



Edition 2014 / 15

*Semi-Finished
Engineering Plastic Products*

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TECAFORM

TECAMID

TECAST
TECARIMTECADUR
TECAPET

TECANAT

TECAFLON

TECASON
TECAPEI

TECATRON

TECAPEEK

TECATOR


TECASINT


Others

Special
materials

Appendix

Index

Polymer	Ensinger Name	Raw material group			
			page	page	page
ABS	TECARAN ABS	Acrylonitrile-butadiene-styrene-graft copolymer	64	65	
E/CTFE	TECAFLOX ECTFE	Ethylene/Chlorotrifluoroethylene			
E/TFE	TECAFLOX ETFE	Ethylene Tetrafluoroethylen copolymer	40		
PA 6	TECAMID 6	Polyamide 6	21	23, 85	25
PA 6	TECAMID 6 MO black	Polyamide 6, with MoS ₂ (black)	21	23	
PA 6	TECAMID 6 blue	Polyamide 6 (blue)	68	69	
PA 6	TECAMID 6 ID blue	TECAMID 6, detectable filler	68	69	
PA 6	TECAMID 6 GF30 black	Polyamide 6, glass fibre (black)	22	24	
PA 6-3	TECAMID 6/3 TR natural	Polyamide 6-3 (transparent)			
PA 6 C	TECAST T	Cast Polyamide 6	27	28	30, 31
PA 6 C	TECAST T MO black	Cast Polyamide 6, MoS ₂ (black)	27	28	
PA 6 C	TECAST L	Cast Polyamide 6, oil	27	28	
PA 6 C	TECAGLIDE green	Cast Polyamide 6, lubricated	27	28	
PA 6 C	TECARIM 1500	Cast Polyamide 6, elastomer	29	29	
PA 11	TECAMID 11	Polyamide 11			
PA 12	TECAMID 12	Polyamide 12	21	23	
PA 46	TECAMID 46 red brown	Polyamide 46 (red brown)		24	
PA 66	TECAMID 66	Polyamide 66	21	23, 85	
PA 66	TECAMID 66 HI brown	Polyamide 66, heat-stabilized	21	23	
PA 66	TECAMID 66 GF30 black	Polyamide 66, glass fibre (black)	22	24	
PA 66	TECAMID 66 CF20 black	Polyamide 66, carbon fibre (black)	22	24	
PA 66	TECAMID 66 SF20	Polyamide 66, aramide fibre			
PA 66	TECAMID 66 LA natural	Polyamide 66, solid lubricant	21	23	
PA 66	TECAMID 66 MO black	Polyamide 66, with MoS ₂ (black)	21	23	
PA 66	TECAMID 66/X GF50 black	Polyamide-copolymer, glass fibre (black)			
PAI	TECATOR 5013 natural	Polyamidimide	56	56, 62	
PAI	TECATOR 5031 PV black	Polyamidimide, graphit, PTFE	56	56	
PBT	TECADUR PBT	Polybutylene terephthalate			
PBT	TECADUR PBT GF30	Polybutylene terephthalate, glass fibre	34	35	
PC	TECANAT	Polycarbonate (transparent)	37	38, 85	
PC	TECANAT CMP natural	Polycarbonate, for semiconductor technology			79
PC	TECANAT GF30	Polycarbonate, glass fibre	37	38	
PC	TECANAT MT natural	Polycarbonate (transparent)	73	77	
PCTFE	TECAFLOX PCTFE natural	Polychloro-trifluoroethylene			
PE-HD	TECAFINE PE	High density polyethylene (natural and black)			
PE-HMW	TECAFINE PE5	High-molecular weight polyethylene			
PE-UHMW	TECAFINE PE10	Ultra-high-molecular weight polyethylene			
PEEK	TECAPEEK natural	Polyetheretherketone	49	51	52
PEEK	TECAPEEK black	Polyetheretherketone (black)	49		
PEEK	TECAPEEK bright red	Polyetheretherketone (bright red)	54	54	
PEEK	TECAPEEK GF30	Polyetheretherketone, glass fibre	50	51	
PEEK	TECAPEEK CF30 black	Polyetheretherketone, carbon fibre (black)	50	51	
PEEK	TECAPEEK PVX black	Polyetheretherketone, carbon fibre, PTFE, graphite (black)	50	51	53
PEEK	TECAPEEK ELS nano black	Polyetheretherketone, CNT	54	54	
PEEK	TECAPEEK blue	Polyetherether ketone (blue)	68	69	
PEEK	TECAPEEK TF10 blue	Polyetheretherketone, PTFE (blue)	68		
PEEK	TECAPEEK ID blue	Polyetheretherketone, detectable filler	68	69	
PEEK	TECAPEEK CMP natural	Polyetherether ketone, for semiconductor technology			79
PEEK	TECAPEEK SE natural	Polyetheretherketone, for semiconductor technology			79
PEEK	TECAPEEK CMF	Polyetheretherketone, ceramics	54	54	
PEEK	TECAPEEK TS grey	Polyetheretherketone, mineral filler	54	54	
PEEK	TECAPEEK PNT black	Polyetheretherketone, glass fibre, CNT	54	54	
PEEK	TECAPEEK MT	Polyetheretherketone, for medical technology	72	76	
PEEK	TECAPEEK MT XRO	Polyetheretherketone, for medical technology			
PEEK	TECAPEEK MT CF30 black	Polyetheretherketone, carbon fibre (black), for medical technology	73	76	

Polymer	Ensinger Name	Raw material group			
			page	page	page
PEEK	TECAPEEK MT CLASSIX white	Polyetheretherketone, for medical technology	73		
PEEK	TECATEC PEEK MT CW50 black	Polyetheretherketone, carbon fibre, composite, for medical technology			
PEKK	TECATEC PEKK MT CW60 black	Polyetherketoneketone, carbon fibre, composite, for medical technology			
PEK	TECAPEEK HT black	Polyetherketone	49	51	
PEKEKK	TECAPEEK ST black	Polyetherketoneetherketoneketone	49	51	
PEI	TECAPEI	Polyetherimide	43	44	
PEI	TECAPEI MT	Polyetherimide, for medical technology			
PEI	TECAPEI GF30	Polyetherimide, glass fibre	43	44	
PES	TECASON E natural	Polyethersulphone	43	44	
PES	TECASON E GF30 black	Polyethersulphone, glass fibre			
PET	TECAPET white	Polyethylene terephthalate	33	35	
PET	TECAPET black	Polyethylene terephthalate (black)	33	35	
PET	TECAPET TF grey	Polyethylene terephthalate, PTFE	33	35	
PET	TECADUR PET	Polyethylene terephthalate			85
PET	TECADUR PET CMP natural	Polyethylen terephthalate, for semiconductor technology			79
PI	TECASINT 1000	Polyimide	59, 60	61, 62	
PI	TECASINT 2000	Polyimide	59	61	
PI	TECASINT 4000	Polyimide	59	61	
PI	TECASINT 5000	Polyimide	59	61	
PI	TECASINT 8000	Polyimide	59	61	
PMP	TECAFINE PMP natural	Polymethyl pentene (transparent)	64	65	
POM-C	TECAFORM AH natural	Polyoxymethylene copolymer	15	17, 18	19
POM-C	TECAFORM AH black	Polyoxymethylene copolymer (black)	15	17, 18	
POM-C	TECAFORM AH GF25	Polyoxymethylene copolymer, glass fibre	16	17, 18	
POM-C	TECAFORM AH LA blue	Polyoxymethylene copolymer, solid lubricant (blue)			
POM-C	TECAFORM AH ELS black	Polyoxymethylene copolymer, conductive carbon	15	17, 18	
POM-C	TECAFORM AH SD natural	Polyoxymethylene copolymer, antistatic agent		18	
POM-C	TECAFORM AH blue	Polyoxymethylene copolymer (blue)	68	69	
POM-C	TECAFORM AH ID	Polyoxymethylene copolymer, detectable filler	68	65	
POM-C	TECAFORM AH MT	Polyoxymethylene copolymer, for medical technology	75		
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POM-H	TECAFORM AD black	Polyoxymethylene homopolymer (black)	15	17, 18	
POM-H	TECAFORM AD AF natural	Polyoxymethylene homopolymer, PTFE	15	17, 18	
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PP	TECAPRO MT	Polypropylene, for medical technology		76	
PP	TECAPRO AM natural	Polypropylene, antimicrobial		76	
PPE	TECANYL 731 grey	Polyphenylene ether	64	65	
PPE	TECANYL GF30	Polyphenylene ether, glass fibre	64	65	
PPE	TECANYL MT	Polyphenylene ether, for medical technology	75		
PPS	TECATRON	Polyphenylene sulphide	46	47	
PPS	TECATRON GF40	Polyphenylene sulphide, glass fibre	46	47	
PPS	TECATRON PVX black	Polyphenylene sulphide, carbon fibre, PTFE, graphite (black)	46	47	
PPS	TECATRON CMP natural	Polyphenylene sulphide, for semiconductor technology			79
PPS	TECATRON SE natural	Polyphenylene sulphide, for semiconductor technology			79
PPSU	TECASON P	Polyphenylene sulphone	43	44	
PPSU	TECASON P blue	Polyphenylene sulphone (blue)			
PPSU	TECASON P MT	Polyphenylene sulphone, for medical technology	74	76	
PPSU	TECASON P MT XRO	Polyphenylene sulphone, for medical technology, contrast agent	74		
PPSU	TECASON P VF	Polyphenylene sulphone, vacuum formable			87
PSU	TECASON S	Polysulphone	43	44	
PSU	TECASON S GF30	Polysulphone, glass fibre			
PTFE	TECAFLON PTFE natural	Polytetrafluoroethylene	40	41	
PTFE	TECAFLON PTFE GF25 natural	Polytetrafluoroethylene, glass fibre			
PTFE + PI	TECASINT 8001 yellow-brown	Polytetrafluoroethylene + Polyimide			
PVDF	TECAFLON PVDF	Polyvinylidene fluoride	40	41	
PVDF	TECAFLON PVDF ELS	Polyvinylidene fluoride, conductive carbon			

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A solid foundation for quality products

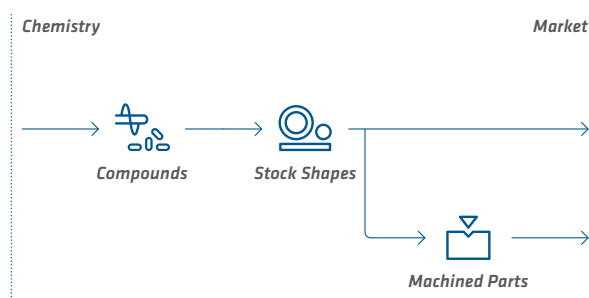
Stock shapes made of technical plastics form the basis for a wide range of new applications. Polymer materials are a key driving force for technological progress. Plastics have a whole array of benefits to offer and in many cases can effectively replace metals or ceramics. And what's more: They often provide the only alternative when it comes to the implementation of unusual technical applications - which makes them a true pacemaker for innovation. Engineering and high-performance plastics are now commonly used in every key field of industry.

Ensinger offers extruded, cast and pressed round rods, plates and tubes in a wide range of dimensions and colours. We keep a permanent stock of popularly used thermoplastics and their most important modifications always on hand in our European warehouse in Nufringen. We also manufacture semi-finished products specifically to customer requirements.

Ensinger covers the entire value chain, from compounding to machining. Additional process technologies, such as profile extrusion, injection and polyamide casting, also belong to our portfolio.

Our stock shapes are cut and machined to individual customer orders with close tolerances guaranteed. Finished part manufacturers who require only minimal quantities of stock shapes for a small production run or to produce a prototype derive just as much benefit from our cutting and surface machining services as do large-scale buyers. By planing, grinding and contour planing we are able to achieve wide-ranging high-precision solutions.

And our customers may rest easy in the assurance of compliance with stringent quality standards every time. Strict guidelines and the deployment of a skilled workforce safeguard all the individual processes, from incoming raw materials right through to the finished product.



Materials for every conceivable application

Our portfolio contains standard, engineering and high performance plastics with property profiles to suit an enormous range of applications:

Standard plastics

This category includes polyolefins such as PMP, PP and PE. These materials offer an ideal characteristic profile for a wide range of standard requirements at temperatures up to 100 °C.

Engineering plastics

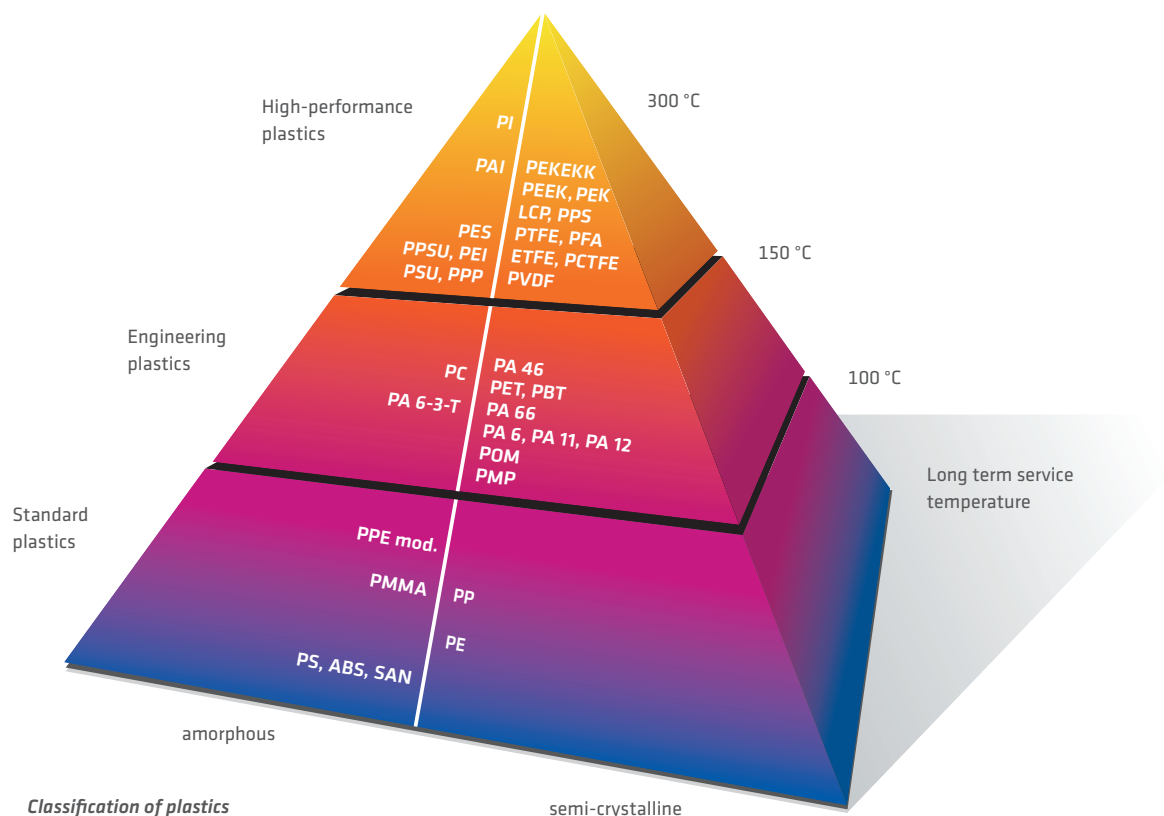
Engineering plastics can be used continuously at temperatures of up to 100 °C or 150 °C. Polyamides (PA), polyacetals (POM) and polyester (PET, PC) which also belong to this group are referred to as technical thermoplastics. These materials demonstrate good mechanical characteristics and a high degree of chemical and wear resistance. Material blends and modifications permit product characteristics to be optimized across a broad range to suit different applications. Engineering plastics consequently cover a wide spectrum of different properties.

As the class designation indicates, easy-to-machine engineering plastics are frequently used to produce technical components for applications in the automotive, manufacturing and engineering industries, in electronic and electrotechnical applications and in the food, transport or household appliances sector.

High performance plastics

The success achieved by high-performance plastics is based on a combination of material benefits which are brought to bear even at raised temperature levels. These include, in particular, good mechanical properties supported by extreme chemical resistance. The long-term service temperatures of materials such as PEEK, PPS and PSU are between 160 °C and 260 °C, and for polyimides are significantly higher. Other important benefits include radiation resistance, excellent fire resistance (self extinguishing) and good electrical properties. Using special additives, thermal dimensional stability and rigidity can be enhanced, tribology improved, or electrical conductivity adjusted.

High-performance plastics are used wherever customary plastics reach the limits of their technical properties or where a customer wishes to save weight by replacing metal with plastic.



Our experts will be pleased to offer their advice

Material selection

It is only with the correct material that a design can achieve its required functionality, safety and service life. It is primarily, the application conditions that determine the selection of materials. Alongside the planned application, the search for a suitable plastic also takes into account all further developmental detail requirements.

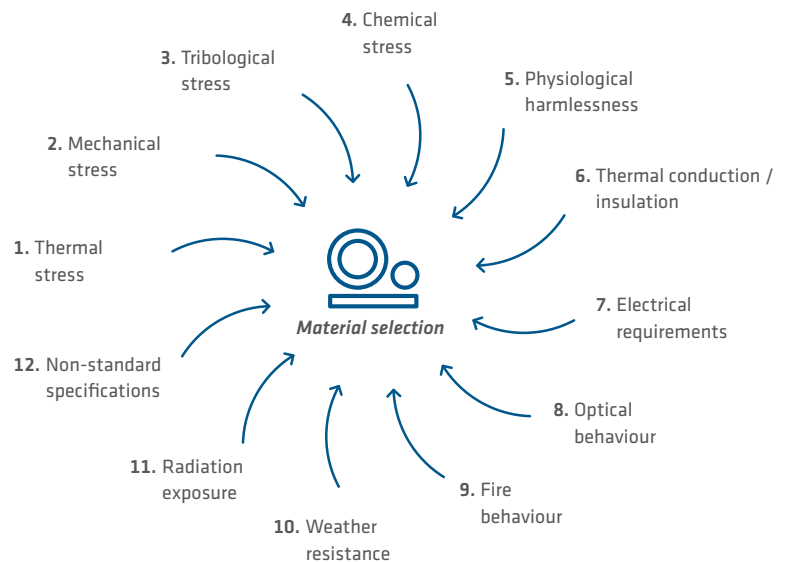
Technical application service

Material experts can provide users with a qualified material recommendation by comparing the available information with the technical data and industry-specific experience data. During the component design phase, the suitability of a plastic can be reviewed at an early stage with the aid of calculation tools. However, any selected material must be confirmed by practical testing.

In close coordination with your specific requirements, our experienced material specialists will find the most suitable plastic and the right process technology to fit your needs.

If you have questions regarding material selection or machining recommendations, our technical service at the headquarters in Nufringen will be happy to help you. You can reach the application engineers by telephone at +49 7032 819 101 or e-mail at:

techservice.shapes@de.ensinger-online.com



Criteria for optimum material selection





Quality and expertise

Supply reliability

An efficient system of stock management ensures that our branches and trading partners receive all their deliveries – whether extremely high quantities or special one-off supplies – with the shortest possible delay or to schedule. The expansion at the Nufringen headquarters connects semi-finished goods production and logistics more closely to each other. The modern high-rack warehouse has 2,500 storage spaces, and the fully automatic conveyor system permits shelf picking with containers of up to 3 m in length and weight of 2.5 t. Registered customers can query the stocking and availability of required materials in the appropriate dimensions around the clock online. As a result, you can plan in both the short-term and long-term.

Quality

For a company operating successfully on a global scale, only the most stringent quality standards are good enough. We invest continuously in research and development to allow us to address future demands with innovative high-tech materials and process technologies. Strict CAQ guidelines are implemented to safeguard the individual process steps from incoming raw materials right through to the finished product. Ensinger is certified to DIN EN ISO 9001 as well as DIN EN ISO 13485.

Product Compliance Management

National and international statutory requirements create the framework for defining the physiological harmlessness and environmental compatibility of materials. Our Product Compliance Management system allows us to ensure compliance of our materials and their production with these requirements through measures such as regular material testing. In close co-operation with our raw material suppliers, we make available all the information you will require for approval of your end products.

Expertise in theory and practice

As industrial demands become ever more stringent, the diversity and complexity of materials increase. Ensinger keeps pace with these advances by the continuous further development of its semi-finished product portfolio. Many products can only be used optimally if they are further processed with expertise. And so we provide a wide range of information in our brochures, data sheets and product handling sheets. Moreover, we offer our customers training in plastics with strong relevance to practice. The seminars are led by our application engineers.

Added value for you

Ensinger is currently expanding its internet customer service offering. Online calculation facilities allow quick and convenient processing. Our stock shapes are cut and machined to individual customer order for the specific application. We also provide a wide range of standard finish machining operations.

Our service includes:

- Sawing of plates, round rods and tubes
- Grinding of rods and tubes
- Thickness processing
- Profile milling
- Combined work processes

You can find additional information on the following page.

