDE** the high crystalline molecular structure and the special additives. The low moisture absorption leads better dimensional stability and less of a reduction in the mechanical values due to moisture.

Water absorption of **LiNNOTAMGLiDE** / **LiNNOTAM**



Applications and examples

The main applications of **LiNNOTAMGLiDE** are in conveyor and transport technology as well as in machine engineering, plant construction and the automotive industry. Particularly in filling, labelling and packaging machines, **LiNNOTAMGLiDE** components are used to advantage.

LiNNOTAMGLiDE also meets the requirements of EU Regulation Nr. 10/2011 as well as the FDA requirement 21 CFR § 177.1500 and can be used in the production of components which come into direct contact with food.

Typical applications are:

- Bearings
- Guide rails
- Sprockets and chain guides
- Slide rails
- Feeder wheels
- Actuators
- Curve guides
- Gears

LiNNOTAMGLiDE

LiNNOTAM with integrated lubrication, self-lubricating effect, improved wear resistance. Colours: black, yellow, natural.

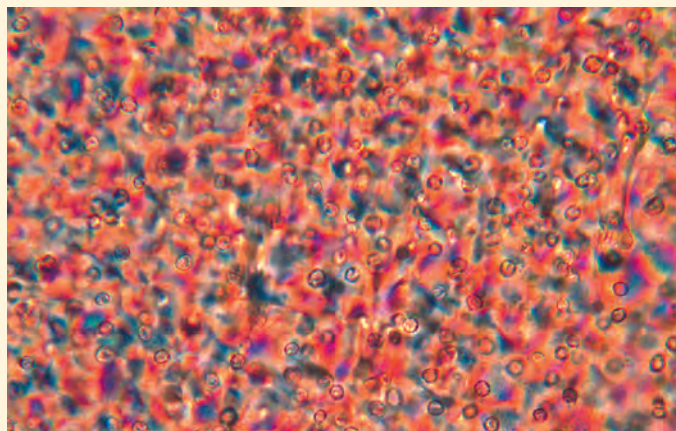
LiNNOTAMGLiDE Pro T is a monomer cast polyamide based on **LiNNOTAM** and contains a solid lubricant additive making it particularly suitable for sliding applications. It supplements the product line of bearing materials and stands for high wear resistance and long service life.

Exceptionally low friction coefficient

The lubricants contained in **LiNNOTAMGLiDE Pro T** were carefully chosen with a focus on sliding properties. The balanced composition of the material formula results in a friction coefficient of just 0.15, which is exceptionally low. Additionally, the tendency towards stick-slip effect is reliably reduced to an absolute minimum.

Homogeneous structure

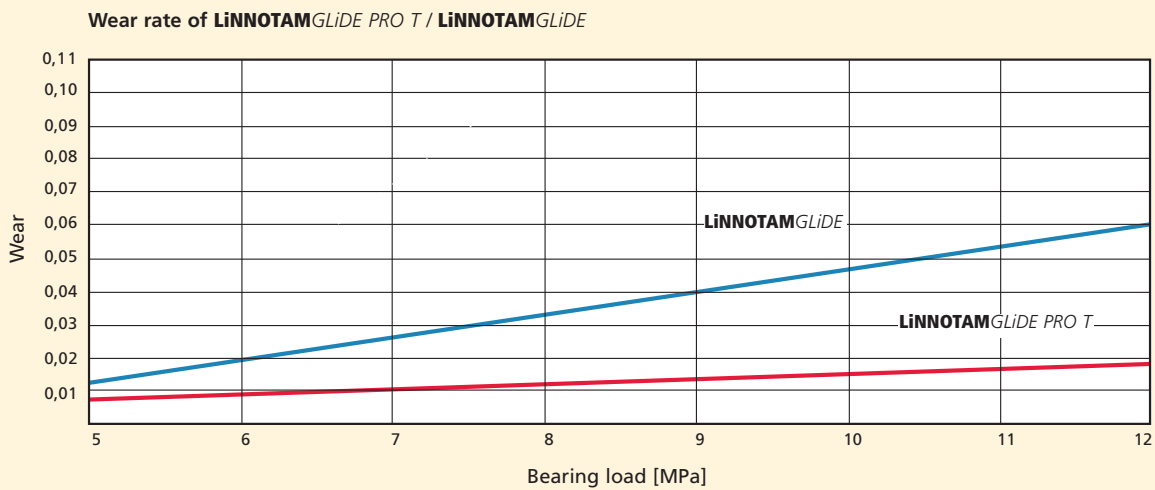
The microtome cut of **LiNNOTAMGLiDE Pro T** at 250x magnification in polarised light shows the homogeneous structure.



Microtome cut of **LiNNOTAMGLiDE Pro T**

Material characteristic

In addition to high strength, this material's main property and characteristic is especially important: the self lubricating effect and the sliding properties remain constant over the entire service life of the part. Significantly better friction values and wear values are achieved compared to unfilled **LiNNOTAM** and oil filled **LiNNOTAMGLiDE**. The combination of properties of **LiNNOTAMGLiDE Pro T** make this material the first choice for sliding and wear prone parts, especially if lubrication of the component is difficult or not desired.



Application areas

for **LiNNOTAMGLiDE Pro T** are in machine and equipment design as well as in drive and conveyor technology. Due to the carefully selected raw materials, **LiNNOTAMGLiDE Pro T** is also available in compliance with EU Regulation Nr. 10/2011 as well as the FDA requirement 21 CFR § 177.1500.

Typical applications:

- Bushings
- Cams
- Slider pads and guide strips
- Wheels
- Gears and sprockets

LiNNOTAMGLiDE Pro T

The finely distributed solid lubricants contained in the material ensure self-lubricating properties. A very low friction value brings an excellent wear resistance. Colors: gray, green, red

LiNNOTAM*Hi*PERFORMANCE 612 is a co-polyamide manufactured by static casting from the raw materials Caprolactam and Laurinlactam. Compared to pure **LiNNOTAM**, shock and impact resistance are higher in **LiNNOTAM*Hi*PERFORMANCE 612**, moisture absorption is lower, creep resistance is better and elasticity is improved. Because of these material properties, **LiNNOTAM*Hi*PERFORMANCE 612** is especially suitable for use in areas where increased shock loads and vibration are expected or where higher fatigue resistance and elasticity are required. This is achieved through its tensile strength, making it an ideal design material.

Typical applications are:

- Gears
- Toothed racks
- Pinions
- Rollers with long idle times
- Crane support pads

LiNNOTAM*Hi*PERFORMANCE 1200 is manufactured from the raw material Laurinlactam on the basis of anionic reaction in a pressureless monomer casting process. The process generates a high molecular highly crystalline material, largely stress-free, meaning that **LiNNOTAM*Hi*PERFORMANCE 1200** displays exceptional characteristics compared to other polyamides.

The main advantages of LiNNOTAM*Hi*PERFORMANCE 1200:

- Extremely low water absorption
(max. 0.9 % in normal climate conditions 25/50)
- Extremely dimensionally stable
- Excellent damping behaviour in mechanical vibrations
- Great durability even at temperatures to – 50 °C
- Very good wear resistance
- Very good slide and emergency running properties
- Low specific weight
- Good chemical and hydrolysis resistance
- Not susceptible to tension cracks

The combination of these properties makes **LiNNOTAM*Hi*PERFORMANCE 1200** the ideal partner for applications in conveyor and drive technology.

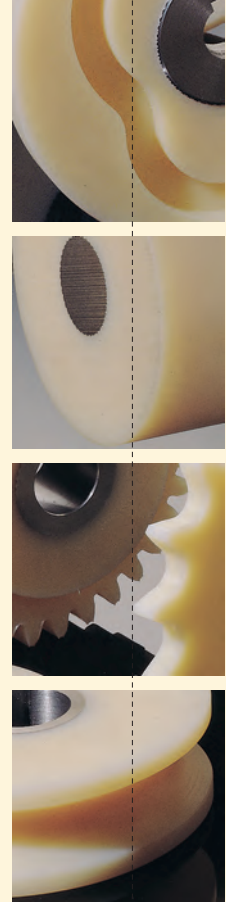
Material characteristics

Due to the highly crystalline molecular structure, material properties are created which are far superior to those of conventional polyamides in many ways. The properties typical for polyamides and appreciated by users are thus mostly retained, e.g. wear resistance / abrasion resistance and the good sliding properties, and are further supported by the special molecular structure.