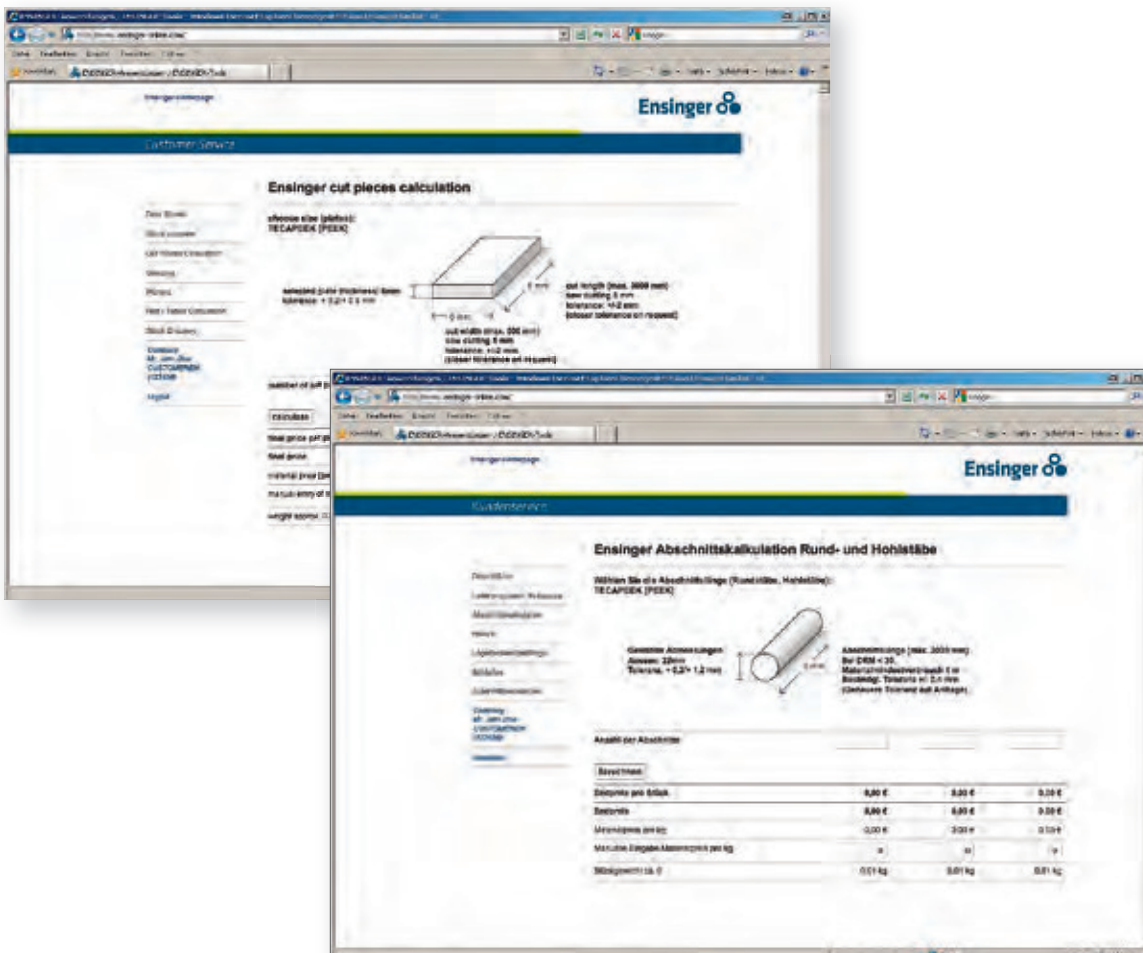
24 hours a day, 7 days a week

If you wish to use the cutting and surface processing service, a number of calculation programs are available on our website. Using the cutting and machining calculation program, for instance, you can quickly and easily determine which dimensions or piece numbers will allow the greatest savings.

You can find out any time around the clock whether the material you require is available from stock in the right dimensions. Our online enquiry tool permits registered customers to enquire about current stock availability. Cut pieces can be despatched if required within just a few hours.

Information in multiple languages

To supplement this product catalogue, in-depth information is provided on the offered stock shapes on our multi-lingual website www.ensinger-online.com. Information supplied includes for instance technical criteria for material selection, data sheets, declarations of conformity, general product liability information and our brochure „Machining recommendations for semi-finished engineering plastics“.

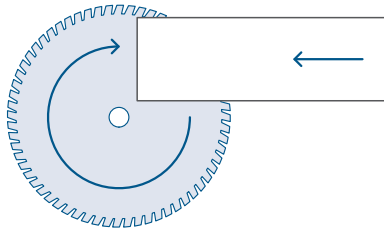


Flexible – versatile – the finished solution for your application needs

We can carry out further machining of your stock shapes in line with your envisaged finished product. An experienced team of skilled machining specialists using our state-of-the-art machine shops will ensure that any machining operation you require is performed to the highest quality standard, even with tight tolerances.

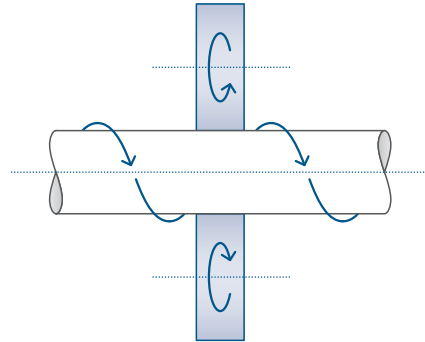
Individual work steps can also be combined. If required, we anneal the material between work stages to ensure that the end result complies precisely with your specification.

Sawing



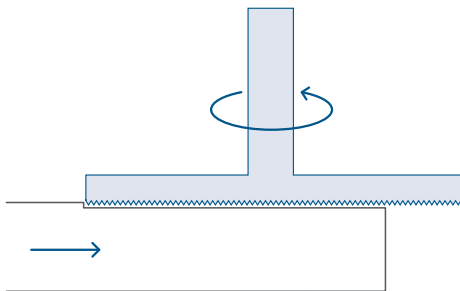
We produce sections and cut pieces in a very wide range of different dimensions: Panel sections can be cut in unreinforced materials from dimensions up to 170 x 1200 x 3200 mm, rods and tubes in a minimum length of 10 mm and diameters of up to 360 mm. In reinforced materials, restrictions apply in some cases in respect of tolerances or the maximum possible machinable dimensions. If necessary, we saw the material when warm to ensure top quality results.

Grinding



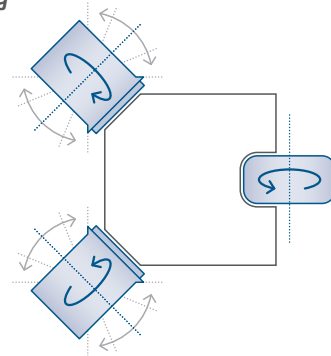
We grind on ultramodern grinding centres, depending on the material and dimensions, up to a diameter of 90 mm and up to h9 (depending on diameter and material). Successful grinding requires not only the best possible machine pool but also a high level of skill and an expert's feel for the material. It produces rods and tubes machined to an exemplary level of surface quality, with narrow tolerances and good concentricity characteristics.

Thickness processing



Two-sided cutting using rotation cutting machines allows for very tight tolerances and ideal surface qualities – even for fibre-reinforced plastics. Four-sided planing machines are available for angular planing and mouldings.

Profile milling



Simpler geometries can be supplied with precise position and shape tolerances using profile milling. This method is used in particular for the manufacture of profiles. On request, we are also able to debur edges, cut T profiles or angles, produce rebates or radii between 3 mm and 20 mm.



TECAFORM

Polyoxymethylene (POM) – TECAFORM – is a semi-crystalline thermoplastic offering high strength and rigidity. The polymer has good sliding properties and wear resistance, as well as low moisture absorption. Its good level of dimensional stability and particularly good fatigue

strength, as well as its outstanding machining properties make POM a versatile engineering material for complex components. A distinction is drawn between homopolymers (POM-H) – TECAFORM AD – and copolymers (POM-C) TECAFORM AH.

Overview of types

TECAFORM AH natural
(POM-C)
Good chemical resistance.
High resilience.

TECAFORM AH black
(POM-C)
Good UV stability.
Very good machining properties.

TECAFORM AH blue
(POM-C)
→ p. 66

TECAFORM AH GF25 natural
(POM-C GF)
Glass fibre reinforced polyacetel with very high strength.
High thermal dimensional stability.

TECAFORM AH MT
(POM-C)
→ p. 70

TECAFORM AH ID
(POM-C, detectable filler)
→ p. 66

TECAFORM AH ELS black
(POM-C, conductive carbon)
→ p. 84

TECAFORM AH SD natural
(POM-C, antistatic)
→ p. 84

TECAFORM AD natural
(POM-H)
High mechanical strength.
Very good machining properties.

TECAFORM AD AF natural
(POM-H TF)
Very good slide friction properties due to PTFE component.
Low water absorption.

On request:

TECAFORM AH LA blue
(POM-C, solid lubricant)
Very good sliding and abrasion values.
Low water absorption.

TECAFORM AD GF20 natural
(POM-H GF)
Highly abrasion resistant.
Easily weldable.

Application examples

Sealing plug
TECAFORM AH natural
(POM-C)
High dimensional stability.
Good sliding properties.
Resistant to oil and grease.



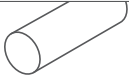
Conveyor chain elements
TECAFORM AD natural
(POM-H)
Good strength.
Good sliding properties.
Good machining capability.



Sealing piston
TECAFORM AH black
(POM-C)
Good resilience.
Good strength.
High dimensional stability.



TECAFORM Rods

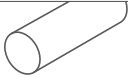
	TECAFORM AH natural	TECAFORM AH black	TECAFORM AH ELS black	TECAFORM AD natural	TECAFORM AD black	TECAFORM AD AF natural	
							
Polymer	POM-C	POM-C	POM-C	POM-H	POM-H	POM-H	
Density [g/cm ³]	1.41	1.41	1.41	1.43	1.43	1.49	
Colour	white opaque	black opaque	black opaque	white opaque	black opaque	dark brown opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
3	0.013	0.013		0.013	0.013		+0.10/+0.60
4	0.021	0.021		0.022	0.022		
5	0.032	0.032		0.033	0.033		
6	0.046	0.046	0.046	0.046	0.046	0.048	
8	0.080	0.080	0.080	0.081	0.081	0.084	+0.10/+0.70
10	0.122	0.122	0.122	0.124	0.124	0.129	
12	0.176	0.176	0.176	0.179	0.179	0.187	+0.20/+0.80
14	0.237	0.237	0.237	0.241	0.241	0.251	
15	0.271	0.271	0.271	0.275	0.275	0.287	
16	0.308	0.308	0.308	0.312	0.312	0.325	
18	0.387	0.387	0.387	0.392	0.392	0.409	
20	0.475	0.475	0.475	0.481	0.481	0.502	
22	0.577	0.577	0.577	0.585	0.585	0.610	+0.20/+1.00
25	0.740	0.740	0.740	0.751	0.751	0.782	
28	0.924	0.924	0.924	0.937	0.937	0.976	
30	1.06	1.06	1.06	1.07	1.07	1.12	
32	1.21	1.21	1.21	1.22	1.22	1.28	+0.20/+1.20
36	1.52	1.52	1.52	1.54	1.54	1.61	
40	1.87	1.87	1.87	1.90	1.90	1.98	
45	2.37	2.37	2.37	2.40	2.40	2.50	+0.30/+1.30
50	2.91	2.91	2.91	2.96	2.96	3.08	
56	3.64	3.64	3.64	3.70	3.70	3.85	
60	4.20	4.20	4.20	4.26	4.26	4.43	+0.30/+1.60
65	4.91	4.91	4.91	4.98	4.98	5.19	
70	5.69	5.69	5.69	5.77	5.77	6.01	
75	6.56	6.56	6.56	6.65	6.65	6.93	+0.40/+2.00
80	7.45	7.45	7.45	7.55	7.55	7.87	
85	8.42	8.42	8.42	8.54	8.54	8.90	+0.50/+2.20
90	9.43	9.43	9.43	9.56	9.56	9.96	
100	11.65	11.65	11.65	11.81	11.81	12.31	+0.60/+2.50
110	14.13	14.13	14.13	14.33	14.33	14.93	+0.70/+3.00
120	16.85	16.85	16.85	17.09	17.09	17.81	+0.80/+3.50
125	18.26	18.26	18.26	18.52	18.52	19.30	
130	19.79	19.79		20.07	20.07	20.91	+0.90/+3.80
135	21.31	21.31		21.61	21.61	22.52	
140	22.89	22.89		23.21	23.21	24.19	
150	26.3	26.3		26.7	26.7	27.8	+1.00/+4.20
160	29.9	29.9		30.4			+1.10/+4.50
165	31.9	31.9		32.4			+1.20/+5.00
180	37.9	37.9		38.4			
200	46.7	46.7		47.4			+1.30/+5.50
210	51.5	51.5					+1.30/+5.80
230	61.8	61.8					+1.50/+6.20
250	72.8	72.8					
300	104.7	104.7					+1.50/+7.50

Tolerances according to DIN:
 Length 0/+3%
 Stock lengths: 3,000 mm



- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
 The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

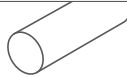
TECAFORM Rods

		TECAFORM AH GF25 natural	
Polymer	POM-C		
Density [g/cm ³]	1.59		
Colour	white opaque		
Diameter [mm]	[kg/m]	Tolerance [mm]	
6	0.052	+0.10/+0.70	
8	0.091	+0.10/+0.80	
10	0.139		
12	0.201	+0.20/+0.90	
14	0.270		
15	0.308		
16	0.349		
18	0.438		
20	0.538		
22	0.656	+0.20/+1.20	
25	0.841		
28	1.05		
30	1.20		
32	1.36		
36	1.73	+0.20/+1.60	
40	2.13		
45	2.71	+0.30/+2.00	
50	3.33		
56	4.16		
60	4.80	+0.30/+2.50	
65	5.62		
70	6.49		
75	7.49	+0.40/+3.00	
80	8.50		
85	9.63	+0.50/+3.40	
90	10.77		
100	13.30	+0.60/+3.80	

Tolerances according to DIN:
Length 0 / +3%
Stock lengths: 3,000 mm

 Stock item
 Non-stock item -
special production

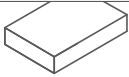
TECAFORM Rods

		TECAFORM AH GF20 natural	
Polymer	POM-C GF20		
Density [g/cm ³]	1.55		
Colour	white opaque		
Diameter [mm]	[kg/m]	Tolerance [mm]	
110	15.70	+0.70/+4.20	
120	18.69	+0.80/+4.60	
125	20.25		
135	23.70	+0.90/+5.40	
140	25.4		
150	29.2	+1.00/+5.80	
160	33.3	+1.10/+6.30	

Tolerances according to DIN:
Length 0 / +3%
Diameter 6 - 100 available on request.
Stock lengths: 3,000 mm

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAFORM Plates

	TECAFORM AH natural	TECAFORM AH black	TECAFORM AH GF25 natural	TECAFORM AH ELS black	TECAFORM AD natural	TECAFORM AD black	TECAFORM AD AF natural	
								
Polymer	POM-C	POM-C	POM-C	POM-C	POM-H	POM-H	POM-H	
Density [g/cm ³]	1.41	1.41	1.59	1.41	1.43	1.43	1.49	
Colour	white opaque	black opaque	white opaque	black opaque	white opaque	black opaque	dark brown opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	4.04	4.04			4.09	4.09	4.27	+0.20/+0.70
6 × 500	4.78	4.78			4.85	4.85	5.05	
8 × 500	6.41	6.41	7.22	6.41	6.50	6.50	6.77	+0.20/+1.10
8 × 620	7.90	7.90	8.91	7.90	8.01	8.01	8.35	
10 × 500	7.89	7.89	8.90	7.89	8.00	8.00	8.34	
10 × 620	9.73	9.73	10.97	9.73	9.86	9.86	10.28	
10 × 1,000*	15.55	15.55			15.77	15.77		
12 × 500	9.55	9.55	10.77	9.55	9.69	9.69	10.10	+0.30/+1.50
12 × 620	11.78	11.78	13.28	11.78	11.95	11.95	12.45	
12 × 1,000*	18.83	18.83			19.10	19.10		
15 × 500	11.78	11.78	13.28	11.78	11.94	11.94	12.44	
15 × 620	14.52	14.52	16.37	14.52	14.73	14.73	15.34	
15 × 1,000*	23.21	23.21			23.54	23.54		
16 × 500	12.52	12.52	14.12	12.52	12.69	12.69	13.23	
16 × 1,000*	24.67	24.67			25.0	25.0		
18 × 500	14.00	14.00	15.79	14.00	14.20	14.20	14.79	
18 × 620		17.26	19.46	17.26	17.51	17.51	18.24	
18 × 1,000*	27.6	27.6			28.0	28.0		
20 × 500	15.48	15.48	17.46	15.48	15.70	15.70	16.36	
20 × 620	19.09	19.09	21.52	19.09	19.36	19.36	20.17	
20 × 1,000*	30.5	30.5			30.9	30.9		
22 × 500	16.96	16.96	19.13	16.96	17.20	17.20	17.92	
22 × 620	20.91	20.91	23.58	20.91	21.21	21.21	22.10	
22 × 1,000*	33.4	33.4			33.9	33.9		
25 × 500	19.18	19.18	21.63	19.18	19.46	19.46	20.27	
25 × 620	23.65	23.65	26.7	23.65	23.99	23.99	25.0	
25 × 1,000*	37.8	37.8			38.3	38.3		
30 × 500	23.33	23.33	26.3	23.33	23.66	23.66	24.65	+0.50/+2.50
30 × 620	28.8	28.8	32.4	28.8	29.2	29.2	30.4	
30 × 1,000*	46.0	46.0			46.6	46.6		
35 × 500	27.0	27.0	30.5	27.0	27.4	27.4	28.6	
35 × 620	33.3	33.3	37.6	33.3	33.8	33.8	35.2	
35 × 1,000*	53.3	53.3			54.0	54.0		
40 × 500	30.7	30.7	34.7	30.7	31.2	31.2	32.5	
40 × 620	37.9	37.9	42.7	37.9	38.4	38.4	40.1	
40 × 1,000*	60.6	60.6			61.4	61.4		
45 × 500	34.4	34.4	38.8	34.4	34.9	34.9	36.4	
45 × 620	42.5	42.5	47.9	42.5	43.1	43.1	44.9	
45 × 1,000*	67.9	67.9			68.8	68.8		
50 × 500	38.1	38.1	43.0	38.1	38.7	38.7	40.3	
50 × 620	47.0	47.0	53.0	47.0	47.7	47.7	49.7	
50 × 1,000*	75.2	75.2			76.2	76.2		

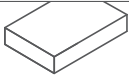
Tolerances according to DIN:
 Length 0 / +3%
 Width +5 / +25 mm
 Stock lengths: 3,000 mm

* Stock length: 1,000 mm

Continued on next page

- Stock item
- Non-stock item - special production


Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.
 The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

	TECAFORM AH natural	TECAFORM AH black	TECAFORM AH GF25 natural	TECAFORM AH ELS black	TECAFORM AD natural	TECAFORM AD black	TECAFORM AD AF natural	
Polymer	POM-C	POM-C	POM-C	POM-C	POM-H	POM-H	POM-H	
Density [g/cm ³]	1.41	1.41	1.59	1.41	1.43	1.43	1.49	
Colour	white opaque	black opaque	white opaque	black opaque	white opaque	black opaque	dark brown opaque	
								Tolerance [mm]
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	
60 × 500	45.9	45.9	50.5 ^a	45.9	46.6	46.6		+0.50/+3.50
60 × 620	56.6	56.6	62.2 ^a	56.6	57.4	57.4		
60 × 1,000*	90.5	90.5			91.8	91.8		
70 × 500	53.3	53.3		53.3	54.1	54.1		
70 × 620	65.8	65.8		65.8	66.7	66.7		
70 × 1,000*	105.1	105.1			106.6	106.6		
80 × 500	61.3	61.3		61.3	62.2	62.2		+0.50/+5.00
80 × 620	75.6	75.6		75.6	76.6	76.6		
80 × 1,000*	120.8	120.8			122.5	122.5		
90 × 500	68.7	68.7			69.7	69.7		
90 × 620	84.7	84.7			85.9	85.9		
90 × 1,000*	135.4	135.4						
100 × 500	76.1	76.1			77.2	77.2		
100 × 620	93.8	93.8			95.2	95.2		
100 × 1,000*	150.0	150.0						
110 × 620*	103.4	103.4						+0.50/+6.00
120 × 620*	112.6	112.6						
130 × 620*	121.7	121.7						
140 × 620*	131.3	131.3						+0.50/+7.00
150 × 620*	140.4	140.4						

Tolerances according to DIN:
 Length 0 / +3%
 Width +5 / +25 mm
 Stock lengths: 3,000 mm

* Stock length: 2,000 mm
^a 20% glass fibre content (density 1.55 g/cm³)

TECAFORM Plates

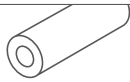
	TECAFORM AH SD natural	
Polymer	POM-C	
Density [g/cm ³]	1.35	
Colour	ivory opaque	
		Tolerance [mm]
Dimensions [mm]	[kg/m]	
12.7 × 610	10.91	+0.00/+0.64
19.1 × 610	16.28	
25.4 × 610	21.56	
38.1 × 610	32.2	
44.4 × 610	37.5	
50.8 × 610	42.9	

Tolerances according to DIN:
 Length 0 / +12,7 mm
 Width 0 / +6,35 mm
 Stock lengths: 1,220 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.
 The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAFORM Tubes