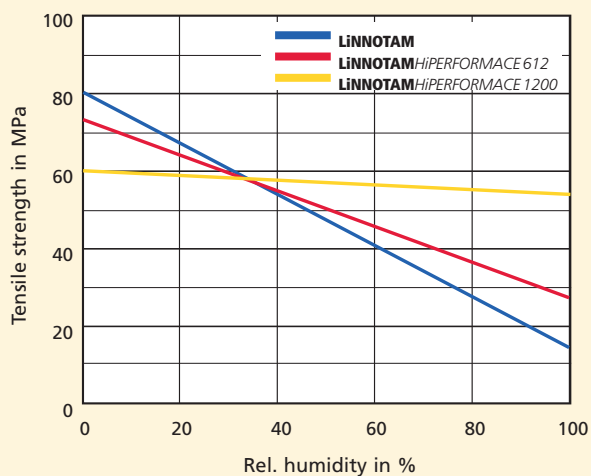
The main difference to the conventional polyamides is considered to be the material characteristics of tough yet hard. The **LiNNOTAM^{Hi}PERFORMANCE** materials exhibit a hardness which is essential for many technical applications, without becoming brittle and breakable. At the same time a high degree of toughness is assured.

A further important feature is the low tendency to absorb moisture from the ambient air. Swelling which is common to polyamides due to moisture from the environment is minimised, and the dimensional stability of engineered parts is considerably improved. Where **LiNNOTAM^{Hi}PERFORMANCE 1200** is used, dimensional changes due to moisture absorption can even be ignored, since in normal climate conditions 23/50 it absorbs a maximum of 0.9 % moisture and only 1.5 % to saturation in water. It is also used in many technical applications where hardness is a priority without becoming brittle and prone to breakage. At the same time a high toughness is assured. Furthermore the loss of rigidity due to moisture absorption is insignificant. Thus **LiNNOTAM^{Hi}PERFORMANCE 1200** is eminently suitable for engineered components for which the special properties of polyamide are essential and long term stability is required.

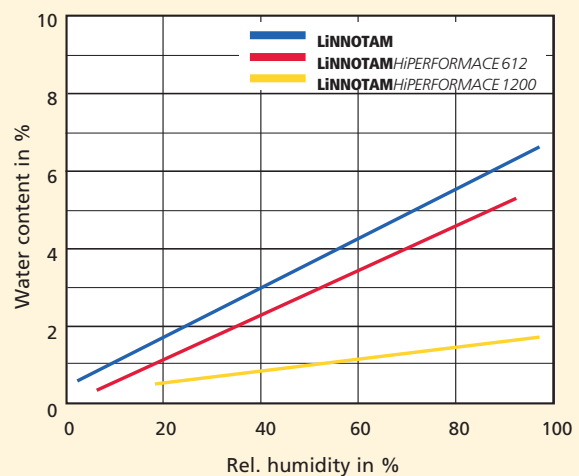
Both materials also feature improved creep resistance, higher elasticity and very good wear resistance. Furthermore their excellent mechanical damping qualities and high degree of toughness even at low temperatures are impressive.