TECAFORM AH
 Polymer: POM-C
 Density: 1.41 g/cm³
 Colour: white opaque

Diameter Outer [mm]	→	16	20	25	30	32	36	40	45	50	56	60	65	70	75	80	85	90	100	110
Diameter Inner [mm]	↓																			
		[kg/m]																		
	8	0.258																		
	10		0.390	0.652																
	15		0.257	0.520	0.839	1.04														
	18			0.413	0.732															
	20				0.649		1.18	1.53		2.58										
	25				0.404	0.618	0.937	1.29	1.79	2.34		3.68	4.45	5.24	6.08	6.97	8.10	9.11	11.31	
	30							0.996		2.04	2.85	3.39	4.16	4.95	5.79	6.68	7.82	8.84	11.04	
	32										2.71			4.82	5.66	6.55		8.71	10.91	
	36								1.06	1.61			3.74	4.53	5.37	6.26	7.42	8.44	10.64	
	40							0.730		1.28	2.09	2.63	3.42			5.94	7.11	8.12	10.32	12.75
	45								0.816	1.63			2.96			5.48	6.66	7.68	9.88	12.31
	50											1.65		3.23	4.07	4.96	6.16	7.18	9.38	11.81
	56															4.27	5.49	6.51	8.71	
	60													2.03		3.76	5.00	6.01	8.21	10.64
	65																4.33	5.34	7.54	9.97
	70															2.34		4.62	6.82	9.25
	80																	3.00	5.20	7.63
Tolerance Outer [mm]					+0.4					+0.6		+0.8				+0.8				+1.2
					+1.1					+2.0		+2.5				+3.0				+3.6
Tolerance Inner [mm]					-1.1					-2.0		-2.5				-3.0				-5.0
					-0.4					-0.6		-0.8				-0.8				-1.6

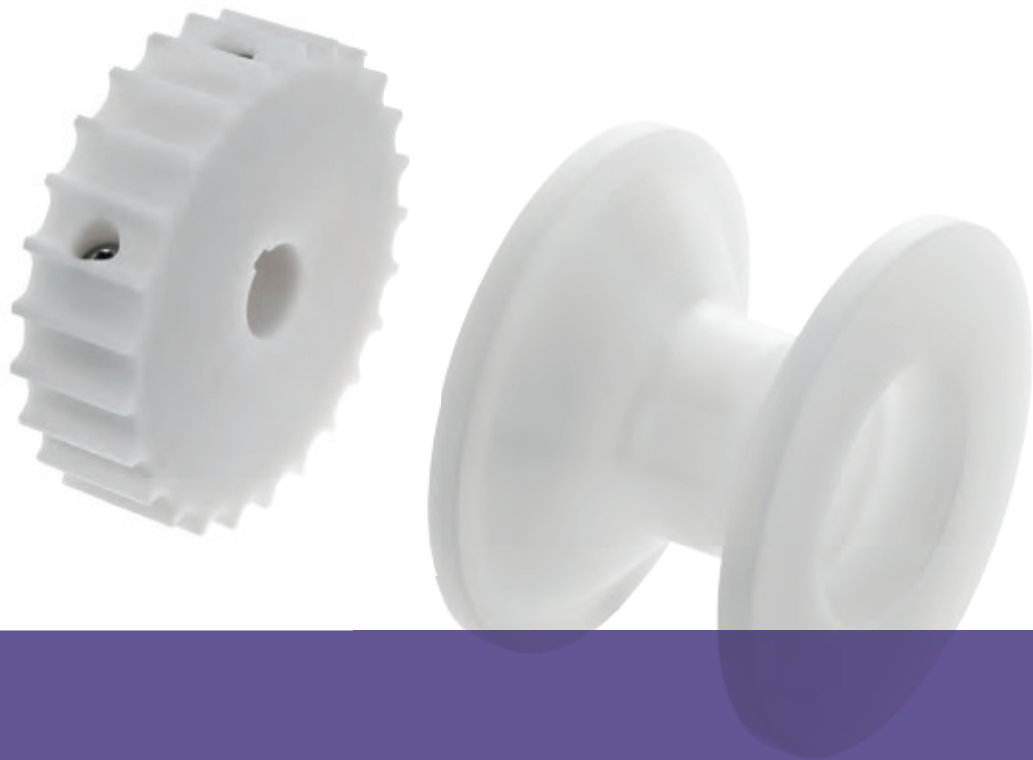
Diameter Outer [mm]	→	120	125	130	135	140	150	165	180	200	230	250	300	320	435	505
	40	15.65	17.06	18.54												
	50	14.72	16.14	17.62	19.15	20.73	24.08									
	60	13.58	15.00	16.47	18.00	19.59	22.93									
	65		14.34		17.34	18.93	22.27									
	70	12.21	13.62	15.10	16.63	18.22	21.56									
	80	10.61	12.03	13.50	15.03	16.62	19.96	25.7	31.7	40.7						
	90	8.78	10.20	11.68	13.21	14.79	18.14	23.92	29.9	38.9	55.2	66.3				
	100	6.73	8.15	9.62	11.16	12.74	16.09	21.88	27.8	36.9	53.2	64.4				
	110			8.88	10.47	13.81	19.62	25.6	34.7	51.0	62.2					
	125					9.97	15.80	21.77	30.9	47.3	58.4	90.7				
	140						11.48	17.44	26.6							
	150							14.28	23.42	40.0	51.1	83.4				
	160								10.89	20.04						
	175									14.56						
	180										29.3	40.4	72.8			
	200										21.05	32.2	64.6			
	220											23.02				
	240													60.4		
	270													43.7		
	300														126.5	
	390															136.0
Tolerance Outer [mm]							+1.5	+1.8	+2.0	+3.0	+3.0	+3.0	+3.0	+3.0	+3.0	+3.0
							+4.5	+5.4	+6.0	+9.0	+10.0	+11.0	+13.0	+15.0		
Tolerance Inner [mm]							-6.5	-7.5	-8.5	-12.0	-13.0	-14.0	-16.0	-18.0		
							-2.0	-2.2	-2.5	-3.0	-3.5	-3.5	-3.5	-3.5		

Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
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TECAMID

Polyamides (PA) are semi-crystalline polymers with very good mechanical properties, extreme toughness and excellent sliding and wear properties. The properties vary here from hard, tough PA 66 to soft, flexible PA 12. Depending

on the type, polyamides absorb different amounts of moisture, so influencing the mechanical properties and dimensional accuracy. TECAMID is the family of extruded polyamides.

Overview of types

TECAMID 66 natural (PA 66)

Good adhesion. Easily welded. Electrically insulating, good machining properties.

TECAMID 66 MO black (PA 66 MoS₂)

Good UV resistance. Low abrasion.

TECAMID 66 GF30 black (PA 66 GF)

Glass fibre reinforced. Very high strength. Good UV stability. Improved thermal dimensional stability.

TECAMID 66 CF20 black (PA 66 CF)

Elevated service temperature. Carbon fibre reinforced. Very high strength.

TECAMID 66 HI brown (PA 66, heat stabilizer)

High level of hardness and dimensional stability. Heat stabilized stock shapes.

TECAMID 66 LA natural (PA 66, solid lubricant)

Very good sliding and abrasion properties with soft mating surfaces. Tough with good strength.

TECAMID 6 natural (PA 6)

Extreme toughness and impact resistance. Good chemical resistance.

TECAMID 6 blue (PA 6)

→ p. 66

TECAMID 6 ID blue (PA 6, detectable filler)

→ p. 66

TECAMID 6 MO black (PA 6 MoS₂)

Good UV resistance and surface hardness. Good machining properties and dimensional stability.

TECAMID 6 GF30 black (PA 6 GF)

Glass fibre-reinforced. Very high strength. Good UV stability and raised thermal dimensional stability.

TECAMID 46 red brown (PA 46)

High thermal-mechanical load. High rigidity. Good creep strength.

TECAMID 12 natural (PA 12)

Very good impact strength. Minimal moisture absorption.

TECAMID 66 / X GF50 black (PA 66 GF)

Glass fibre reinforced with extremely high strength. High long-term service temperature and dimensional stability.

On request:

TECAMID 11 natural (PA 11)

High degree of toughness. Minimal moisture absorption. Bio-based.

TECAMID 6/3 TR natural (PA 6-3)

Transparent. Electrically insulating.

Application examples

Valve flange

TECAMID 6 natural (PA 6)

Minimal thermal expansion. Good chemical resistance. High impact strength. Good electrical properties.



Bushing

TECAMID 66 MO black (PA 66 MoS₂)

Low abrasion. Good UV resistance. Increased surface hardness.



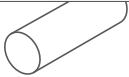
Gear

TECAMID 6 MO black (PA 6 MoS₂)

Good toughness and strength. Resistant to oil and grease. High impact strength.





TECAMID Rods

	TECAMID 6 natural	TECAMID 6 MO black	TECAMID 66 natural	TECAMID 66 MO black	TECAMID 66 HI brown	TECAMID 66 LA natural	TECAMID 12 natural	
								
Polymer	PA 6	PA 6	PA 66	PA 66	PA 66	PA 66	PA 12	
Density [g/cm ³]	1.14	1.14	1.15	1.15	1.15	1.11	1.02	
Colour	ivory opaque	black opaque	ivory opaque	black opaque	brown opaque	ivory opaque	ivory opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
4	0.017	0.017	0.017	0.017			0.015	+0.10/+0.60
5	0.026	0.026	0.026	0.026			0.023	
6	0.037	0.037	0.037	0.037			0.033	
8	0.064	0.064	0.065	0.065	0.065	0.063	0.058	+0.10/+0.70
10	0.099	0.099	0.100	0.100	0.100	0.096	0.088	
12	0.143	0.143	0.144	0.144	0.144	0.139	0.128	+0.20/+0.80
14	0.192	0.192	0.194	0.194	0.194	0.187	0.172	
15	0.219	0.219	0.221	0.221	0.221	0.214	0.196	
16	0.249	0.249	0.251	0.251	0.251	0.242	0.222	
18	0.313	0.313	0.315	0.315	0.315	0.304	0.280	
20	0.384	0.384	0.387	0.387	0.387	0.374	0.343	
22	0.466	0.466	0.471	0.471	0.471	0.454	0.417	+0.20/+1.00
25	0.599	0.599	0.604	0.604	0.604	0.583	0.536	
28	0.747	0.747	0.754	0.754	0.754	0.727	0.668	
30	0.855	0.855	0.863	0.863	0.863	0.833	0.765	
32	0.977	0.977	0.985	0.985	0.985	0.951	0.874	+0.20/+1.20
36	1.23	1.23	1.24	1.24	1.24	1.20	1.10	
40	1.51	1.51	1.53	1.53	1.53	1.47	1.35	
45	1.92	1.92	1.93	1.93	1.93	1.87	1.71	+0.30/+1.30
50	2.36	2.36	2.38	2.38	2.38	2.29	2.11	
56	2.95	2.95	2.97	2.97	2.97	2.87	2.64	
60	3.39	3.39	3.42	3.42	3.42	3.30	3.04	+0.30/+1.60
65	3.97	3.97	4.01	4.01	4.01	3.87	3.55	
70	4.60	4.60	4.64	4.64	4.64	4.48	4.11	
75	5.30	5.30	5.35	5.35	5.35	5.16	4.74	+0.40/+2.00
80	6.02	6.02	6.07	6.07	6.07	5.86	5.39	
85	6.81	6.81	6.87	6.87	6.87	6.63	6.09	+0.50/+2.20
90	7.62	7.62	7.69	7.69	7.69	7.42	6.82	
100	9.42	9.42	9.50	9.50	9.50	9.17	8.43	+0.60/+2.50
110	11.43	11.43	11.53	11.53	11.53	11.12	10.22	+0.70/+3.00
120	13.63	13.63	13.75	13.75	13.75	13.27	12.19	+0.80/+3.50
125	14.76	14.76	14.89	14.89	14.89	14.38	13.21	
130	16.00	16.00	16.14	16.14	16.14	15.58	14.31	+0.90/+3.80
135	17.23	17.23	17.38	17.38	17.38	16.78	15.42	
140	18.51	18.51	18.67	18.67	18.67	18.02	16.56	
150	21.27	21.27	21.45	21.45	21.45	20.71	19.03	+1.00/+4.20
160	24.20		24.42	24.42			21.66	+1.10/+4.50
165	25.8		26.0	26.0			23.09	+1.20/+5.00
180	30.6		30.9	30.9			27.4	
200	37.8		38.1	38.1			33.8	+1.30/+5.50
210	41.6							+1.30/+5.80
220	45.6							
230	49.9							+1.50/+6.20
250	58.9							
300	84.7							+1.50/+7.50

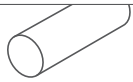
Tolerances according to DIN:
Length 0 / +3 %
Stock lengths: 3,000 mm

Alternative diameters for TECAMID 6 and TECAMID 6 MO
may be found in the TECAST section on page 27.

 Stock item
 Non-stock item -
special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
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TECAMID Rods



	TECAMID 6 GF30 black	TECAMID 66 GF30 black	TECAMID 66 CF20 black	
Polymer	PA 6	PA 66	PA 66	
Density [g/cm ³]	1.36	1.34	1.23	
Colour	black opaque	black opaque	black opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
4	0.021			+0.10/+0.70
5	0.032			
6	0.045			
8	0.078	0.077	0.070	+0.10/+0.80
10	0.119	0.117	0.108	
12	0.172	0.169	0.155	+0.20/+0.90
14	0.231	0.227	0.209	
15	0.263	0.260	0.238	
16	0.298	0.294	0.270	
18	0.375	0.369	0.339	
20	0.460	0.453	0.416	
22	0.561	0.553	0.508	+0.20/+1.20
25	0.720	0.709	0.651	
28	0.897	0.884	0.812	
30	1.03	1.01	0.929	
32	1.16	1.15	1.05	
36	1.48	1.46	1.34	+0.20/+1.60
40	1.82	1.80	1.65	
45	2.32	2.29	2.10	+0.30/+2.00
50	2.85	2.81	2.58	
56	3.56	3.51	3.22	
60	4.11	4.05	3.71	+0.30/+2.50
65	4.80	4.73	4.34	
70	5.55	5.47	5.02	
75	6.41	6.32		+0.40/+3.00
80	7.27	7.17		
85	8.24	8.12		+0.50/+3.40
90	9.21	9.08		
100	11.38	11.21		+0.60/+3.80
110	13.78	13.57		+0.70/+4.20
120	16.40	16.16		+0.80/+4.60
125	17.77	17.51*		
130	19.32	19.03*		+0.90/+5.40
135*	20.79	20.49		
140*	22.33	22.00		
150*	25.6	25.3		+1.00/+5.80
160*		28.6 ^a		+1.10/+6.30
165*		30.5 ^a		+1.20/+7.40
180*		36.2 ^a		
200*		44.7 ^a		+1.30/+8.50

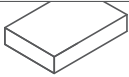
Tolerances according to DIN:
Length 0/+3%
Stock lengths: 3,000 mm

* Stock length: 1,000 mm
^a 25 % glass fibre content (density 1.33 g/cm³),
stock length 1,000 mm

 Stock item
 Non-stock item -
special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
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TECAMID Plates

	TECAMID 6 natural	TECAMID 6 MO black	TECAMID 66 natural	TECAMID 66 MO black	TECAMID 66 HI brown	TECAMID 66 LA natural	TECAMID 12 natural	
								
Polymer	PA 6	PA 6	PA 66	PA 66	PA 66	PA 66	PA 12	
Density [g/cm ³]	1.14	1.14	1.15	1.15	1.15	1.11	1.02	
Colour	ivory opaque	black opaque	ivory opaque	black opaque	brown opaque	ivory opaque	ivory opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	3.26	3.26	3.29	3.29	3.29	3.18	2.92	+0.20/+0.70
6 × 500	3.86	3.86	3.90	3.90	3.90	3.76	3.46	
8 × 500	5.18	5.18	5.23	5.23	5.23	5.04	4.63	+0.20/+1.10
10 × 500	6.38	6.38	6.43	6.43	6.43	6.21	5.71	
10 × 620	7.86	7.86	7.93	7.93	7.93	7.66	7.04	
12 × 500	7.73	7.73	7.79	7.79	7.79	7.52	6.91	+0.30/+1.50
12 × 620	9.53	9.53	9.61	9.61	9.61	9.27	8.52	
12 × 1,000*	15.23	15.23	15.36		15.36	14.82		
16 × 500	10.12	10.12	10.21	10.21	10.21	9.85	9.06	
16 × 620	12.48	12.48	12.59	12.59	12.59	12.15	11.17	
16 × 1,000*	19.95	19.95	20.12		20.12	19.42		
18 × 500	11.32	11.32	11.42	11.42	11.42	11.02	10.13	
18 × 1,000*	22.31	22.31	22.50		22.50	21.72		
20 × 500	12.52	12.52	12.63	12.63	12.63	12.19	11.20	
20 × 620	15.43	15.43	15.57	15.57	15.57	15.03		
20 × 1,000*	24.67	24.67	24.88		24.88	24.02		
22 × 500	13.71	13.71	13.83	13.83	13.83	13.35	12.27	
22 × 1,000*	27.0	27.0	27.3		27.3	26.3		
25 × 500	15.51	15.51	15.65	15.65	15.65	15.10	13.88	
25 × 620	19.12	19.12	19.29	19.29	19.29	18.62	17.11	
25 × 1,000*	30.6	30.6	30.8		30.8	29.8		
30 × 500	18.86	18.86	19.03	19.03	19.03	18.37	16.88	+0.50/+2.50
30 × 620	23.26	23.26	23.46	23.46	23.46	22.65	20.81	
30 × 1,000*	37.2	37.2	37.5		37.5	36.2		
35 × 500	21.86	21.86	22.05	22.05	22.05	21.28	19.56	
35 × 620	27.0	27.0	27.2	27.2	27.2	26.2	24.11	
35 × 1,000*	43.1	43.1	43.5		43.5	41.9		
40 × 500	24.85	24.85	25.1	25.1	25.1	24.20	22.24	
40 × 620	30.6	30.6	30.9	30.9	30.9	29.8	27.4	
40 × 1,000*	49.0	49.0	49.4		49.4	47.7		
45 × 500	27.8	27.8	28.1	28.1	28.1	27.1	24.91	
45 × 620	34.3	34.3	34.6	34.6	34.6	33.4	30.7	
45 × 1,000*	54.9	54.9	55.4		55.4	53.4		
50 × 500	30.8	30.8	31.1	31.1	31.1	30.0	27.6	
50 × 620	38.0	38.0	38.4	38.4	38.4	37.0	34.0	
50 × 1,000*	60.8	60.8	61.3		61.3	59.2		
60 × 500	37.1		37.5		37.5	36.2		+0.50/+3.50
60 × 620	45.8		46.2		46.2	44.6		
60 × 1,000*	73.2		73.8		73.8	71.2		
70 × 500	43.1		43.5		43.5	42.0		
70 × 620	53.2		53.6		53.6	51.8		
70 × 1,000*	85.0				85.7			
80 × 300			30.6		30.6			+0.50/+5.00
80 × 500	49.6		50.0		50.0	48.3		
80 × 620	61.1		61.6					
80 × 1,000*	97.7							
90 × 500	55.5		56.0		56.0	54.1		
100 × 300			38.0		38.0			
100 × 500	61.5		62.1		62.1	59.9		

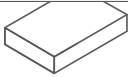
Tolerances according to DIN:
Length 0 / +3% / Width +5 / +25 mm
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

* Stock length: 2,000 mm
Alternative diameters for TECAMID 6 and TECAMID 6 MO can be found in the TECAST section on page 27.