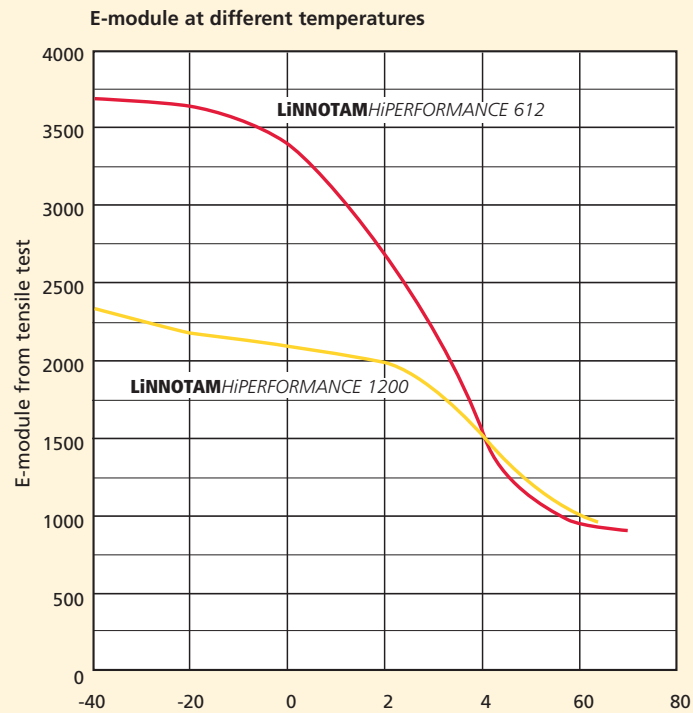


Loss of rigidity due to moisture absorption



Moisture absorption when stored in air





LiNOTAM HiPERFORMANCE 612

Polyamide with greater impact resistance, less water absorption and improved creep resistance compared to pure **LiNOTAM**.

LiNOTAM HiPERFORMANCE 1200

Cast polyamide based on Laurinlactam. Very good impact resistance, toughness, excellent dimensional stability, lowest water absorption, very good creep resistance, hydrolysis resistance, good chemical resistance.

Drive elements often transmit high torque, and to generate this high power, loads must be transmitted to the elements via the shaft-hub connection. In principle engineering plastics are suitable for these purposes. However, pure plastic designs often reach their limits in such cases. The allowable surface pressure in the keyway is often exceeded or the hubs become distorted under the high load. Furthermore, plastics are liable to notching, so that in extreme situations there is a danger that the groove in the side under load will give way. Further problems often arise when demands are made on tolerances which are not possible with plastic designs.

This is where the material varieties of **LINNOTAMDRIVE**, which have been developed for just these applications, come into use. The combination of **LINNOTAMDRIVE** with a metal core combines the advantages and specific properties of both materials in an unusual design material. The knurled metal core is completely covered with a low viscosity melt generated in the monomer casting process. After casting, the polymer cools down and shrinks onto the metal core. Between the core and the mantle, a powerful bond exists which assures optimal and dependable transmission of power.

Due to the surface structure of the metal core, a safeguard against radial and lateral slip is assured. The mantle consists of **LINNOTAMHiPERFORMANCE 600**, **LINNOTAMHiPERFORMANCE 612** or **LINNOTAMHiPERFORMANCE 1200**, whichever is preferred.

Typical applications of LINNOTAMDRIVE are:

- Gears
 - spur gears
 - worm gears
 - bevel gears
- Sprockets
- Castors, guide rollers and sheaves
- Cams
- Agitator blades
- Pump impellers

Further advantages of LiNNOTAMDRIVE:

- Combined power plastic/metal combination
- Optimal power and torque transmission
- Reliable transmission of high axle power and torque
- Calculation and manufacture of the shaft/hub connection with traditional processes and tolerances for metal
- Lower momentum mass compared to purely steel constructions
- Higher degree of true running

Practice has shown that with this surface characteristic, power and torque transmission with plastic is successful and sufficiently high power/torque values can be transmitted. Practical results are also supported by the compression and torsion tests shown in fig. 1 and 2.

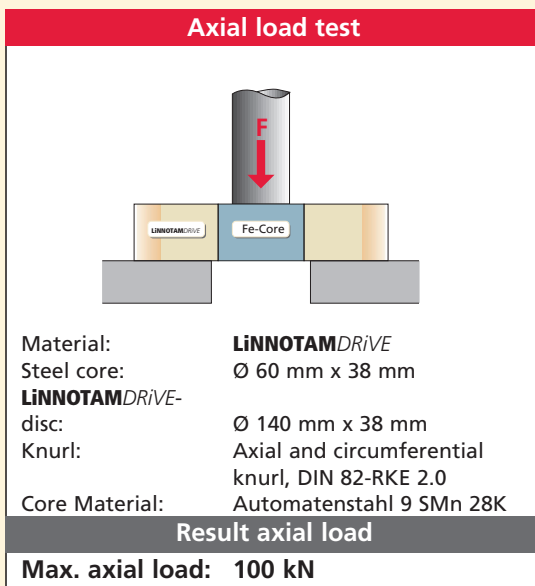


Fig. 1 Compression test

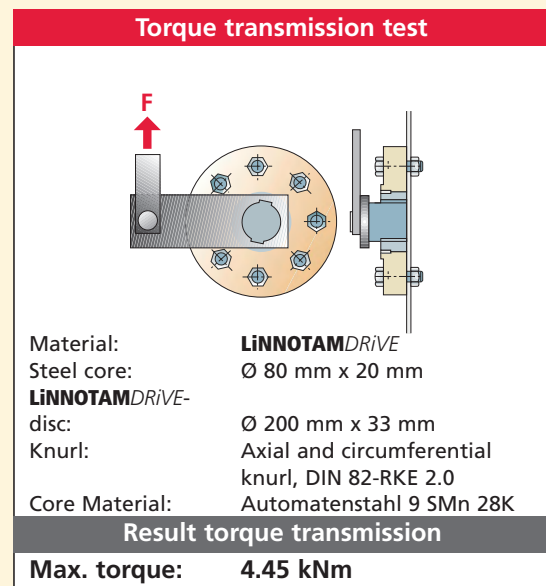


Fig. 2 Torsion test

LiNNOTAMDRIVE is equipped standard with machining steel 9 SMn 28 K as core material.

The following are also possible as core materials:

- Stainless steel
 - V2A (1.4305)
 - V4A (1.4571)
- Aluminium
- Brass

Other core materials are possible on request.

POM

Polyacetal

Extruded plastics

Polyacetal is a high crystalline thermoplastic with a high level of stability and rigidity as well as good sliding properties and wear resistance with a low level of moisture absorption. Its good dimensional stability, exceptional fatigue resistance and excellent machining properties make Polyacetal a versatile design material also for complex components. It satisfies high surface finish requirements.

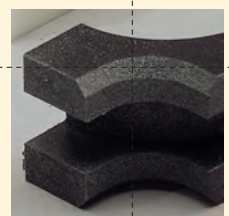
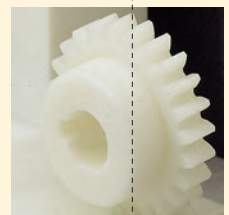
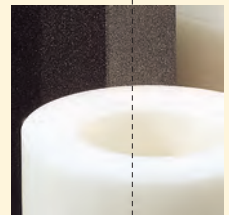
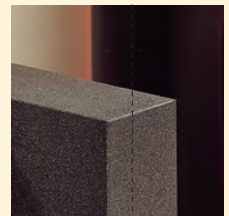
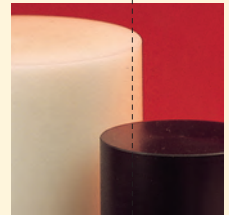
There is a difference between homopolymers (POM-H) and copolymers (POM-C), whereby the homopolymers have a somewhat higher degree of density, hardness and stability. Copolymers, however, have a higher impact toughness, greater wear resistance and thermal / chemical resistance.

The Polyacetal semi-finished products that we offer – from which we also manufacture finished products – are produced from POM-C in an extrusion process.

Main properties

- High stability
- High rigidity
- High hardness
- Good impact resistance, also at low temperatures
- Low level of moisture absorption (at saturation 0.8 %)
- Good creep resistance
- High dimensional stability
- Physiologically safe

Colours: natural, black



Sliding properties

POM-C has excellent sliding properties and good wear resistance. Together with its other outstanding properties, POM-C is well suited for sliding applications with medium to high loads. This also applies to applications where high levels of humidity or wetness are to be expected.