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.
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TECAMID Plates

	TECAMID 6 GF30 black		TECAMID 66 GF30 black		Tolerance [mm]
	Polymer	PA 6	PA 66	PA 66	
Density [g/cm ³]	1.36	1.34			
Colour	black opaque	black opaque			
Dimensions [mm]	[kg/m]	[kg/m]			
5 × 500	3.89	3.84	+0.20/+0.70		
6 × 500	4.61	4.54			
8 × 500	6.18	6.09	+0.20/+1.10		
10 × 500	7.61	7.50			
10 × 620	9.38	9.24			
12 × 500	9.22	9.08	+0.30/+1.50		
12 × 620	11.36	11.20			
16 × 500	12.07	11.90			
16 × 620	14.89	14.67			
18 × 500	13.50	13.30			
20 × 500	14.93	14.71			
20 × 620	18.41	18.14			
22 × 500	16.36	16.12			
25 × 500	18.50	18.23			
25 × 620	22.81	22.48			
30 × 500	22.50	22.17	+0.50/+2.50		
30 × 620	27.7	27.3			
35 × 500	26.1	25.7			
35 × 620	32.2	31.7			
40 × 500	29.6	29.2			
40 × 620	36.6	36.0			
45 × 500	33.2	32.7			
45 × 620	41.0	40.4			
50 × 500	36.8	36.3			
50 × 620	45.4	44.7			
60 × 500	44.3	43.6	+0.50/+3.50		
60 × 620	54.6	53.8			
70 × 500	51.4	50.7			
70 × 620	63.4	62.5			
80 × 500	59.1	58.2	+0.50/+5.00		
80 × 620	72.9	71.8			
90 × 500	66.3	65.3			
90 × 620	81.7	80.5			
100 × 300	44.9	44.2			
100 × 500	73.4	72.3			
100 × 620	90.5	89.2			

Tolerances according to DIN:

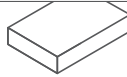
Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

TECAMID Plates

	TECAMID 66 CF20 black		Tolerance [mm]
	Polymer	PA 66	
Density [g/cm ³]	1.23		
Colour	black opaque		
Dimensions [mm]	[kg/m]	[kg/m]	
8 × 300	3.42		+0.20/+1.10
10 × 300	4.21		
12 × 300	5.10		+0.30/+1.50
16 × 300	6.68		
18 × 300	7.47		
20 × 300	8.26		
20 × 500	13.50		
25 × 300	10.24		
25 × 500	16.73		
30 × 300	12.45		+0.50/+2.50
30 × 500	20.35		
35 × 300	14.42		
35 × 500	23.58		
40 × 300	16.40		
40 × 500	26.8		
45 × 300	18.38		
45 × 500	30.0		
50 × 300	20.35		
50 × 500	33.3		


Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

TECAMID Plates

	TECAMID 46 red brown		Tolerance [mm]
	Polymer	PA 46	
Density [g/cm ³]	1.19		
Colour	red brown opaque		
Dimensions [mm]	[kg/m]	[kg/m]	
10 × 620	8.21		+0.20/+1.10
12 × 620	9.94		+0.30/+1.50
16 × 620	13.03		
20 × 620	16.11		
25 × 620	19.96		
30 × 620	24.28		+0.50/+2.50

Tolerances according to DIN:

Length 0 / +3%

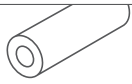
Width +5 / +25 mm

Stock lengths: 2,000 mm

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAMID Tubes



TECAMID 6 natural
 Polymer: PA 6
 Density: 1.14 g/cm³
 Colour: ivory opaque

Diameter Outer [mm]	→	16	20	25	30	32	36	40	45	50	56	60	70	75	80	85	90	100	110		
Diameter Inner [mm]	↓																				
8		0.208																			
10			0.315																		
15			0.208	0.420	0.678																
18				0.334	0.592																
20					0.525	0.693	0.951	1.24													
25					0.326	0.500	0.758		1.44	1.89	2.54		4.91	5.64	6.55	7.37	9.15				
30								0.805		1.65	2.30	2.74		4.68	5.40	6.33	7.15	8.93			
32											2.19		3.89	4.57	5.30		7.04	8.82			
36									0.858	1.30	1.96		3.66	4.34	5.06	6.00	6.82	8.60			
40								0.590	1.04	1.69	2.13				4.80	5.75	6.57	8.35	10.31		
45									0.659	1.32					4.43	5.39	6.21	7.99	9.95		
50												1.34	2.61		4.01		5.81	7.58	9.55		
54														2.92		4.63		7.23	9.19		
60													1.64		3.04			6.64	8.60		
65																3.50	4.32	6.10	8.06		
70															1.89		3.73	5.51	7.47		
80																	2.42	4.20	6.17		
Tolerance Outer [mm]					+0.4					+0.6			+0.8		+0.8					+1.2	
					+1.1					+2.0			+2.5		+3.0					+3.6	
Tolerance Inner [mm]					-1.1					-2.0			-2.5		-3.0					-5.0	
					-0.4					-0.6			-0.8		-0.8					-1.6	

Diameter Outer [mm]	→	120	125	130	135	140	150	165	180	200	230	250	300	320	435	505	
40		12.65	13.80	14.99													
50		11.91	13.05	14.24	15.48	16.76	19.47										
54			12.70		15.13	16.41	19.12										
60		10.98	12.12	13.32	14.55	15.84	18.54										
65			11.59		14.02	15.30	18.01										
70		9.87	11.01	12.21	13.44	14.73	17.43										
80		8.58	9.72	10.91	12.15	13.43	16.14	20.80	25.6	32.9							
90		7.10	8.25	9.44	10.68	11.96	14.66	19.34	24.16	31.5	44.6	53.6					
100		5.44	6.59	7.78	9.02	10.30	13.01	17.69	22.52	29.9	43.1	52.0					
110				7.18	8.46	11.17		15.86	20.69	28.0	41.3	50.3					
125						8.06		12.78	17.60	24.96	38.3	47.2	73.3				
150								11.54	18.94	32.3	41.3	67.4					
175									11.77								
180										23.69	32.7	58.9					
200										17.02	26.0	52.2					
240													48.8				
270													35.3	117.4	179.9		
300														102.3	164.9		
390															109.9		
Tolerance Outer [mm]							+1.5		+1.8	+2.0		+3.0	+3.0	+3.0	+3.0	+3.0	
							+4.5		+5.4	+6.0		+9.0	+10.0	+11.0	+13.0	+15.0	
Tolerance Inner [mm]							-6.5		-7.5	-8.5		-12.0	-13.0	-14.0	-16.0	-18.0	
							-2.0		-2.2	-2.5		-3.0	-3.5	-3.5	-3.5	-3.5	

Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECAST TECARIM

Using the casting method, polyamide stock shapes with large diameters and a high degree of crystallinity (mechanical strength) can be produced. TECAST is the family of cast polyamides, TECARIM is the trade name given by Ensinger

to the product group of tough, highly load-resistant polyamide 6 block copolymers manufactured using the reaction injection moulding method. Due to the manufacturing processes both polyamide materials are almost stress free.

Overview of types

TECAST T natural (PA 6 C)

Good damping properties.
Good sliding properties.
High degree of toughness.
High strength.
Electrically insulating.

TECAST T MO black (PA 6 C MoS₂)

Good damping properties.
Good sliding properties, also in dry running conditions.
High degree of toughness.
High strength.
Improved surface hardness.
UV / weather resistant.
Not electrically insulating.

TECAST L natural (PA 6 C, oil)

Good sliding properties, also in dry running conditions.
Good slip-stick behaviour.
Tough.
Good thermal resistance.
Good electrical insulation.

TECAGLIDE green (PA 6 C, solid lubricant)

Good sliding properties, also in dry running conditions.
Good slip-stick behaviour.
Tough.
Electrically insulating.

TECARIM 1500 yellow (PA 6 C, Elastomere)

Very high level of toughness.
Good low temperature impact strength.
No brittle fracture.
Good shock absorption.
Electrically insulating.

Application examples

Pulley (part component) TECAST T natural (PA 6 C)

Good toughness and strength.
Good damping properties.
High abrasion resistance.
High mechanical load capacity.



Spring release block

TECARIM 1500 yellow
(PA 6 C, Elastomere)
Capable of deformation without fracture.
Very good impact strength.
High mechanical load capacity.

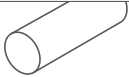


Sliding element with steel inlay TECAST T natural (PA 6 C)

Good sliding properties.
Good wear resistance.
High mechanical load capacity.



TECAST / TECARIM Rods



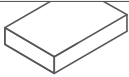
	<i>TECAST T natural</i>	<i>TECAST T MO black</i>	<i>TECAST L natural</i>	<i>TECAST L yellow</i>	<i>TECAST L black</i>	<i>TECAGLIDE green</i>		
Polymer	PA 6 C	PA 6 C	PA 6 C	PA 6 C	PA 6 C	PA 6 C		
Density [g/cm ³]	1.15	1.15	1.13	1.14	1.14	1.13		
Colour	ivory opaque	black opaque	ivory opaque	yellow opaque	black opaque	green opaque	Stock length	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[mm]	Tolerance [mm]
50	2.41	2.41	2.37	2.39	2.39	2.37	2.000	+0.30/+1.90
60	3.54	3.54	3.48	3.51	3.51	3.48	2.000	+0.30/+2.50
65	4.09	4.09	4.02	4.06	4.06	4.02	2.000	
70	4.79	4.79	4.70	4.74	4.74	4.70	2.000	
75	5.38	5.38	5.28	5.33	5.33	5.28	2.000	+0.40/+2.80
80	6.03	6.03	5.92	5.97	5.97	5.92	2.000	
85	6.82	6.82	6.70	6.76	6.76	6.70	2.000	+0.50/+3.20
90	7.62	7.62	7.49	7.56	7.56	7.49	2.000	
95	8.24	8.24	8.10	8.17	8.17	8.10	2.000	+0.60/+3.50
100	9.46	9.46	9.30	9.38	9.38	9.30	2.000	
110	11.38	11.38	11.18	11.28	11.28	11.18	2.000	+0.70/+3.90
120	13.75	13.75	13.51	13.63	13.63	13.51	2.000	+0.80/+4.30
125	15.03	15.03	14.77	14.86	14.90	14.77	2.000	
130	15.99	15.99	15.71	15.85	15.85	15.71	2.000	+0.80/+5.00
135	17.73	17.73	17.42	17.58	17.58	17.42	2.000	
140	18.54	18.54	18.21	18.37	18.37	18.21	2.000	
150	21.60	21.60	21.22	21.41	21.41	21.22	2.000	+0.80/+5.30
160	24.40	24.40	23.98	24.19	24.19	23.98	2.000	+0.80/+6.00
170	27.3	27.3	26.9	27.1	27.1	26.9	2.000	+1.00/+6.50
180	30.3	30.3	29.8	30.1	30.1	29.8	2.000	
190	34.0	34.0	33.4	33.7	33.7	33.4	2.000	+1.00/+7.50
200	37.9	37.9	37.3	37.6	37.6	37.3	2.000	
210	42.0	42.0	41.3	41.6	41.6	41.3	2.000	+1.00/+8.50
220	46.4	46.4	45.6	46.0	46.0	45.6	2.000	
230	50.2	50.2	49.4	49.8	49.8	49.4	2.000	+1.00/+9.50
250	60.7	60.7	59.6	60.2	60.2	59.6	2.000	
280	76.2	76.2	74.8	75.5	75.5	74.8	2.000	+1.00/+11.00
300	86.7	86.7	85.2	85.9	85.9	85.2	1.000	+1.50/+12.00
320	97.7	97.7	96.0	96.9	96.9	96.0	1.000	
330	104.0	104.0	102.2	103.1	103.1	102.2	1.000	+1.50/+13.50
350	117.1	117.1	115.1	116.1	116.1	115.1	1.000	
370	131.0	131.0	128.7	129.9	129.9	128.7	1.000	+1.50/+15.00
400	152.9	152.9	150.2	151.5	151.6	150.2	1.000	
450	194.5	194.5	191.1	192.8	192.8	191.1	1.000	+1.50/+16.50
500	237.2	237.2	233.1	235.1	235.1	233.1	1.000	+1.50/+18.00
600	336.1	336.1	330.3	333.2	333.2	330.3	1.000	+3.00/+21.00
710	482.9	482.9	474.5	478.7	478.7	474.5	600	+3.00/+25.00
800	603.7	603.7	593.2	598.5	598.5	593.2	750	

Tolerances according to DIN:
Length 0 / +3 %

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAST / TECARIM Plates

	<i>TECAST T natural</i>	<i>TECAST T MO black</i>	<i>TECAST L natural</i>	<i>TECAST L yellow</i>	<i>TECAST L black</i>	<i>TECAGLIDE green</i>	
Polymer	PA 6 C	PA 6 C	PA 6 C	PA 6 C	PA 6 C	PA 6 C	
Density [g/cm ³]	1.15	1.15	1.13	1.14	1.14	1.13	
Colour	ivory opaque	black opaque	ivory opaque	yellow opaque	black opaque	green opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
8 × 1,000*	10.85	10.85	10.66	10.75	10.75	10.66	+0.20/+1.50
8 × 1,220	14.09	14.09	13.85	13.97	13.97	13.85	
10 × 1,000*	13.35	13.35	13.12	13.23	13.23	13.12	
10 × 1,220	17.07	17.07	16.77	16.92	16.92	16.77	
12 × 1,000*	15.85	15.85	15.58	15.71	15.71	15.58	+0.30/+2.50
12 × 1,220	20.04	20.04	19.70	19.87	19.87	19.70	
15 × 1,000*	19.60	19.60	19.26	19.43	19.43	19.26	
15 × 1,220	24.51	24.51	24.08	24.29	24.29	24.08	
16 × 1,000*	20.85	20.85	20.49	20.67	20.67	20.49	
16 × 1,220	26.0	26.0	25.5	25.8	25.8	25.5	
20 × 1,000*	25.9	25.9	25.4	25.6	25.6	25.4	
20 × 1,220	31.9	31.9	31.4	31.7	31.7	31.4	
25 × 1,000*	32.1	32.1	31.5	31.8	31.8	31.5	
25 × 1,220	39.4	39.4	38.7	39.0	39.0	38.7	
30 × 1,000*	38.4	38.4	37.7	38.0	38.0	37.7	+0.50/+3.50
30 × 1,220	46.8	46.8	46.0	46.4	46.4	46.0	
35 × 1,000*	44.6	44.6	43.8	44.2	44.2	43.8	
35 × 1,220	54.3	54.3	53.3	53.8	53.8	53.3	
40 × 1,000*	50.9	50.9	50.0	50.4	50.4	50.0	
40 × 1,220	61.7	61.7	60.6	61.2	61.2	60.6	
45 × 1,000*	57.1	57.1	56.1	56.6	56.6	56.1	
45 × 1,220	69.1	69.1	67.9	68.5	68.5	67.9	
50 × 1,000*	63.4	63.4	62.3	62.8	62.8	62.3	
50 × 1,220	76.6	76.6	75.2	75.9	75.9	75.2	
55 × 1,000*	69.6	69.6	68.4	69.0	69.0	68.4	+0.50/+5.00
55 × 1,220	84.0	84.0	82.5	83.3	83.3	82.5	
60 × 1,000*	75.9	75.9	74.6	75.2	75.2	74.6	
60 × 1,220	91.4	91.4	89.9	90.7	90.7	89.9	
65 × 1,000*	82.1	82.1	80.7	81.4	81.4	80.7	
70 × 1,000*	88.4	88.4	86.8	87.6	87.6	86.8	
75 × 1,000*	94.6	94.6	93.0	93.8	93.8	93.0	+0.50/+7.00
80 × 1,000*	100.9	100.9	99.1	100.0	100.0	99.1	
90 × 1,000*	113.4	113.4	111.4	112.4	112.4	111.4	
100 × 1,000*	125.9	125.9	123.7	124.8	124.8	123.7	
110 × 1,000*	138.4	138.4	136.0	137.2	137.2	136.0	+0.50/+9.00
120 × 1,000*	150.9	150.9	148.3	149.6	149.6	148.3	
130 × 1,000*	163.4	163.4	160.6	162.0	162.0	160.6	

Tolerances according to DIN:

Length 0 / +3%

Width 0 / +4%

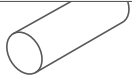
Stock lengths: 3,048 mm

* Stock length: 2,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Also available planed. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAST / TECARIM Rods



**TECARIM
1500 yellow**

Polymer	PA 6 C
Density [g/cm ³]	1.11
Colour	yellow opaque

Diameter [mm]	[kg/m]	Stock length [mm]	Tolerance [mm]
30	0.844	1.000	+0.20/+1.40
40	1.48	1.000	
50	2.32	1.000	+0.30/+1.90
65	3.92	1.000	+0.30/+2.50
79	5.78	1.000	+0.40/+2.80
100	9.26	1.000	+0.60/+3.50
110	11.21	1.000	+0.70/+3.90
150	20.83	850	+0.80/+5.30
180	28.5	600	+1.00/+6.50

Tolerances according to DIN:
Length 0 / +3 %

TECAST / TECARIM Plates



**TECARIM
1500 yellow**

Polymer	PA 6 C
Density [g/cm ³]	1.11
Colour	yellow opaque

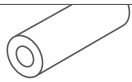
Dimensions [mm]	[kg/m]	Stock length [mm]	Tolerance [mm]
10 × 580	7.31	580	+0.20/+1.50
30 × 300	11.41	900	+0.50/+3.50
50 × 300	18.55	800	
60 × 300	22.38	800	+0.50/+5.00
80 × 300	29.9	600	+0.50/+7.00
100 × 300	37.0	500	
150 × 300	50.4	350	+0.50/+10.00

Tolerances according to DIN:
Length 0 / +3 %
Width +5 / +25 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Also available ground respectively planed. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAST / TECARIM Tubes



TECAST T natural
 Polymer: PA 6 C
 Density: 1.15 g/cm³
 Colour: ivory opaque

Diameter Outer [mm]	→	50	60	70	80	90	100	110	120	130	140	150	160	170	180	
Diameter Inner [mm]	↓	[kg/m]														
30		2.03	3.27	4.63												
35		1.77	3.00	4.33	5.67											
40			2.70	4.03	5.40	6.90	8.77									
45			2.33	3.67	5.03	6.38	8.40									
50				3.27	4.63	6.17	8.00	10.07	13.10	14.90						
55				2.80	4.17	5.73	7.53	9.60								
60					3.67	5.20	7.10	9.10	12.17	13.93						
65					3.13	4.67	6.57	8.57	11.63	13.40	16.47	19.33				
70						4.07	5.97	8.03	11.03	12.80	15.87	18.73	21.93			
75							5.30	7.40	10.40	12.17	15.23	18.10	21.27			
80							4.60	6.70	9.83	11.50	14.53	17.43	20.63	23.43	26.7	
85									9.10	10.77	13.83	16.70	19.93	22.70	26.0	
90								5.17	8.30	10.10	13.03	15.93	19.17	21.93	25.2	
95									7.50	9.27	12.23	15.10	18.33	21.13		
100									6.63	8.40	11.50	14.23	17.50	20.27	23.53	
105										7.50	10.57	13.33	16.57			
110										6.53	9.60	12.50	15.63	18.43	21.70	
115										5.53	8.60	11.50	14.63			
120											7.53	10.43	13.77	16.37	19.63	
130												8.17	11.50	14.33	17.40	
140													9.10	11.90	15.20	
150															12.57	
Tolerance Outer [mm]			+0.8		+0.8			+1.0				+1.5			+1.8	
			+3.0		+4.0			+5.0				+7.5			+9.0	
Tolerance Inner [mm]			-4.0		-4.0			-6.0				-7.5			-9.0	
			-0.8		-0.8			-1.0				-1.5			-1.8	

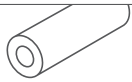
Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

Continued on next page

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECAST T natural
 Polymer: PA 6 C
 Density: 1.15 g/cm³
 Colour: ivory opaque

Diameter Outer [mm]	→	190	200	210	220	250	280*	300*	325 ^a	350 ^a	400 ^a	450 ^a	500 ^a	550 ^a	600 ^a	
Diameter Inner [mm]	↓	[kg/m]														
90		29.3														
100		27.6	31.4	35.0	39.8	53.2	71.4									
110		25.8	29.5	33.5	37.9	51.4	69.6									
120		23.73	27.5	31.5	36.2	49.3	65.6									
130		21.53	25.3	29.2	34.0	47.1	63.5									
140		19.10	22.87	26.8	31.6	44.7										
150		16.73	20.27	24.23	29.0	42.6		72.8	87.9	104.5						
160			17.73	21.43	26.2	39.8	58.5	69.9	85.1	101.7						
170				18.73	23.23	36.9	55.4	66.9	82.1							
180					20.40	33.7	52.8	63.6	80.5	95.5						
190					17.03	30.4	49.3	60.2	77.1							
200						26.9	45.7	57.2	73.6	90.3	125.1	165.9				
225							35.8	47.3	64.6	80.5	115.4	156.3				
250								36.2	53.7	70.3	106.6	148.3		245.2		
275									41.6	58.0	94.4	136.2	181.3	233.4		
300										44.6	81.9	125.7	171.6	220.4	277.1	
325											67.3	111.1	157.1	206.2	262.9	
350												96.6	144.8	194.9	247.5	
375												79.6	127.8	178.3	228.5	
400													111.2	164.5	215.5	
425													91.7	145.5	196.6	
450														127.2	181.1	
475														105.7	159.7	
500															139.4	
Tolerance Outer [mm]					+2.0	+2.5		+3.0			+3.0		+3.0		+3.0	
					+11.0	+12.5		+15.0			+17.5		+20.0		+25.0	
Tolerance Inner [mm]					-11.0	-12.5		-15.0			-17.5		-20.0		-25.0	
					-2.0	-2.5		-3.0			-3.0		-3.0		-3.0	

Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

* Stock length: 2,000 mm
^a Stock length: 1,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

Stock item
 Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECADUR TECAPET

Semi-crystalline polyesters have a very high level of hardness, rigidity and strength coupled with excellent sliding characteristics and low sliding abrasion. Due to their good creep resistance, low moisture absorption and excellent

dimensional stability, TECAPET or TECADUR PBT GF30 are perfectly suited for use with complex parts with extreme dimensional stability and surface quality requirements, as well as offering very good machining properties.

Overview of types

TECAPET white (PET)

Very good machining properties.
High creep and abrasion resistance.

TECAPET black (PET)

Good UV resistance.
Very good machining properties.

TECAPET TF grey (PET TF)

High abrasion resistance.
Excellent sliding properties.

TECADUR PET natural (PET)

Good machining properties.
High strength.

TECADUR PET CMP natural (PET)

→ p. 79

TECADUR PBT GF30 natural (PBT GF)

Glass fibre reinforced polyester with very high strength.
High thermal dimensional stability.
Minimal thermal expansion.

Application examples

Piston TECADUR PET natural (PET)

High strength.
Good creep resistance.
High dimensional stability.



Flow valve TECAPET white (PET)

High strength.
Good dimensional stability.
Good resistance to oils and greases.

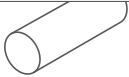


Roller TECAPET white (PET)

High degree of stability.
High creep resistance.
Good mechanical properties.