Because of the close static and dynamic coefficients of friction, low start-up moments can be implemented.

This does not apply to the types filled with glass, as their sliding properties are much worse than the unfilled types.

Weathering effects

POM-C is not resistant to UV rays. UV rays, in combination with atmospheric oxygen, oxidise the surface, and discolouration occurs or the surface becomes matte. If the material is subject to the effects of UV rays for a long time, it tends to become brittle.

Chemical resistance

POM is resistant to weak acids, weak and strong alkaline solutions, organic solvents such as petrol, benzene, oils and alcohols.

POM-C is not resistant to strong acids (pH < 4) or oxidising materials.

Behaviour in fire

POM-C is rated as normal flammable. When the source of ignition is removed, POM-C continues to burn, forming droplets. During thermal decomposition, formaldehyde can form. The oxygen index (= the oxygen concentration required for combustion) at 15 % is very low compared to other plastics.

Areas of Use

- General machine engineering
- Vehicle construction
- Precision mechanics
- Electrical industry
- Information technology

Applications

- Spring elements
- Bushes
- Gears
- Sliding elements
- Insulators
- Pump components
- Casing parts
- Valves and valve bodies
- Counter parts
- Precision parts

Machining

POM-C develops a fragmented chip and is thus ideally suited for machining on automatic lathes, but it is also possible to machine it on cutting machine tools. The semi-finished products can be drilled, milled, sawed, planed and turned on a lathe. It is also possible to cut threads or insert threaded parts in the material. Generally no cooling or lubricating emulsion is necessary.

To limit material deformation due to internal residual stress in semi-finished products, the parts should always be machined from the geometrical centre of the semi-finished product, removing an even quantity of material from all sides.

If maximum dimensional stability is demanded from the finished components, the parts to be manufactured should be rough machined and stored for an interim period or heat treated. The parts can then be completed. More detailed information on interim storage and heat treatment, as well as other information about machining, is provided in the chapter on "Machining guidelines" in our range of products.

PET

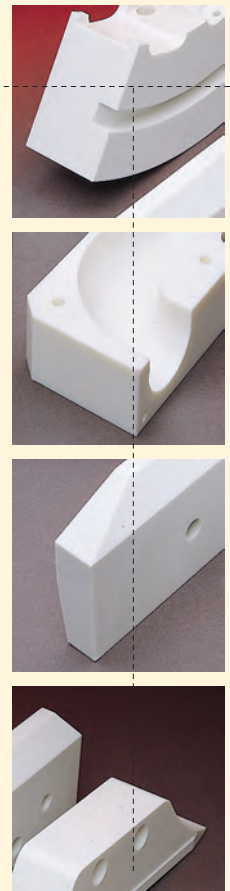
Polyethyleneterephthalate

The molecular structure of polyethyleneterephthalate can be produced either as an amorphous or semi-crystalline thermoplastic. The amorphous type is crystal clear with lower mechanical stability and inferior sliding properties.

The semi-crystalline types, on the other hand, have a high level of hardness, rigidity and stability with excellent sliding properties and low sliding abrasion. Because of its good creep resistance, low level of moisture absorption and excellent dimensional stability, the material is ideally suited for complex parts with the highest demands on dimensional stability and surface finish. For the reasons mentioned above, only the semi-crystalline type is suitable for sliding applications.

The wear resistance and sliding properties of PET-GL have been improved compared to pure PET by adding a special, homogeneously distributed solid lubricating agent.

The polyethylene terephthalate semi-finished products that we offer – and from which we also manufacture all finished products – are manufactured from semi-crystalline types in an extrusion process.



Polyethylene terephthalate

- High stability
- High rigidity
- High hardness
- Low moisture absorption (at saturation 0.5 %)
- Very good creep resistance
- Very high dimensional stability
- Constantly low sliding friction
- Very little sliding abrasion
- Physiologically safe

Colours

PET: natural, black

PET-GL: light grey

Sliding properties

PET has excellent sliding properties, very good wear resistance and, in combination with its other properties, is an excellent material for highly loaded sliding applications. This also applies to applications where high levels of humidity or wetness are expected.

The modified type PET-GL is especially suitable for highly loaded sliding applications in dry running operations due to its integrated solid lubricating agent. The solid lubricating agent "self lubricates" the PET-GL, which gives it excellent sliding properties and highest wear resistance with a much higher load-bearing strength (pv limiting value) compared to pure PET. It also prevents the stick-slip effect. The other properties are equal to those of pure PET.

Weathering effects

PET is not resistant to UV rays. The material surface changes when subjected to UV rays in combination with atmospheric oxygen. If the material is to be subjected to UV rays for longer periods, a black coloured type is recommended.

Chemical resistance

PET is resistant to weak acids and alkaline solutions, salt solutions, perchlorinated and fluorinated hydrocarbons, oils, fuels, solvents and surface-active substances. Strong polar solvents have an irreversible swelling effect. PET is not resistant to strong acids or alkaline solutions, esters, ketones or chlorinated hydrocarbons.

Behaviour in fire

PET is rated as normal flammable. When the source of ignition is removed, PET continues to burn, forming droplets. The oxygen index (the oxygen concentration required for combustion) at 23 % is average compared to other plastics.

Areas of use

- General machine engineering
- Vehicle construction
- Precision mechanics
- Electrical industry
- Information technology

Applications

- Ratchet wheels
- Bushes
- Gearwheels
- Sliding elements
- Insulators
- Casing parts
- Counter components
- Precision bearings
- Cam disks

Machining

PET develops a brittle, flowing chip and is suitable for machining on automatic lathes, but it can also be machined on cutting machine tools. The semi-finished products can be drilled, milled, sawed, planed and turned on a lathe. It is also possible to cut a thread into the material or insert a threaded element. Generally no cooling or lubricating emulsion is necessary.

Polyamide 6 (PA 6) is the best known extruded polyamide and offers a combination of all typical polyamide material properties. Compared to the cast varieties however, this variety displays higher water absorption, is less wear resistant and has less dimensional stability. Furthermore, because of the manufacturing process, only a limited size range and unit weight can be produced. This restricts the design possibilities of the user.

The main properties of PA 6 are:

- Good mechanical stability
- High impact resistance
- Good damping properties

Typical application examples are:

- Gears and sprockets
- Hammer heads
- Impact and shock resistant components

PA 66 is used in smaller dimensioned applications and offers higher rigidity and wear resistance compared to PA 6. Compared to the cast varieties, this material also has higher water absorption. Regarding the other properties, PA 66 is comparable to the standard cast type PA 6 G, however it is much more costly. As in the case of PA 6, the manufacturing process limits the size and unit weight which can be produced, and this restricts the design possibilities of the user. Therefore PA 66 in practical application is replaced to a large extent by the more economical PA 6 G, which can also be produced in almost unlimited sizes.

The main properties of PA 66 are:

- Good mechanical stability
- High impact resistance
- Good damping properties
- Good wear resistance