TECADUR / TECAPET Rods

	TECAPET white	TECAPET black	TECAPET TF grey	
				
Polymer	PET	PET	PET	
Density [g/cm ³]	1.36	1.39	1.43	
Colour	white opaque	black opaque	grey opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10	0.118	0.120	0.124	+0.10/+0.70
12	0.170	0.174	0.179	+0.20/+0.80
14	0.229	0.234	0.241	
15	0.262	0.268	0.275	
16	0.297	0.303	0.312	
18	0.373	0.381	0.392	
20	0.458	0.468	0.481	
22	0.556	0.569	0.585	+0.20/+1.00
25	0.714	0.730	0.751	
28	0.891	0.911	0.937	
30	1.02	1.04	1.07	
32	1.16	1.19	1.22	+0.20/+1.20
36	1.47	1.50	1.54	
40	1.80	1.84	1.90	
45	2.29	2.34	2.40	+0.30/+1.30
50	2.81	2.87	2.96	
56	3.52	3.59	3.70	
60	4.05	4.14	4.26	+0.30/+1.60
65	4.74	4.84	4.98	
70	5.48	5.61	5.77	
75	6.33	6.47	6.65	+0.40/+2.00
80	7.18	7.34	7.55	
90	9.09	9.29		+0.50/+2.20
100	11.24	11.48		+0.60/+2.50
110	13.63	13.93		+0.70/+3.00
120	16.26	16.61		+0.80/+3.50
125	17.61	18.00		
130	19.08	19.51		+0.90/+3.80
135	20.55	21.01		
140	22.08	22.56		
150	25.4	25.9		+1.00/+4.20
160	28.9			+1.00/+4.50
165	30.8			+1.20/+5.00
180	36.5			
200	45.1			+1.30/+5.50

Tolerances according to DIN:

Length 0 / +3%

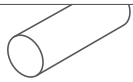
Stock lengths: 3,000 mm

- Stock item
- Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECADUR / TECAPET Rods



**TECADUR
PBT GF30
natural**

Polymer	PBT	
Density [g/cm ³]	1.46	
Colour	grey-white opaque	
Diameter [mm]	[kg/m]	Tolerance [mm]
10	0.128	+0.10/+0.80
12	0.184	+0.20/+0.90
14	0.248	
15	0.283	
16	0.320	
18	0.402	
20	0.494	
22	0.603	+0.20/+1.20
25	0.773	
28	0.963	
30	1.10	
32	1.25	
36	1.59	+0.20/+1.60
40	1.96	
45	2.49	+0.30/+2.00
50	3.06	
56	3.82	
60	4.41	+0.30/+2.50
65	5.16	
70	5.96	
75	6.88	+0.40/+3.00
80	7.81	
90	9.89	+0.50/+3.40
100	12.22	+0.60/+3.80

Tolerances according to DIN:

Length 0 / +3%

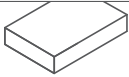
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECADUR / TECAPET Plates

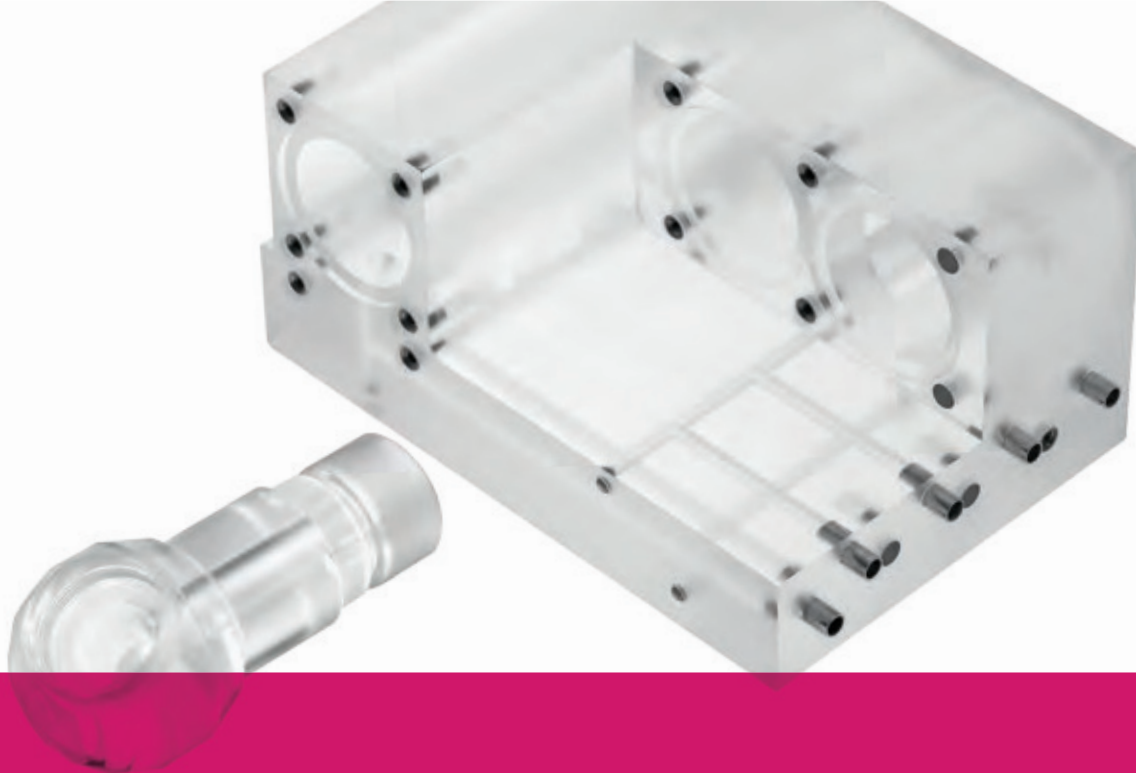
	TECAPET white	TECAPET black	TECAPET TF grey	TECADUR PBT GF30 natural	
Polymer	PET	PET	PET	PBT	
Density [g/cm ³]	1.36	1.39	1.43	1.46	
Colour	white opaque	black opaque	grey opaque	grey-white opaque	
					Tolerance
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[mm]
8 × 500	6.18		6.50	6.63	+0.20/+1.10
10 × 500	7.61	7.78	8.00	8.17	
10 × 620	9.38	9.59			
12 × 500	9.22	9.42	9.69	9.89	+0.30/+1.50
12 × 620	11.36	11.61			
16 × 500	12.07	12.34	12.69	12.96	
16 × 620	14.89	15.22			
16 × 1,000*	23.80	24.32			
20 × 500	14.93	14.82	15.70	16.03	
20 × 620	18.41	18.82			
20 × 1,000*	29.4	30.1			
22 × 500	16.36	16.72	17.20	17.56	
25 × 500	18.50	18.91	19.46	19.86	
25 × 620	22.81	23.32			
25 × 1,000*	36.5	37.3			
30 × 500	22.50	22.33	23.66	24.16	+0.50/+2.50
30 × 620	27.7	28.4			
30 × 1,000*	44.4	44.7			
35 × 500	26.1	26.7	27.4	28.0	
35 × 620	32.2	32.9			
35 × 1,000*	51.4	52.5			
40 × 500	29.6	30.3	31.2	31.8	
40 × 620	36.6	37.4			
40 × 1,000*	58.4	59.7			
45 × 500	33.2	34.0	34.9	35.7	
45 × 620	41.0	41.9			
45 × 1,000*	65.5	66.9			
50 × 500	36.8	37.6	38.7	39.5	
50 × 620	45.4	46.4			
50 × 1,000*	72.5	74.1			
60 × 500	44.3	45.3		47.6	+0.50/+3.50
60 × 620	54.6	55.8			
60 × 1,000*	87.3				
70 × 500	51.4	52.6		55.2	
70 × 620	63.4	64.8			
80 × 300				38.8	+0.50/+5.00
80 × 500	59.1	60.4			
80 × 620	72.9	74.5			
90 × 500	66.3	67.7			
90 × 620	81.7	83.5			
100 × 300	44.9				
100 × 500	73.4	75.0			
100 × 620	90.5	92.5			
110 × 620*	99.8				+0.50/+6.00
120 × 620*	108.6				
130 × 620*	117.4				
140 × 620*	126.6				+0.50/+7.00
150 × 620*	135.4				

Tolerances according to DIN:
 Length 0 / +3%
 Width +5 / +25 mm
 Stock lengths: 3,000 mm

* Stock length: 1,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.
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TECANAT

Polycarbonate (PC) is an amorphous polymer with a high level of transparency. PC is characterized by high strength, rigidity and hardness. TECANAT also offers good impact

strength. It is very resistant to external influences such as weather and UV-radiation.

Overview of types

TECANAT (PC)

Highly tough and transparent.
High service temperature.

TECANAT GF30 natural (PC GF)

Glass fibre reinforced polycarbonate with very high strength.
Low water absorption.

TECANAT MT natural (PC)

→ p. 70

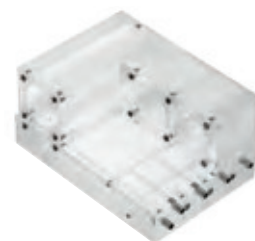
TECANAT CMP natural (PC)

→ p. 79

Application examples

Distributor block for analytical system TECANAT natural (PC)

High purity.
Excellent toughness.
High dimensional accuracy.



Shower head TECANAT natural (PC)

High degree of transparency.
Good impact strength.
High dimensional stability.

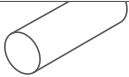


Fluid medium container TECANAT natural (PC)

Physiologically harmless.
High level of dimensional stability.
Low water absorption.
High degree of transparency.



TECANAT Rods

	TECANAT natural	TECANAT black	TECANAT GF30 natural	
				
Polymer	PC	PC	PC	
Density [g/cm ³]	1.19	1.19	1.42	
Colour	white transparent	black opaque	white translucent	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
3	0.011	0.011		+0.10/+0.70
4	0.018	0.018		
5	0.028	0.028		
6	0.039	0.039		
8	0.068	0.068		+0.10/+0.80
10	0.104	0.104	0.124	
12	0.150	0.150	0.179	+0.20/+0.90
14	0.202	0.202	0.241	
16	0.261	0.261	0.312	
18	0.328	0.328	0.391	
20	0.403	0.403	0.480	
22	0.491	0.491	0.586	+0.20/+1.20
25	0.630	0.630	0.751	
28	0.785	0.785	0.937	
30	0.898	0.898	1.07	
32	1.02	1.02	1.22	
36	1.30	1.30	1.55	+0.20/+1.60
40	1.59	1.59	1.90	
45	2.03	2.03	2.42	+0.30/+2.00
50	2.49	2.49	2.98	
56	3.11	3.11	3.72	
60	3.59	3.59	4.29	+0.30/+2.50
65	4.20	4.20	5.02	
70	4.86	4.86	5.80	
75	5.61	5.61	6.69	+0.40/+3.00
80	6.36	6.36	7.59	
90	8.06	8.06	9.62	+0.50/+3.40
100	9.96	9.96	11.88	+0.60/+3.80
110	12.05	12.05	14.38	+0.70/+4.20
120	14.35	14.35	17.13	+0.80/+4.60
125	15.55	15.55	18.55	
130	16.90	16.90	20.17	+0.90/+5.40
135	18.19	18.19	21.71	
140	19.54	19.54	23.31	
150	22.43	22.43	26.8	+1.00/+5.80
165	27.3	27.3		+1.20/+7.40
180	32.4	32.4		
200	40.0	40.0		+1.30/+8.50
210	44.1	44.1		+1.30/+9.00
230	52.9	52.9		+1.50/+9.50
250	62.2	62.2		

Tolerances according to DIN:

Length 0/ +3%

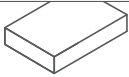
Stock lengths: 3,000 mm

- Stock item
- Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECANAT Plates

 Polymer Density [g/cm ³] Colour	TECANAT natural	TECANAT black	TECANAT GF30 natural	Tolerance [mm]
	PC 1.19 white transparent	PC 1.19 black opaque	PC 1.42 white translucent	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	
10 × 500	6.66	6.66	7.94	+0.20/+1.10
10 × 620	8.21	8.21	9.80	
12 × 500	8.06	8.06	9.62	+0.30/+1.50
12 × 620	9.94	9.94	11.86	
16 × 500	10.56	10.56	12.61	
16 × 620	13.03	13.03	15.54	
18 × 500	11.81	11.81	14.10	
18 × 620	14.57	14.57	17.38	
20 × 500	13.06	13.06	15.59	
20 × 620	16.11	16.11	19.22	
22 × 500	14.31	14.31	17.08	
22 × 620	17.65	17.65	21.06	
25 × 500	16.19	16.19	19.32	
25 × 620	19.96	19.96	23.82	
30 × 500	19.69	19.69	23.50	+0.50/+2.50
30 × 620	24.28	24.28	29.0	
36 × 500	23.44	23.44	28.0	
36 × 620	28.9	28.9	34.5	
40 × 500	25.9	25.9	31.0	
40 × 620	32.0	32.0	38.2	
45 × 500	29.1	29.1	34.7	
45 × 620	35.8	35.8	42.8	
50 × 500	32.2	32.2	38.4	
50 × 620	39.7	39.7	47.4	
60 × 500	38.8	38.8	46.2	+0.50/+3.50
60 × 620	47.8	47.8	57.0	
70 × 500	45.0	45.0	53.7	
70 × 620	55.5	55.5	66.2	
80 × 500	51.7	51.7	61.7	+0.50/+5.00
80 × 620	63.8	63.8	76.1	
90 × 500	58.0	58.0		
90 × 620	71.5	71.5		
100 × 300	39.3	39.3		
100 × 500	64.2	64.2		

Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECAFLON

Fluoropolymers have excellent, almost universal resistance to chemicals. They can be used both at high and very low temperatures (-260 °C to +260 °C). In addition, TECAFLON PVDF and TECAFLON PTFE possess outstand-

ing resistance to weathering (UV resistance). Due to the low coefficient of friction, they are often used as sliding materials or as corresponding additives in other high-performance plastics.

Overview of types

TECAFLON PVDF natural (PVDF)

Good chemical resistance and high level of strength. Very good welding properties.

TECAFLON PTFE natural (PTFE)

Exceptional chemical resistance. Particularly low coefficient of friction. Ideally suited for soft mating partners.

On request:

TECAFLON PVDF ELS black (PVDF, conductive carbon)
→ page 84

TECAFLON PTFE GF25 natural (PTFE GF)

Glass fibre-reinforced stock shapes with improved strength. Good machining properties.

TECAFLON ETFE natural (E/TFE)

Minimal moisture absorption. High service temperature.

Application examples

Support

TECAFLON PTFE natural (PTFE)

Very good UV resistance. Good electrical insulation. High degree of toughness.



Die

TECAFLON PTFE natural (PTFE)

Excellent chemical resistance. Low coefficient of friction. No slip-stick effect.



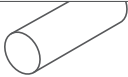
Valve body

TECAFLON PVDF natural (PVDF)

Good chemical resistance. High degree of toughness and strength.



TECAFLON Rods

		TECAFLON PTFE natural	
Polymer	PTFE		
Density [g/cm ³]	2.15		
Colour	white opaque		
Diameter [mm]	[kg/m]	Tolerance [mm]	
4	0.030	+0.00/+0.30	
5	0.046		
6	0.066	+0.00/+0.40	
8	0.117		
10	0.182		
12	0.269	+0.00/+0.80	
14	0.362		
15	0.414		
16	0.470		
18	0.591		
20	0.727		
22	0.892	+0.00/+1.20	
25	1.13		
28	1.43		
30	1.62	+0.00/+1.60	
32	1.88		
35	2.24		
40	2.94	+0.00/+2.00	
45	3.70		
50	4.54		
55	5.54	+0.00/+2.60	
60	6.56		
65	7.70	+0.00/+2.80	
70	8.90		
75	10.25	+0.00/+3.20	
80	11.63		
90	14.65		
100	18.17	+0.00/+4.00	
110	21.91		
120	26.0		
130	30.4		
140	35.7	+0.00/+6.00	
150	40.9		
160	46.4		

Tolerances according to DIN:

Length 0 / +3%

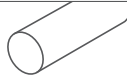
Stock lengths: 2,000 mm

Tolerance based on GKV according to manufacturer's specifications.

GF25 and CF25 available on request.

- Stock item
- Non-stock item - special production

TECAFLON Rods

		TECAFLON PVDF natural	
Polymer	PVDF		
Density [g/cm ³]	1.78		
Colour	white opaque		
Diameter [mm]	[kg/m]	Tolerance [mm]	
4	0.027	+0.10/+0.60	
5	0.041		
6	0.057		
8	0.101	+0.10/+0.70	
9	0.126		
10	0.154		
12	0.223	+0.20/+0.80	
15	0.343		
16	0.388		
18	0.488		
20	0.599		
22	0.728	+0.20/+1.00	
25	0.935		
28	1.17		
30	1.34		
32	1.52	+0.20/+1.20	
35	1.82		
40	2.36		
45	2.99	+0.30/+1.30	
50	3.68		
56	4.60		
60	5.30	+0.30/+1.60	
65	6.20		
70	7.18		
75	8.28	+0.40/+2.00	
80	9.40		
90	11.90	+0.50/+2.20	
100	14.71	+0.60/+2.50	
110	17.84	+0.70/+3.00	
120	21.28	+0.80/+3.50	
125	23.05		
130	24.98	+0.90/+3.80	
135	26.9		
140	28.9		
150	33.2	+1.00/+4.20	
160	37.8	+1.10/+4.50	
165	40.3	+1.20/+5.00	
180	47.8		
200	59.0	+1.30/+5.50	
210*	65.0	+1.30/+5.80	
230*	78.0	+1.50/+6.20	
250*	91.9		
280*	115.1	+1.50/+6.60	

Tolerances according to DIN:

Length 0 / +3%

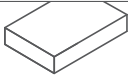
Stock lengths: 3,000 mm

* Stock length: 1,000 mm

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAFLON Plates

TECAFLON PTFE natural		
		
Polymer	PTFE	
Density [g/cm ³]	2.15	
Colour	white opaque	
Dimensions [mm]	[kg/m]	Tolerance [mm]
1 × 1,200	2.78	+0.00/+0.05
2 × 1,200	5.70	+0.00/+0.20
3 × 1,200	9.22	+0.00/+0.80
4 × 1,200	11.94	
5 × 1,200	14.65	
6 × 1,200	17.36	
8 × 1,200	23.33	+0.00/+1.20
10 × 1,200	28.8	
12 × 1,200	35.3	+0.00/+2.00
15 × 1,200	43.4	
20 × 1,200	57.0	
25 × 1,200	70.5	
30 × 1,200	85.5	+0.00/+3.00
40 × 1,200	112.6	
50 × 1,200	139.7	
60 × 1,200	166.8	
70 × 1,200	194.0	
80 × 1,200	221.1	
90 × 1,200	250.9	+0.00/+5.00
100 × 1,200	278.1	

Tolerances according to DIN:

Length 0 / +3%

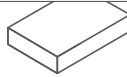
Width +5 / +25 mm

Stock lengths: 1,200 mm

Tolerance based on GKV according to manufacturer's specifications.

GF30 available on request.

TECAFLON Plates

TECAFLON PVDF natural		
		
Polymer	PVDF	
Density [g/cm ³]	1.78	
Colour	white opaque	
Dimensions [mm]	[kg/m]	Tolerance [mm]
10 × 500	9.96	+0.20/+1.10
10 × 620	12.28	
10 × 1,000*	19.63	
15 × 500	14.87	+0.30/+1.50
15 × 620	18.33	
15 × 1,000*	29.3	
20 × 500	19.54	
20 × 620	24.10	
20 × 1,000*	38.5	
25 × 500	24.22	
25 × 620	29.9	
25 × 1,000*	47.7	
30 × 500	29.5	+0.50/+2.50
30 × 620	36.3	
30 × 1,000*	58.0	
36 × 500	35.1	
36 × 620	43.2	
36 × 1,000*	69.1	
40 × 500	38.8	
40 × 620	47.8	
40 × 1,000*	76.5	
45 × 500	43.5	
45 × 620	53.6	
50 × 500	48.2	
50 × 620	59.4	
60 × 300	35.5	+0.50/+3.50
60 × 500	58.0	
70 × 300	41.2	
70 × 500	67.3	
80 × 300	47.3	+0.50/+5.00
80 × 500	77.4	
90 × 300	53.0	
90 × 500	86.7	
100 × 300	58.8	
100 × 500	96.1	

Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

* Stock length: 2,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

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TECASON TECAPEI

Polyarylsulphones (PSU, PPSU) are a family of thermoplastic, amorphous and polar polymers. Even at high temperatures, TECASON P, TECASON E or TECASON S demonstrate high strength and stability. Polyetherimide (PEI), an amorphous

thermoplastic from the polyimide group, is very similar to polysulphones. It is frequently used in the electrotechnical industry.

Overview of types

TECASON S natural (PSU)

High frequency resistant plastic. Translucent. Suitable for contact with food.

TECASON E natural (PES)

Good electrical insulating properties. Translucent. Hydrolysis-resistant.

TECASON P (PPSU)

Material suitable for super heated steam sterilization. High thermal dimensional stability.

TECASON P MT coloured (PPSU)

→ p. 70

TECASON P MT XRO coloured (PPSU)

→ p. 70

TECAPEI (PEI)

Long-term service temperature up to 170 °C. Resistance to high-energy radiation.

TECAPEI GF30 (PEI GF)

High thermal and mechanical load capacity. Resistance to high-energy radiation.

TECAPEI MT (PEI)

→ p. 70

Application examples

Control panel for dialysis system TECASON E natural (PES)

Good sterilization resistance. Free from surface burrs. High degree of transparency.



Dispensing plunger for water analysis TECASON S natural (PSU)

High transparency for optical control. Good dimensional stability. Resistance to disinfectant and cleaning agents.



Knee cap trial implant TECASON P MT green (PPSU)

Resistant to steam sterilisation. Biocompatible.