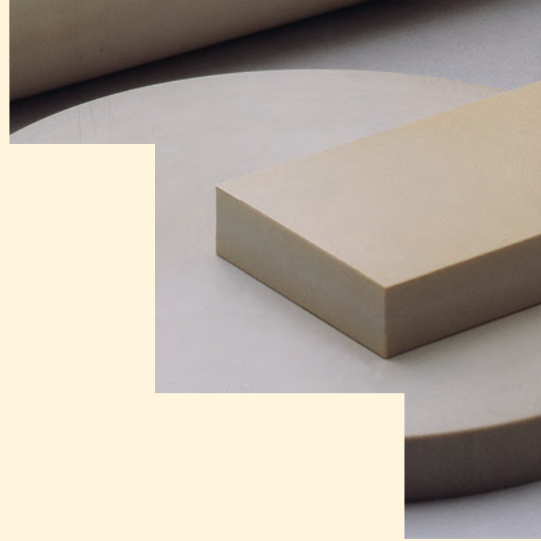
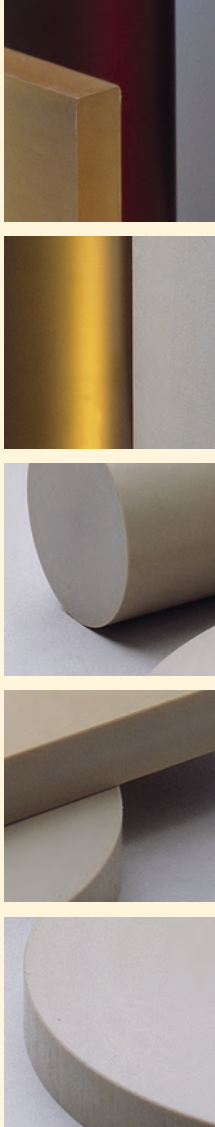
Typical application examples are:

- Friction bearings
- Slide plates
- Gears and sprockets

PA 66 GF 30

Polyamide 66 + 30 % glass fibre

Compared to unreinforced PA 66, the combination with glass fibre produces an improved pressure and tension resistance, rigidity and dimensional stability as well as low water absorption. Glass fibre reinforced Polyamide 66 is therefore particularly suitable for components which are subjected to high stress and/or high demands on the dimensional stability.



LICHARZ
HIGH-TEMPERATURE PLASTICS:

PEEK

PEEK

Polyetheretherketone

Polyetheretherketone is a semi-crystalline thermoplastic with excellent sliding properties, very good mechanical properties, even under thermal load and has excellent resistance to chemicals. The high continuous working temperature rounds out the profile of this high-performance plastic and makes it a virtually universally useable design material for highly stressed parts. The polyetheretherketone semi-finished products that we offer – from which we also manufacture finished parts – are produced in extrusion or press processes.

Main properties

- High continuous working temperature (+ 250 °C in air)
- High mechanical strength
- High rigidity
- High creep resistance, also at high temperatures
- Good sliding properties
- High wear resistance
- High dimensional stability
- Excellent chemical resistance
- Hydrolysis resistant
- Good electrical insulator
- Radiation resistant
- Physiologically safe
- Fire resistant (UL 94 V 0)

Colours: natural (similar to RAL 7032), black

Sliding properties

PEEK combines ideal sliding properties with high mechanical strength and heat stability as well as superb chemical stability. It is therefore particularly suited to sliding functions. For construction parts particularly subject to high friction loads and wear, there is a version modified with carbon fibre, PTFE and graphite available, which gives highest resistance to wear, low friction values and high pv limit values.

Resistance to weathering

PEEK is resistant to X rays, β -rays and γ -rays. Hence PEEK is ideal for use in the pharmaceutical and nuclear industries. PEEK is not resistant to UV rays in combination with atmospheric oxygen.

Chemical resistance

PEEK is resistant to non-oxidising acids, concentrated alkaline solutions, salt solutions, cleaning agents and paraffin oils. It is not resistant to oxidising agents such as concentrated sulphuric acid, nitric acid or hydrogen fluoride.

Behaviour in fire

PEEK is rated fire resistant in the highest category. When the source of ignition is removed PEEK is self-extinguishing. The oxygen index (the oxygen concentration required for combustion) is 35 %.

Areas of use

- Chemical and petrochemical industries
- Pharmaceutical industry
- Food industry
- Nuclear industry
- Aerospace industry
- Defence technology

Applications

- Gears
- Friction bearings
- Spools
- Fittings (e.g. housings for hot water meters)
- Valves
- Piston rings
- Parts for car engines (e.g. bearing cages)

Machining

In addition to its good welding and bonding properties PEEK can be easily machined. The semi-finished products can be drilled, milled, sawed, planed and turned on a lathe. It is also possible to cut a thread into the material or insert a threaded element. Generally no cooling or lubricating emulsion is necessary.

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