TECASON / TECAPEI Rods

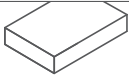
	TECASON S natural	TECASON E natural	TECASON P natural	TECAPEI natural	TECAPEI GF30 natural	
						
Polymer	PSU	PES	PPSU	PEI	PEI	
Density [g/cm ³]	1.24	1.37	1.29	1.28	1.51	
Colour	amber transparent	amber transparent	amber transparent	amber transparent	amber opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
8	0.071	0.078	0.074	0.073		+0.10/+0.80
10	0.108	0.120	0.113	0.112		
12	0.156	0.173	0.163	0.162		+0.20/+0.90
16	0.272	0.301	0.283	0.281		
20	0.420	0.463	0.436	0.433	0.511	
22	0.512	0.566	0.533	0.528	0.623	+0.20/+1.20
25	0.656	0.725	0.683	0.677	0.799	
30	0.936	1.03	0.974	0.966	1.14	
32	1.06	1.17	1.11	1.10	1.29	
36	1.35	1.49	1.41	1.40	1.65	+0.20/+1.60
40	1.66	1.84	1.73	1.72	2.02	
45	2.12	2.34	2.20	2.18	2.58	+0.30/+2.00
50	2.60	2.87	2.70	2.68	3.16	
56	3.24	3.58	3.38	3.35		
60	3.74	4.14	3.90	3.87	4.56	+0.30/+2.50
70	5.06	5.60	5.27	5.23		
80	6.63	7.33	6.90	6.84		+0.40/+3.00
90	8.40	9.28	8.74	8.67		+0.50/+3.40
100	10.38	11.46	10.79	10.71		+0.60/+3.80
110	12.56	13.88	13.07	12.97		+0.70/+4.20
120	14.96	16.52	15.56	15.44		+0.80/+4.60
125	16.20	17.90	16.85	16.72		
135	18.96	20.95	19.72	19.57		+0.90/+5.40
140	20.36	22.49	21.18	21.01		
150	23.38	25.8	24.32	24.13		+1.00/+5.80

Tolerances according to DIN:
Length 0 / +3%
Stock lengths: 3.000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECASON / TECAPEI Plates

	<i>TECASON S natural</i>	<i>TECASON E natural</i>	<i>TECASON P natural</i>	<i>TECAPEI natural</i>	<i>TECAPEI GF30 natural</i>	
Polymer	PSU	PES	PPSU	PEI	PEI	
Density [g/cm ³]	1.24	1.37	1.29	1.28	1.51	
Colour	amber transparent	amber transparent	amber transparent	amber transparent	amber opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10 × 300	4.24	4.69	4.41	4.38		+0.20/+1.10
10 × 500	6.94	7.66	7.22			
10 × 620	8.55	9.45	8.90	8.83		
12 × 300	5.14	5.68	5.35	5.31		+0.30/+1.50
12 × 500	8.40	9.28	8.74	8.67		
12 × 620	10.36	11.45	10.78	10.69		
16 × 300	6.73	7.44	7.00	6.95		
16 × 500	11.01	12.16	11.45	11.36		
16 × 620	13.57	15.00	14.12	14.01		
20 × 300	8.33	9.20	8.66	8.60		
20 × 500	13.61	15.04	14.16	14.05	16.58	
20 × 620	16.79	18.55	17.46	17.33		
25 × 300	10.32	11.40	10.73	10.65		
25 × 500	16.87	18.64	17.55	17.41	20.54	
25 × 620	20.80	22.98	21.64	21.47		
30 × 300	12.55	13.87	13.06	12.95		+0.50/+2.50
30 × 500	20.52	22.67	21.35	21.18	24.99	
30 × 620	25.3	28.0	26.3	26.1		
36 × 300	14.94	16.51	15.54	15.42		
36 × 500	24.43	27.0	25.4	25.2	29.7	
36 × 620	30.1	33.3	31.3	31.1		
40 × 300	16.53	18.27	17.20	17.07		
40 × 500	27.0	29.9	28.1	27.9	32.9	
40 × 620	33.3	36.8	34.7	34.4		
50 × 300	20.52	22.67	21.35	21.18		
50 × 500	33.5	37.1	34.9	34.6		
50 × 620	41.4	43.0	43.0	42.7		
60 × 300	24.70	27.3	25.7	25.5		+0.50/+3.50
60 × 500	40.4	44.6	42.0	41.7		
70 × 300	28.7	31.7	29.8	29.6		
80 × 300	33.0	36.4	34.3	34.0		+0.50/+5.00

Tolerances according to DIN:

Length 0 / +3 %

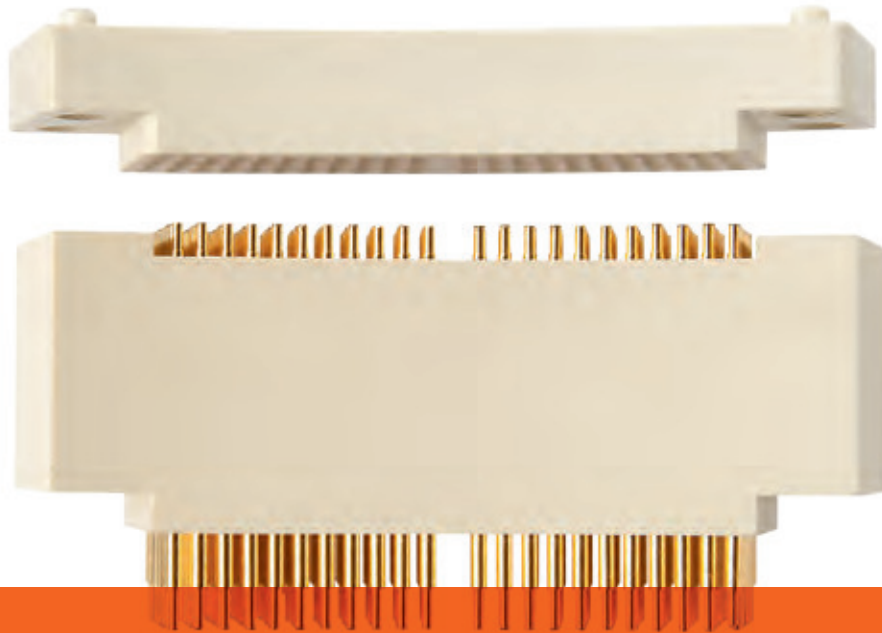
Width +5 / +25 mm

Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

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TECATRON

Polyphenylenesulphide (PPS) is a semi-crystalline, high temperature thermoplastic polymer. Due to its chemical structure, TECATRON is a very resistant polymer with excellent mechanical strength, even at temperatures above

200 °C. In addition to low water absorption, PPS also has good dimensional stability and excellent electrical properties. PPS is chemically very stable even at high temperatures.

Overview of types

TECATRON (PPS)

Low water absorption.
Very good electrical insulation.

TECATRON GF40 (PPS GF)

Extremely high strength due to glass fibre reinforcement.
Very good chemical resistance.

TECATRON PVX black (PPS CF CS TF)

Very good sliding and friction values.
Suitable for bearings under high levels of stress.

TECATRON CMP natural (PPS)

→ p. 79

TECATRON SE (PPS)

→ p. 79

Application examples

Fluid valve

TECATRON GF40 natural (PPS GF)

Good chemical resistance.
Dimensionally stable.
Narrow tolerances possible.



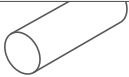
End plate of a fuel cell

TECATRON GF40 black (PPS GF)

Very good rigidity and strength even at high temperatures.
High thermal stability.
High dimensional stability.
Good chemical resistance.



TECATRON Rods

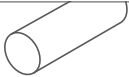
		TECATRON natural	
Polymer		PPS	
Density [g/cm ³]		1.36	
Colour		beige opaque	
Diameter [mm]	[kg/m]	Tolerance [mm]	
10	0.118	+0.10/+0.70	
12	0.170	+0.20/+0.80	
16	0.297		
20	0.458		
22	0.556	+0.20/+1.00	
25	0.714		
30	1.02		
32	1.16	+0.20/+1.20	
36	1.47		
40	1.80		
45	2.29	+0.30/+1.30	
50	2.81		
56	3.52		
60	4.05	+0.30/+1.60	

Tolerances according to DIN:

Length 0 / +3%

Stock lengths: 3,000 mm

TECATRON Rods

		TECATRON GF40 natural	TECATRON GF40 black	TECATRON PVX black		
Polymer		PPS	PPS	PPS		
Density [g/cm ³]		1.63	1.63	1.50		
Colour		beige opaque	black opaque	black opaque		
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]	
10	0.143	0.143	0.131	0.131	+0.10/+0.80	
12	0.206	0.206	0.189	0.189	+0.20/+0.90	
16	0.358	0.358	0.329	0.329		
20	0.551	0.551	0.507	0.507		
22	0.673	0.673	0.619	0.619	+0.20/+1.20	
25	0.862	0.862	0.794	0.794		
30	1.23	1.23	1.13	1.13		
32	1.40	1.40	1.28	1.28		
36	1.78	1.78	1.64	1.64	+0.20/+1.60	
40	2.18	2.18	2.01	2.01		
45	2.78	2.78			+0.30/+2.00	
50	3.42	3.42				
56	4.26	4.26				
60	4.92	4.92			+0.30/+2.50	

Tolerances according to DIN:

Length 0 / +3%

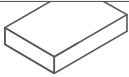
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

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TECATRON Plates

	TECATRON natural	TECATRON GF40 natural	TECATRON GF40 black	TECATRON PVX black	
					
Polymer	PPS	PPS	PPS	PPS	
Density [g/cm ³]	1.36	1.63	1.63	1.50	
Colour	beige opaque	beige opaque	black opaque	black opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10 × 500	7.61	9.12	9.12	8.39	+0.20/+1.10
12 × 500	9.22	11.05	11.05	10.16	+0.30/+1.50
16 × 500	12.07	14.47	14.47	13.32	
18 × 500	13.50	16.18	16.18	14.89	
20 × 500	14.93	17.90	17.90	16.47	
25 × 500	18.50	22.18	22.18	20.41	
30 × 500	22.50	27.0	27.0	24.82	+0.50/+2.50
36 × 500	26.8	32.1	32.1	29.5	
40 × 500	29.6	35.5	35.5	32.7	
50 × 300	22.50	27.0	27.0	24.82	
50 × 500	36.8	44.1	44.1		
60 × 300	27.1	32.5	32.5		+0.50/+3.50
70 × 300	31.5	37.7	37.7		

Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

- Stock item
- Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planed.
The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECAPEEK

Polyaryletherketones (PAEK, e.g. PEEK, PEK, PEKEKK) are high temperature-resistant thermoplastics with unusual characteristics. The high strength of the semi-crystalline aromatic polymers is maintained even at high temperatures. In addition, PAEK materials demonstrate very good impact

strength at low temperatures, high mechanical fatigue strength, a very low tendency to creep as well as good sliding and wear properties. Their chemical resistance is also very good. Due to their unusual characteristics, TECAPEEK is used for particularly demanding applications.

Overview of types

TECAPEEK
(PEEK)
Long-term service temperatures of up to +260 °C. Excellent mechanical properties even at high temperatures.

TECAPEEK blue
(PEEK)
→ p. 66

TECAPEEK bright red
(PEEK)
Bright signal colour.

TECAPEEK GF30
(PEEK GF)
Glass fibre-reinforced with increased strength. Excellent chemical resistance.

TECAPEEK CF30 black
(PEEK CF)
Very high strength values due to the addition of carbon fibre. Extremely abrasion resistant.

TECAPEEK PVX black
(PEEK CF CS TF)
Very good sliding values. Suitable for bearings under high levels of stress.

TECAPEEK ELS nano black
(PEEK, CNT)
→ p. 79

TECAPEEK TF10 blue
(PEEK TF)
→ p. 66

TECAPEEK ID blue
(PEEK, detectable filler)
→ p. 66

TECAPEEK PNT
(PEEK GF CNT)
→ p. 54

TECAPEEK MT coloured
TECAPEEK MT XRO coloured
TECAPEEK MT CF30 black
(PEEK / PEEK CF)
→ p. 70

TECAPEEK
MT CLASSIX white
TECAPEEK
MT CLASSIX XRO20
(PEEK)
→ p. 70

TECAPEEK CMP natural
TECAPEEK SE
(PEEK)
→ p. 79

TECAPEEK TS
(PEEK, mineral)
→ p. 79

TECAPEEK CMF
white / grey
(PEEK, ceramic)
→ p. 79

TECAPEEK HT black
(PEK)
Good abrasion and wear resistance. High loading capacity under static and dynamic stress.

TECAPEEK ST black
(PEKEKK)
Excellent mechanical properties at high temperatures.

Application examples

Support comb
TECAPEEK GF30 natural
(PEEK GF)
High degree of toughness. High dimensional stability. Good chemical resistance. Electrically insulating.



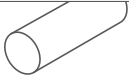
Valve cover
TECAPEEK natural
(PEEK)
Good thermal formability. Good resistance to oil and grease even at high temperatures.



Gear rack
TECAPEEK PVX black
(PEEK CF CS TF)
Good tribological properties. Good dimensional stability. High strength and rigidity.





TECAPEEK Rods

	TECAPEEK natural	TECAPEEK black	TECAPEEK HT black	TECAPEEK ST black	
					
Polymer	PEEK	PEEK	PEK	PEKEKK	
Density [g/cm ³]	1.31	1.31	1.31	1.32	
Colour	beige opaque	black opaque	black opaque	black opaque	
					Tolerance
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[mm]
3	0.012	0.012	0.012	0.012	+0.10/+0.60
4	0.020	0.020	0.020	0.020	
5	0.030	0.030	0.030	0.030	
6	0.042	0.042	0.042	0.043	
8	0.074	0.074	0.074	0.075	+0.10/+0.70
10	0.114	0.114	0.114	0.114	
12	0.164	0.164	0.164	0.165	+0.20/+0.80
15	0.252	0.252	0.252	0.254	
16	0.286	0.286	0.286	0.288	
18	0.359	0.359	0.359	0.362	
20	0.441	0.441	0.441	0.444	
22	0.536	0.536	0.536	0.540	+0.20/+1.00
25	0.688	0.688	0.688	0.693	
28	0.858	0.858	0.858	0.865	
30	0.983	0.983	0.983	0.990	
32	1.12	1.12	1.12	1.13	+0.20/+1.20
36	1.41	1.41	1.41	1.42	
40	1.74	1.74	1.74	1.75	
45	2.20	2.20	2.20	2.22	+0.30/+1.30
50	2.71	2.71	2.71	2.73	
56	3.39	3.39	3.39	3.41	
60	3.90	3.90	3.90	3.93	+0.30/+1.60
65	4.56	4.56	4.56	4.60	
70	5.28	5.28	5.28	5.32	
80	6.92	6.92	6.92	6.97	+0.40/+2.00
90	8.76	8.76	8.76	8.82	+0.50/+2.20
100	10.82	10.82	10.82	10.90	+0.60/+2.50
110	13.13	13.13			+0.70/+3.00
120	15.66	15.66			+0.80/+3.50
125	16.97	16.97			
135	19.80	19.80			+0.90/+3.80
140	21.27	21.27			
150	24.44	24.44			+1.00/+4.20
160	27.8				+1.10/+4.50
165	29.7				+1.20/+5.00
180*	35.2				
200*	43.4				+1.30/+5.50
210*	47.9				+1.30/+5.80

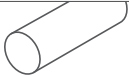
Tolerances according to DIN:
Length 0 / +3 %
Stock lengths: 3,000 mm

* Stock length: 1,000 mm

 Stock item
 Non-stock item –
special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
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TECAPEEK Rods

	TECAPEEK GF30 natural	TECAPEEK CF30 black	TECAPEEK PVX black	
				
Polymer	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.53	1.38	1.44	
Colour	beige opaque	black opaque	black opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5	0.036	0.032	0.034	+0.10/+0.70
6	0.050	0.045	0.047	
8	0.088	0.079	0.082	+0.10/+0.80
10	0.134	0.121	0.126	
12	0.193	0.174	0.182	+0.20/+0.90
15	0.296	0.267	0.279	
16	0.336	0.303	0.316	
18	0.422	0.380	0.397	
20	0.518	0.467	0.487	
22	0.632	0.570	0.594	+0.20/+1.20
25	0.810	0.730	0.762	
28	1.01	0.911	0.950	
30	1.16	1.04	1.09	
32	1.31	1.18	1.23	
36	1.67	1.51	1.57	+0.20/+1.60
40	2.05	1.85	1.93	
45	2.61	2.35	2.46	+0.30/+2.00
50	3.21	2.89	3.02	
56	4.00	3.61	3.77	
60	4.62	4.17	4.35	+0.30/+2.50
65	5.40	4.87	5.09	
70	6.25	5.64	5.88	
80	8.18	7.38	7.70	+0.40/+3.00
90	10.36	9.35	9.75*	+0.50/+3.40
100	12.80		12.05*	+0.60/+3.80

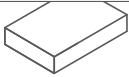
Tolerances according to DIN:
Length 0 / +3%
Stock lengths: 3,000 mm

* Stock length: 1,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAPEEK Plates



	TECAPEEK natural	TECAPEEK black	TECAPEEK GF30 natural	TECAPEEK CF30 black	TECAPEEK PVX black	TECAPEEK ST black	TECAPEEK HT black		
Polymer	PEEK	PEEK	PEEK	PEEK	PEEK	PEKEKK	PEK		
Density [g/cm ³]	1.31	1.31	1.53	1.38	1.44	1.32	1.31		
Colour	beige opaque	black opaque	beige opaque	black opaque	black opaque	black opaque	black opaque	Stock length	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[mm]	Tolerance [mm]
5 x 500	3.75	3.75	4.38			3.78	3.75	3.000	+0.20/+0.70
5 x 620	4.62	4.62	5.40	4.87	5.08	4.66	4.62	3.000	
6 x 500	4.44	4.44	5.18			4.47	4.44	3.000	
6 x 620	5.47	5.47	6.39	5.77	6.02	5.51	5.47	3.000	
8 x 500	5.95	5.95	6.95	6.27	6.54	6.00	5.95	3.000	+0.20/+1.10
8 x 620	7.34	7.34	8.57	7.73	8.07	7.40	7.34	3.000	
10 x 500	7.33	7.33	8.56	7.72	8.06	7.38	7.33	3.000	
10 x 620	9.04	9.04	10.55	9.52	9.93	9.11	9.04	3.000	
12 x 500	8.88	8.88	10.37	9.35	9.76	8.94	8.88	3.000	+0.30/+1.50
12 x 620	10.95	10.95	12.78	11.53	12.03	11.03	10.95	3.000	
16 x 500	11.63	11.63	13.58	12.25	12.78	11.72	11.63	3.000	
16 x 620	14.34	14.34	16.75	15.11	15.76	14.45	14.34	3.000	
18 x 500	13.01	13.01	15.19	13.70	14.30	13.11	13.01	3.000	
18 x 620	16.04	16.04	18.73	16.89	17.63	16.16	16.04	3.000	
20 x 500	14.38	14.38	16.80	15.15	15.81	14.49	14.38	3.000	
20 x 620	17.73	17.73	20.71	18.68	19.49	17.87	17.73	3.000	
20 x 1,000*	28.3							2.000	
22 x 500	15.76	15.76	18.40	16.60	17.32	15.88	15.76	3.000	
25 x 500	17.82	17.82	20.82	18.78	19.59	17.96	17.82	3.000	
25 x 620	21.98	21.98	25.7	23.15	24.16	22.14	21.98	3.000	
25 x 1,000*	35.1							2.000	
30 x 500	21.68	21.68	25.3	22.83	23.83	21.84	21.68	3.000	+0.50/+2.50
30 x 620	26.7	26.7	31.2	28.2	29.4	26.9	26.7	3.000	
30 x 1,000*	42.7							2.000	
32 x 500	23.05	23.05	26.9	24.28	25.3	23.23	23.05	3.000	
36 x 500	25.8	25.8	30.1	27.2	28.4	26.0	25.8	3.000	
40 x 500	28.6	28.6	33.4	30.1	31.4	28.8	28.6	3.000	
40 x 620	35.2	35.2	41.1	37.1	38.7	35.5	35.2	3.000	
40 x 1,000*	56.3							2.000	
45 x 500	32.0	32.0	37.4	33.7	35.2	32.2	32.0	3.000	
45 x 620	39.5	39.5	46.1	41.6	43.4	39.8	39.5	3.000	
50 x 500	35.4	35.4	41.4	37.3	39.0	35.7	35.4	3.000	
50 x 620	43.7	43.7	51.0	46.0	48.0	44.0	43.7	3.000	
50 x 1,000*	69.8							2.000	
60 x 300	26.1	26.1	30.5					3.000	+0.50/+3.50
60 x 500	42.7	42.7	49.8					3.000	
60 x 1,000*	84.1							2.000	
70 x 300	30.3	30.3	35.4					3.000	
80 x 300	34.8		40.7					3.000	+0.50/+5.00
80 x 500	56.9							3.000	
100 x 300	43.2							3.000	
120 x 620^a	104.6							1.000	+0.50/+6.00
150 x 620^a	130.5							1.000	+0.50/+7.00

Tolerances according to DIN:
 Length 0 / +3%
 Width +5 / +25 mm
 Stock lengths: 3,000

* Stock length: 2,000 mm
^a Stock length: 1,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

TECAPEEK Tubes



TECAPEEK natural
 Polymer: PEEK
 Density: 1.31 g/cm³
 Colour: beige opaque

Diameter Outer [mm]	→	16	20	25	30	36	40	45	50	56	60	65	70	75	80	85	90	100	110
Diameter Inner [mm]	↓	[kg/m]																	
8		0.239																	
10		0.362																	
15		0.239	0.483	0.779															
18		0.384	0.680																
20			0.603	1.09	1.42														
25			0.375	0.871	1.20	1.66	2.17	2.92	3.42	4.14	4.87	5.65	6.48	7.52	8.47	10.51			
30				0.926	1.90	2.64	3.15	3.87	4.60	5.38	6.21	7.27	8.21	10.26					
35				0.598	1.06	2.32													
36					1.50														
40					0.678	1.19	1.94	2.45	3.17	3.90	4.68	5.52	6.60	7.55	9.59				
45						0.758	1.52	2.02	2.75	3.48	4.26	5.09	6.19	7.14	9.18				
50								1.54	3.00	3.78	4.61	5.73	6.67	8.72	10.97				
56											3.97	5.10	6.05	8.09					
60											1.88	3.50	4.64	5.59	7.63	9.88			
65													4.02	4.96	7.01	9.26			
70													2.17	4.29	6.34	8.59			
80														2.79	4.83	7.08			
90																		5.37	
Tolerance Outer [mm]					+0.4			+0.6		+0.8				+0.8					+1.2
					+1.1			+2.0		+2.5				+3.0					+3.6
Tolerance Inner [mm]					-1.1			-2.0		-2.5				-3.0					-5.0
					-0.4			-0.6		-0.8				-0.8					-1.6

Diameter Outer [mm]	→	125	135	140	150	165	180	185	190	200	210	230	250	255	280	285	290	300	305	360
50		15.00	17.79	19.26	22.37															
60		13.93	16.72	18.20	21.30															
65		13.32	16.11	17.59	20.69															
70		12.66	15.45	16.92	20.03															
80		11.17	13.96	15.44	18.54	23.90	29.4	31.7	33.7	37.8										
90		9.48	12.27	13.74	16.85	22.22	27.8	30.0	32.0	36.2	51.3	61.6	64.8							
100		7.57	10.36	11.84	14.95	20.33	25.9	28.1	30.1	34.3	38.7	49.5	59.8	62.9						
110			8.25	9.72	12.83	18.23	23.77	26.0	28.0	32.2	36.6	47.4	57.8	60.9	78.3					
125					9.26	14.68	20.23	22.50	24.51	28.7	33.1	44.0	54.3	57.5	74.9	84.3	88.0			
130					7.97	13.39	18.94	21.22	23.23	27.4	31.8									
140						10.66	16.21	18.50	20.51	24.69	29.1									
150							13.27	15.57	17.58	21.76	26.1	37.1	47.5	50.7	68.1	77.5	81.2			
160							10.11	12.44	14.45	18.62	23.01									
175										13.52	17.91									
180												27.2	37.5	40.8	58.2	67.6	71.4			
190												23.50	33.8		54.5	63.9	67.7			
195												21.56	31.9		52.6	62.0	65.8			
200												19.56			47.6	50.6	60.0	63.8		
210													25.7	29.0	46.5	55.9	59.7			
220													21.39	24.71	42.1	51.5	55.3			
260																25.7				
290																			58.3	
Tolerance Outer [mm]					+1.5	+1.8				+2.0		+3.0						+3.0	+3.0	
					+4.5	+5.4				+6.0		+9.0						+10.0	+11.0	
Tolerance Inner [mm]					-6.5	-7.5				-8.5		-12.0						-13.0	-14.0	
					-2.0	-2.2				-2.5		-3.0						-3.5	-3.5	

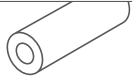
Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

- Stock item
- Non-stock item - special production

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TECAPEEK Tubes



TECAPEEK PVX black
 Polymer: PEEK
 Density: 1.44 g/cm³
 Colour: black opaque

Diameter Outer [mm]	→	40	45	50	56	60	65	70	75	78	80	85	90	100	110
Diameter Inner [mm]	↓	[kg/m]													
25		1.32	1.82	2.39	3.21	3.76	4.55	5.35	6.21		7.12	8.27	9.31	11.55	
30				2.09	2.91	3.46	4.25	5.05	5.91		6.83	7.99	9.03	11.27	
36				1.65	2.47	3.02	3.82	4.62	5.48	6.02	6.40	7.58	8.62	10.86	
40					2.14	2.69	3.49	4.29	5.15	5.69	6.06	7.26	8.30	10.54	
45							3.02	3.82	4.68	5.22	5.59	6.81	7.84	10.09	
50								3.29	4.15	4.70	5.07	6.30	7.33	9.58	12.06
54									3.69	4.23	4.61	5.85	6.88	9.13	11.61
56											4.36	5.61	6.65	8.89	
60											3.84	5.10	6.14	8.39	10.87
65												4.42	5.46	7.70	10.18
70													4.72	6.96	9.44
75														6.17	8.64
80														5.31	7.79
90															5.90
Tolerance Outer [mm]				+0.6		+0.8					+0.8			+1.2	
				+2.0		+2.5					+3.0			+3.6	
Tolerance Inner [mm]				-2.0		-2.5					-3.0			-5.0	
				-0.6		-0.8					-0.8			-1.6	

Diameter Outer [mm]	→	125	135	140	150	165	180	185	190	200	210	230	250	255	285	300	305
50		16.49	19.55	21.18	24.59												
54		16.05	19.11	20.73	24.15												
60		15.32	18.38	20.00	23.42												
65		14.64	17.71	19.33	22.75												
70		13.91	16.98		22.02												
75		13.13															
80		12.28	15.35	16.97	20.39	26.3		34.8	37.0								
90		10.42	13.49	15.11	18.52	24.43		33.0	35.2								
100		8.32	11.39	13.01	16.43	22.35	28.4	30.9	33.1								
110			9.07	10.69	14.10	20.04	26.1	28.6	30.8	35.4					86.1		
112															85.6		
125					10.18	16.14	22.23	24.73	26.9	31.5					82.3	92.6	96.7
130					8.76	14.72	20.82	23.33	25.5	30.1	34.9						
140						11.72	17.82	20.34	22.55	27.1	32.0						
150							14.58	17.12	19.33	23.92	28.7	40.8	52.2		74.8	85.2	89.3
160								13.67	15.88	20.47	25.3						
175										14.86							
180												29.9	41.3		64.0	74.3	78.5
190														40.8	59.9	70.3	74.4
195														38.7	57.8	68.1	72.3
200												21.50	32.9	36.5	55.6		70.1
210														31.9	51.1	61.4	65.6
220															46.3	56.6	60.8
Tolerance Outer [mm]					+1.5		+1.8				+2.0		+3.0		+3.0	+3.0	+3.0
					+4.5		+5.4				+6.0		+9.0		+10.0	+11.0	+11.0
Tolerance Inner [mm]					-6.5		-7.5				-8.5		-12.0		-13.0	-14.0	-14.0
					-2.0		-2.2				-2.5		-3.0		-3.5	-3.5	-3.5

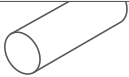
Tolerances according to DIN:
 Length 0 / +3%
 Stock lengths: 3,000 mm

The complete range of dimensions can be looked up in our online stock program at www.ensinger-online.com

- Stock item
- Non-stock item - special production

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TECAPEEK Rods


	TECAPEEK CMF white	TECAPEEK CMF grey	TECAPEEK TS grey	TECAPEEK ELS nano black	TECAPEEK TF10 natural	TECAPEEK PNT black	TECAPEEK bright red	
Polymer	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.65	1.65	1.49	1.36	1.35	1.38	1.36	
Colour	white opaque	grey opaque	blue grey opaque	black opaque	beige opaque	black opaque	bright red opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10	0.143	0.143	0.129	0.118	0.117	0.120	0.118	+0.10/+0.70
20	0.555	0.555	0.502	0.458	0.454	0.465	0.458	+0.20/+0.80
30	1.24	1.24	1.12	1.02	1.01	1.04	1.02	+0.20/+1.00
40	2.19	2.19	1.98	1.80	1.79	1.83	1.80	+0.20/+1.20
50	3.41	3.41	3.08	2.81	2.79	2.85	2.81	+0.30/+1.30
60	4.91	4.91	4.43	4.05	4.02	4.11	4.05	+0.30/+1.60
70				5.48	5.44	5.57	5.48	
80				7.18	7.13	7.29	7.18	+0.40/+2.00
90				9.09		9.23	9.09	+0.50/+2.20
100				11.24		11.40	11.24	+0.60/+2.50

Tolerances according to DIN:

Length 0 / +3%

Stock lengths: 3,000 mm

TECAPEEK Plates

	TECAPEEK CMF white	TECAPEEK CMF grey	TECAPEEK TS grey	TECAPEEK ELS nano black	TECAPEEK TF10 natural	TECAPEEK PNT black	TECAPEEK bright red	
Polymer	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.65	1.65	1.49	1.36	1.35	1.38	1.36	
Colour	white opaque	grey opaque	blue grey opaque	black opaque	beige opaque	black opaque	bright red opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	4.72	4.72	4.27	3.89	3.86	3.95	3.89	+0.20/+0.70
6 × 500	5.59	5.59	5.05	4.61	4.57	4.68	4.61	
10 × 500	9.23	9.23	8.34	7.61	7.55	7.72	7.61	+0.20/+1.10
12 × 500	11.18	11.18	10.10	9.22	9.15	9.35	9.22	+0.30/+1.50
15 × 500	13.78	13.78	12.44	11.36	11.28	11.53	11.36	
20 × 500	18.11	18.11	16.36	14.93	14.82	15.15	14.93	
25 × 500	22.45	22.45	20.27	18.50	18.37	18.78	18.50	
30 × 500	27.3	27.3	24.65	22.50	22.34	22.83	22.50	+0.50/+2.50
40 × 500	36.0	36.0	32.5	29.6	29.4	30.1	29.6	
50 × 500				36.8	36.5	37.3		

Tolerances according to DIN:

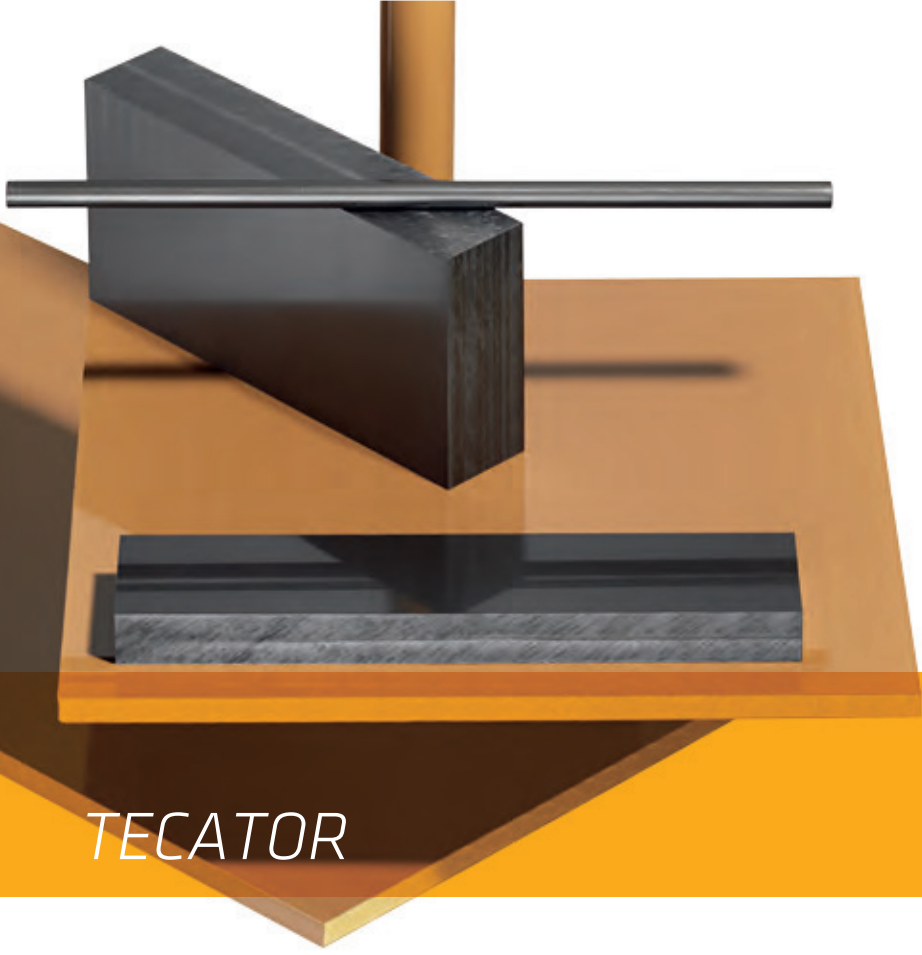
Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground respectively planed. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



TECATOR

TECATOR (PAI) is a high-performance thermoplastic characterized by outstanding loading capacity also in the cryogenic range. Compared to metal components, TECATOR parts with comparable properties are lighter and are used where weight saving is a key issue.

Properties

- Thermally resilient from the cryogenic range up to + 270 °C
- High rigidity, high strength coupled with toughness
- High long-term stability and high fatigue strength
- Extremely high creep resistance
- Good chemical resistance towards wide-ranging conventional solvents and lubricants, fuels and acids
- High resistance to high-energy radiation
- Self-extinguishing according to UL 94 V-0
- Good machining capability using conventional tools and machinery

Fields of application

Cryotechnics, electrical and electronic engineering, precision mechanics, mechanical engineering, medical technology, vacuum technology, aerospace, semi-conductor technology, automotive engineering.

Applications

Switches and plug components, valve seats, bearing and valve balls, bearing bushes and plates, piston rings, sliding rails, rollers, insulating parts, burn-in holders, test sockets for semi-conductors, rotors, housing components, support rings, structural components subject to high mechanical and thermal stress.

Overview of types

TECATOR 5013 natural (PAI)

Yellow-brown, natural type. Highest compression strength and impact resistance. Excellent electrical insulation and high dielectric constant.

TECATOR 5031 PV black (PAI, GR, TF)

Black, modified sliding properties. Low coefficient of friction and high abrasion resistance. Reduced thermal expansion.

Application examples

Insulating bodies for plugs TECATOR 5013 natural (PAI)

High thermal stability. Very good electrical insulation. Very low long-term thermal stability. Very good mechanical properties (> 200 °C).

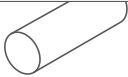


Throw-over switch TECATOR 5013 natural (PAI)

High thermal stability. Highly abrasion resistant. Very good creep resistance. High long-term stability.



TECATOR Rods


	TECATOR 5013 natural	TECATOR 5031 PV black		
	Polymer	PAI	PAI	
Density [g/cm ³]	1,40	1,46		
Colour	yellow-brown opaque	black opaque		
Diameter [mm]	[kg/m]	[kg/m]	Tolerance [mm]	
5	0.044	●	0.00 / +1.20	
6.25	0.064	0.070		
7.5	0.087	●		
10	0.165	0.167	0.00 / +1.50	
12.5	0.240	0.246		
15	0.352	0.369		
20	0.620	0.662	0.00 / +1.70	
25	0.940	1.01		
30	1.25	●		
40	●	●	0.00 / +1.80	
50	●	●		
60	●	●		
80	●	●		
100	●	●	0.00 / +2.00	

Tolerances according to DIN:

Length +1.00 / +25.0 mm

Stock lengths: 1,220 mm

TECATOR Plates

	TECATOR 5013 natural	TECATOR 5031 PV black		
	Polymer	PAI	PAI	
Density [g/cm ³]	1,40	1,46		
Colour	yellow-brown opaque	black opaque		
Dimensions [mm]	[kg/m]	[kg/m]	Tolerance Thickness [mm]	Tolerance Width [mm]
1 × 150	●	●	0.00 / +0.80	0.00 / +5.00
2 × 150	●	●		
5 × 300	3.15	●	0.00 / +1.20	0.00 / +5.00
6.25 × 300	3.60	3.77		
7.5 × 300	●	●		
10 × 300	5.65	5.87		
12.5 × 300	6.78	7.09		
15 × 300	8.09	●		
20 × 300	10.96	10.93		
25 × 300	13.08	●		
30 × 300	15.70	●		
40 × 300	●	●		

Tolerances according to DIN:

Length +1.00 / +25.0 mm

Stock lengths: 1,220 mm

● Non-standard products (produced on request)



TECASINT

Sintered TECASINT stock shapes and direct formed parts have excellent long-term thermal stability. The broad temperature application spectrum of these materials ranges from $-270\text{ }^{\circ}\text{C}$ to $+300\text{ }^{\circ}\text{C}$. Even when heated briefly to $350\text{ }^{\circ}\text{C}$, TECASINT materials will not melt or soften. Strength, dimensional stability and creep strength remain high under mechanical stress even during long-term usage.

Properties

- High strength over a wide temperature range from $-270\text{ }^{\circ}\text{C}$ to $+300\text{ }^{\circ}\text{C}$
- Long-term thermal stability $300\text{ }^{\circ}\text{C}$
- HTD / A up to $470\text{ }^{\circ}\text{C}$
- Good cryogenic properties
- High pressure and creep strength
- High radiation resistance
- High purity, low outgassing in vacuum in accordance with ESA regulation ECSS-Q-70-02
- Minimal thermal expansion
- Minimal thermal conductivity
- Excellent friction and abrasion properties – even when not lubricated
- Good chemical resistance to acids, fats and solvents
- Excellent electrical insulation properties
- Inherently flame resistant (UL 94 V0)

Fields of application

The fields of application are many and varied: The mechanical engineering, automotive and gear manufacturing industries appreciate the outstanding sliding properties of the graphite / PTFE-modified TECASINT product types. In aerospace or vacuum technology, unreinforced or MoS_2 -modified product types (for sliding applications) are used.

Important fields of application are found in the glass industry. Components made of TECASINT are frequently used for the careful handling of hot glass. Its good thermal and electrical insulating effect also makes TECASINT ideally suited for applications in welding torches and the electrical and electronics industry. TECASINT has a very low ion content and is used in particular for applications in the semi-conductor industry, for example in wafer applications.

Forms of delivery and production processes

TECASINT is available as:

Stock shapes (rods, plates, short pipes, disks).

Parts for machining to drawing.

Volume production parts using the direct forming process.

Precision components made of TECASINT are produced in small production runs using machining processes in accordance with customer drawing. For larger piece numbers (from appr. 1,000 pcs.) components can be manufactured at low cost using the direct forming (DF) method.

Product families

TECASINT 1000

Very high modulus, high rigidity and hardness. Previous designation SINTIMID.

TECASINT 2000

Very high modulus, high rigidity and hardness. Compared to TECASINT 1000, significantly reduced moisture absorption. Higher toughness and improved machining capability. Ideally suited for direct forming components.

TECASINT 4000

Compared to the other TECASINT materials, TECASINT 4000 is characterized by the following properties: Minimal water absorption. Highest stability against oxidation in air. Low friction. Optimum chemical resistance. HDT /A up to 470 °C. Different types available with high fracture strain and toughness or with high flexural modulus.

TECASINT 5000

Non-melting high-temperature polyamidimide (PAI). Extremely good dimensional stability and load capacity up to 300 °C.

TECASINT 8000

Matrix of PTFE reinforced with PI powder. Reduced creep under load. Excellent sliding and friction properties. Ideally suited for soft mating partners (stainless steel, aluminium, brass, bronze). Extreme chemical resistance and simple machining properties.

Modifications

Unfilled

Maximum strength and elongation. Highest modulus. Minimal thermal and electrical conductivity. High purity. Low outgassing in accordance with ESA regulation ECSS-Q-70-20.

+ 15 % graphite

Enhanced wear resistance and thermal ageing. Self lubricating, for lubricated and dry applications.

+ 40 % graphite

Reduced thermal elongation. Maximum creep strength and resistance to thermal ageing. Improved self-lubrication. Reduced strength.

+ 15 % graphite

+ 10 % PTFE
Extremely low static friction and low coefficient of friction due to PTFE modification. Good properties also in dry running conditions due to self lubrication. For applications involving low friction and wear characteristics at medium temperatures and loads (< 200 °C).

+ 15 % MoS₂

Best friction and abrasion properties in vacuum. Frequently used in aerospace applications, in vacuum or in inert gases (techn. dry). Low outgassing in accordance with ESA regulation ECSS-Q-70-20.

+ 30 % glass fibres

Reduced thermal elongation. High thermal-mechanical load properties. Good electrical insulation.

SD

Static dissipative / antistatic, permanently migration free. Surface resistance 10⁹⁻¹¹ Ω or 10⁷⁻⁹ Ω. For explosion-proof equipment and in semi-conductor technology (test sockets).

Overview of modifications

Description	Nomenclature	Availability TECASINT				
		Stock shape	1000	2000	4000	4100
Pure	x011	1011	2011	4011	4111	5011
15 % graphite	x021	1021	2021	4021	4121	-
40 % graphite	x031	1031	2031	-	-	-
15 % graphite / 10 % PTFE	x061	1061	2061	-	-	-
15 % MoS₂	x391	1391	2391	-	-	-
30 % MoS₂	x041	1041	-	-	-	-
30 % PTFE	x611	1611	-	-	-	-
30 % GF	x051	1051	-	-	-	5051
SD static dissipative	x201	-	-	-	-	5201

Modifications TECASINT 8000

80 P / 20 PI	8001
60 P / 40 PI	8061

Overview of nomenclature TECASINT TECASINT xxxx

1st digit	→ PI basic material /product family
2nd / 3rd digit	→ Formulation code /Modification
4th digit	→ Production process (1 = stock shape, 2 = direct formed part)

Application examples

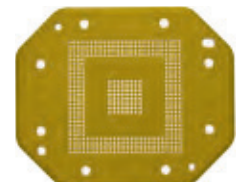
Machined Parts

TECASINT 1000 - 4000 (PI)
Very high thermal resistance. High strength even at high temperatures.

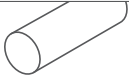


Test socket

TECASINT 4051 brown (PI)
Low water absorption. High dimensional stability and thermal stability. Good chemical resistance.



TECASINT 1000 Rods

	TECASINT 1011 <i>natural</i> (SINTIMID PUR HT)	TECASINT 1021 <i>black</i> (SINTIMID 15 G)	TECASINT 1031 <i>black</i> (SINTIMID 40 G)	TECASINT 1061 <i>black</i> (SINTIMID PVX)	TECASINT 1391 <i>black</i> (SINTIMID 15M)	
						
Polymer	PI	PI	PI	PI	PI	
Density [g/cm ³]	1,34	1,42	1,57	1,48	1,49	
Colour	black	black	black	black	black	
Diameter [mm]						Tolerance [mm]
6.3 (1/4")	●	●	●	●	●	0.00 /+0.80
8	●	●	●	●	●	
10	●	●	●	●	●	
12.7 (1/2")	●	●	●	●	●	
15.8 (5/8")	●	●	●	●	●	
25.4 (1")	●	●	●	●	●	0.00 /+0.80
30	●	●	●	●	●	
35	●	●	●	●	●	
38.1 (1 1/2")	●	●	●	●	●	
40	●	●	●	●	●	
45	●	●	●	●	●	
50.8 (2")	●	●	●	●	●	0.00 /+1.00
55	●	●	●	●	●	
60	●	●	●	●	●	
65	●	●	●	●	●	
70	●	●	●	●	●	
75	●	●	●	●	●	
80	●	●	●	●	●	
85	●	●	●	●	●	
90	●	●	●	●	●	
95	●	●	●	●	●	
100	●	●	●	●	●	

- Standard products (from stock or delivery at short notice)
- Non-standard products (produced on request)

TECASINT 1000 Delivery dimensions [mm]	250	500	750	1,000
Ø 6 - 15	●	●		
from Ø 16	●	●	●	●

Also available ground.
Other diameters on request.
All information without guarantee.

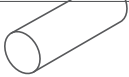
TECASINT 4000 Rods

TECASINT 4011 / 4021 Delivery dimensions [mm]	250	500	750	1,000
Ø 6 - 15	●	●		
Ø 16 - 80	●	●	●	●

TECASINT 4111 / 4121 Delivery dimensions [mm]	250	500
Ø 6 - 15	●	●
Ø 16 - 80	●	●

All information without guarantee.

TECASINT 2000 Rundstäbe

	TECASINT 2011 natural	TECASINT 2021 black	TECASINT 2031 black	TECASINT 2061 black	TECASINT 2391 black	
						
Polymer	PI	PI	PI	PI	PI	
Density [g/cm ³]	1,38	1,45	1,59	1,52	1,54	
Colour	brown	black	anthracite	anthracite	black	
Diameter [mm]						Tolerance [mm]
6.3 (1/4")	●	●	●	●	●	0.00 / +0.80
8	●	●	●	●	●	
10	●	●	●	●	●	
12.7 (1/2")	●	●	●	●	●	
15.8 (5/8")	●	●	●	●	●	
19.1 (3/4")	●	●	●	●	●	
25.4 (1")	●	●	●	●	●	0.00 / +0.80
30	●	●	●	●	●	
35	●	●	●	●	●	
38.1 (1 1/2")	●	●	●	●	●	
40	●	●	●	●	●	
45	●	●	●	●	●	
50.8 (2")	●	●	●	●	●	0.00 / +1.00
55	●	●	●	●	●	
60	●	●	●	●	●	
65	●	●	●	●	●	
70	●	●	●	●	●	
75	●	●	●	●	●	
80	●	●	●	●	●	
85	●	●	●	●	●	
90	●	●	●	●	●	
95	●	●	●	●	●	
100	●	●	●	●	●	

- Standard products (from stock or delivery at short notice)
- Non-standard products (produced on request)

TECASINT 2000 Delivery dimensions [mm]	250	500	750	1,000
∅ 6 - 15	●	●		
from ∅ 16	●	●	●	●

Also available ground.
Other diameters on request.
All information without guarantee.

TECASINT 1000 Plates

	TECASINT 1011 <i>natural</i> (SINTIMID PUR HT)	TECASINT 1021 <i>black</i> (SINTIMID 15 G)	TECASINT 1031 <i>black</i> (SINTIMID 40 G)	TECASINT 1061 <i>black</i> (SINTIMID PVX)	TECASINT 1391 <i>black</i> (SINTIMID 15 H)
Polymer	PI	PI	PI	PI	PI
Density [g/cm ³]	1,34	1,42	1,57	1,48	1,49
Colour	black	black	black	black	black

Thickness [mm]	TECASINT 1011	TECASINT 1021	TECASINT 1031	TECASINT 1061	TECASINT 1391	Tolerance [mm]
6	●	●	●	●	●	0.00 / +1.00
10	●	●	●	●	●	
12	●	●	●	●	●	
15.8	●	●	●	●	●	
20	●	●	●	●	●	
25	●	●	●	●	●	0.00 / +1.00
30	●	●	●	●	●	
35	●	●	●	●	●	
40	●	●	●	●	●	
45	●	●	●	●	●	
50	●	●	●	●	●	
60	●	●	●	●	●	
70	●	●	●	●	●	0.00 / +1.50
80	●	●	●	●	●	
90	●	●	●	●	●	
100	●	●	●	●	●	

- Standard products (from stock or delivery at short notice)
- Non-standard products (produced on request)

TECASINT 1000 Delivery dimensions [mm]	125 x 150	125 x 300	300 x 250	300 x 500	300 x 750	300 x 1,000
2 - 50	●	●	●	●	●	●
60 - 100			●	●	●	●

On request: Intermediate thickness dimensions.
All information without guarantee.

TECASINT 4000 Plates

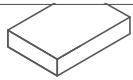
TECASINT 4011 / 4021 Delivery dimensions [mm]	125 x 150	125 x 300	250 x 300	500 x 300	750 x 300	300 x 1,000
2 - 85	●	●	●	●	●	●

Max. dimension: 300 x 1,000 mm
All information without guarantee.

TECASINT 4111 / 4121 Delivery dimensions [mm]	125 x 150	125 x 300	250 x 300	300 x 500
2 - 85	●	●	●	●

Max. dimension: 300 x 500 mm
All information without guarantee.

TECASINT 2000 / 5000 Plates



	TECASINT 2011 natural	TECASINT 2021 black	TECASINT 2031 black	TECASINT 2061 black	TECASINT 2391 black	TECASINT 5011 natural (SINTIMID PAI PUR)	TECASINT 5051 grey-green (SINTIMID PAI GF30)	
Polymer	PI	PI	PI	PI	PI	PAI	PAI	
Density [g/cm ³]	1,38	1,45	1,59	1,52	1,54	1,38	1,57	
Colour	brown	black	anthracite	anthracite	black	sandy	dark brown	
Thickness [mm]								Tolerance [mm]
6	●	●	●	●	●	●	●	0.00 / +1.00
10	●	●	●	●	●	●	●	
12	●	●	●	●	●	●	●	
15.8	●	●	●	●	●	●	●	
20	●	●	●	●	●	●	●	
25	●	●	●	●	●	●	●	0.00 / +1.00
30	●	●	●	●	●	●	●	
35	●	●	●	●	●	●	●	
40	●	●	●	●	●	●	●	
45	●	●	●	●	●	●	●	
50	●	●	●	●	●	●	●	
60	●	●	●	●	●	●	●	
70	●	●	●	●	●	●	●	0.00 / +1.50
80	●	●	●	●	●	●	●	
90	●	●						
100	●	●						

- Standard products (from stock or delivery at short notice)
- Non-standard products (produced on request)

TECASINT 2000 / 5000 Delivery dimensions [mm]	125 × 150	125 × 300	300 × 250	300 × 500	300 × 750	300 × 1,000
2 - 50	●	●	●	●	●	●
60 - 100			●	●	●	●

TECASINT 8000 Plates

TECASINT 8001 / 8061 Delivery dimensions [mm]	290 × 490	290 × 990
2 - 65	●	●

On request: Intermediate thickness dimensions.
All information without guarantee.



TECAFINE TECANYL TECARAN

Polyolefins such as polyethylene (TECAFINE PE) and polypropylene (TECAFINE PP) are semi-crystalline thermoplastics from the group of standard polymers. Alongside their minimal density, they are characterized primarily by good chemical resistance, low water absorption and good electrical insulating properties. Acrylonitrile-butadiene-

styrene graft copolymer (TECARAN ABS) is an amorphous thermoplastic which has a high impact strength even at low temperatures, as well as low moisture absorption. PPE (TECANYL) is used predominantly for components in which high heat deflection temperature, dimensional stability and dimensional accuracy are key.

Overview of types

TECAFINE PE10 (PE-UHMW)

Very good sliding friction properties. Very good electrical insulation. Tough at low temperatures.

TECAFINE PES (PE-HMW)

Good sliding properties, abrasion resistant.

TECAFINE PE (PE-HD)

Very low moisture absorption. Easily weldable.

TECAFINE PP (PP)

Very low moisture absorption, very good electrical insulation.

TECAPRO MT (PP)

→ p. 70

TECAPRO AM natural (PP)

→ p. 66

TECAFINE PMP natural (PMP)

Transparent, also in the UV range. Very good electrical insulation.

TECANYL 731 grey (PPE)

Good strength. Very good electrical insulation.

TECANYL GF30 (PPE GF)

Very high rigidity, good welding and adhesion capability.

TECANYL MT (PPE)

→ p. 70

TECARAN ABS (ABS)

Extreme rigidity and toughness. Very good electrical insulation.

Application examples

Grip handle for kitchen appliances TECARAN black (ABS)

Good strength and toughness. High impact strength. Minimal weight. Easily bonded.

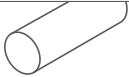


Stripper TECAFINE PE natural (PE)

Good sliding properties. Food conformity. Resistant to cleaning agents. High degree of toughness.



OTHERS Rods

	<i>TECAFINE PMP natural</i>	<i>TECANYL 731 grey</i>	<i>TECANYL GF30 natural</i>	<i>TECARAN ABS grey</i>	
					
Polymer	PMP	PPE	PPE	ABS	
Density [g/cm ³]	0.83	1.10	1.30	1.04	
Colour	light yellow transparent	grey opaque	beige opaque	grey opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10	0.073	0.096	0.114	0.091	+0.10/+0.80
12	0.105	0.139	0.164	0.131	+0.20/+0.90
14	0.141	0.187	0.220	0.176	
15	0.161	0.213	0.252	0.201	
16	0.182	0.241	0.285	0.228	
18	0.229	0.303	0.358	0.287	
20	0.281	0.372	0.440	0.352	
22	0.343	0.454	0.537	0.429	+0.20/+1.20
25	0.439	0.582	0.688	0.550	
28	0.548	0.726	0.858	0.686	
30	0.627	0.831	0.982	0.785	
32	0.711	0.942	1.11	0.891	
36	0.905	1.20	1.42	1.13	+0.20/+1.60
40	1.11	1.47	1.74	1.39	
45	1.42	1.88	2.22	1.77	+0.30/+2.00
50	1.74	2.31	2.72	2.18	
56	2.17	2.88	3.40	2.72	
60	2.51	3.32	3.93	3.14	+0.30/+2.50
65	2.93	3.89	4.59	3.67	
70	3.39	4.49	5.31	4.25	
75	3.91	5.18	6.13	4.90	+0.40/+3.00
80	4.44	5.88	6.95	5.56	
90	5.62	7.45	8.81	7.04	+0.50/+3.40
100	6.94	9.20	10.88	8.70	+0.60/+3.80
110	8.41	11.14	13.17	10.54	+0.70/+4.20
120	10.01	13.27	15.68	12.54	+0.80/+4.60
125	10.84	14.37	16.98	13.59	
135	12.69	16.82	19.88	15.90	+0.90/+5.40
140	13.63	18.06	21.34	17.07	
150	15.65	20.74	24.51	19.61	+1.00/+5.80
160	17.82	23.61	27.9	22.33	+1.10/+6.30
165	19.06	25.3	29.9	23.88	+1.20/+7.40
180	22.58	29.9	35.4	28.3	
200	27.9	37.0	43.7	35.0	+1.30/+8.50

Tolerances according to DIN:

Length 0 / +3%

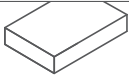
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

OTHERS Plates

	TECAFINE PMP natural	TECANYL 731 grey	TECANYL GF30 natural	TECARAN ABS grey	
Polymer	PMP	PPE	PPE	ABS	
Density [g/cm ³]	0.83	1.10	1.30	1.04	
Colour	light yellow transparent	grey opaque	beige opaque	grey opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500		3.15	3.72		+0.20/+0.70
6 × 500		3.73	4.40		
8 × 500		5.00	5.91		+0.20/+1.10
10 × 500	4.64	6.15	7.27	5.82	
10 × 620	5.73	7.59	8.97	7.17	
12 × 500	5.62	7.45	8.81	7.05	+0.30/+1.50
12 × 620	6.93	9.19	10.86	8.69	
15 × 500	6.93	9.19	10.86	8.69	
15 × 620	8.55	11.33	13.39	10.71	
16 × 500	7.37	9.77	11.54	9.23	
16 × 620	9.09	12.04	14.23	11.38	
18 × 500	8.24	10.92	12.91	10.33	
18 × 620	10.16	13.47	15.91	12.73	
20 × 500	9.11	12.08	14.27	11.42	
20 × 620	11.24	14.89	17.60	14.08	
20 × 1,000*		23.80	28.1		
25 × 500	11.29	14.97	17.69	14.15	
25 × 620	13.92	18.45	21.81	17.45	
25 × 1,000*		29.5	34.9		
30 × 500	13.73	18.20	21.51	17.21	+0.50/+2.50
30 × 620	16.93	22.44	26.5	21.22	
30 × 1,000*		35.9	42.4		
35 × 500	15.91	21.09	24.93	19.94	
35 × 620	19.62	26.0	30.7	24.59	
35 × 1,000*		41.6	49.1		
40 × 500	18.09	23.98	28.3	22.67	
40 × 620	22.31	29.6	34.9	28.0	
40 × 1,000*		47.3	55.9		
45 × 500	20.27	26.9	31.8	25.4	
45 × 620	25.0	33.1	39.2	31.3	
45 × 1,000*		53.0	62.6		
50 × 500	22.45	29.8	35.2	28.1	
50 × 620	27.7	36.7	43.4	34.7	
50 × 1,000*		58.6	69.3		
60 × 500	27.0	35.8	42.3	33.9	+0.50/+3.50
60 × 620	33.3	44.2	52.2	41.8	
60 × 1,000*		70.6	83.4		
70 × 500	31.4			39.3	
80 × 500	36.1			45.2	+0.50/+5.00
90 × 500	40.4			50.7	
100 × 500	44.8			56.1	



Tolerances according to DIN:

Length 0 / +3 %

Width +5 / +25 mm

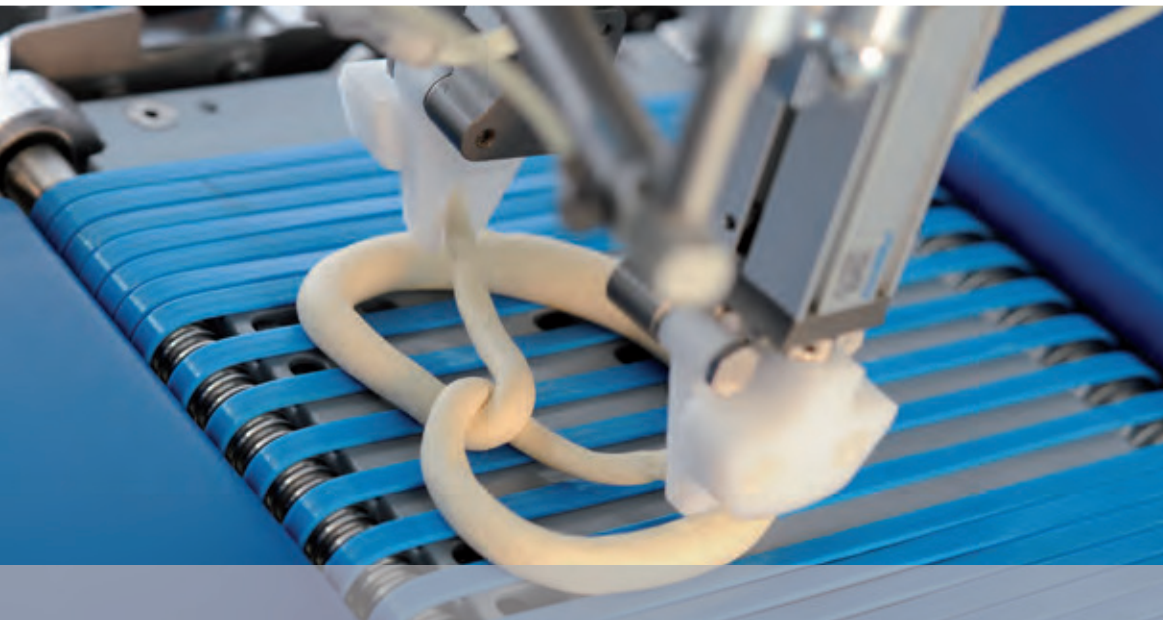
Stock lengths: 3,000 mm

* Stock length: 2,000 mm

-  Stock item
-  Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planed.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



Food technology

In many areas of industry, technical plastics play a vital role in improving the efficiency and competitive standing of customer applications. Lightweight, versatile plastics have a proven track record stretching back over many decades in the processing and packaging of foods. Their success is based on a combination of material benefits which are brought to bear even at raised temperature levels. These include primarily good mechanical properties and high resistance to chemicals.

There are widely varied application possibilities for technical plastics in plant and machinery for meat, fish and poultry processing. Materials from Ensinger enhance production speed and safety in the manufacture of dairy produce, baked goods and confectionery production.

They are frequently used in this type of application as gears, bearing bushes or in the form of other machine components. Plastics can also come into direct contact with foodstuffs, for example in filling, mixing and portioning systems. Stringent demands are placed on these plastics, particularly in the case of plant components which come into direct contact with food. The main objective of EU and US regulations is to exclude any damaging effects due to the migration of substances.

At Ensinger, product safety takes number one priority. The special care taken in this field is reflected by product-specific conformity certificates with FDA approval for raw material, regulation (EC) No 1935/2004, (EU) No 10/2011 (migration tested on semi-finished products) as well as (EC) No 2023/2006 and seamless traceability.

Our Quality Management is in step with international standards and is firmly rooted in our corporate procedures. Above and beyond DIN EN ISO 9001, Ensinger GmbH is also certified to the Medical Products Standard DIN EN ISO 13485. Our semi-finished products are manufactured in compliance with the requirements of regulation (EU) No 2023/2006 on good manufacturing practice (GMP) for materials and articles intended to come into contact with food.

Ensinger materials for food technology

The conformity for food contact is issued order-related with the following contents:
 → FDA approval for raw material
 → (EC) No 1935/2004
 → (EU) No 10/2011
 → (EC) No 2023/2006

Standard portfolio

TECAFORM AH natural
 → p. 14 ff.

TECAFORM AH black
 → p. 14 ff.

TECAPET AD natural
 → p. 14 ff.

TECAMID 6 natural
 → p. 20 ff.

TECAMID 66 natural
 → p. 20 ff.

TECAST T natural
 → p. 26 ff.

TECAPET white
 → p. 32 ff.

TECAPET TF grey
 → p. 32 ff.

TECANAT natural
 → p. 36 ff.

TECAFLON PVDF natural
 → p. 39 ff.

TECAPEEK natural
 → p. 48 ff.

TECAPEEK black
 → p. 48 ff.

Special portfolio

Optically detectable materials:

TECAFORM AH blue (POM-C)
 Good chemical resistance. High flexural fatigue strength.

TECAMID 6 blue (PA 6)
 Good toughness and strength. Good chemical resistance.

TECAPEEK blue (PEEK)
 High permanent operating temperature (260 °C). High mechanical strength even at high temperatures.

Inductively detectable materials:

TECAFORM AH ID (POM-C, detectable filler)
 Very good machining properties. Minimal water absorption. Available in blue and grey.

TECAMID 6 ID blue (PA 6, detectable filler)
 Good toughness and strength.

TECAPEEK ID blue (PEEK, detectable filler)
 Suitable for permanent utilization at up to 260 °C. Excellent chemical resistance.

Optically detectable, sliding friction modified high temperature material:

TECAPEEK TF10 blue (PEEK TF)
 Very good sliding properties. Excellent chemical resistance.

Application examples

Scraper

TECAFORM AH ID grey (POM-C, detectable filler)
 Inductively detectable. Good toughness and strength. Good resistance to cleaning agents.



Piston

TECADUR PET natural (PET)
 High strength. Good creep resistance. High dimensional stability.



Conveyor screw

TECAGLIDE green (PA 6 C)
 Low sliding coefficient. Good abrasion behaviour. Good machining capability. For applications without food contact.



Throughfeed filler

TECAMID 6 natural (PA 6)
 High degree of toughness. Resistant to oils, greases and fuels. Good abrasion resistance. MAJA-Maschinenfabrik Hermann Schill GmbH & Co KG



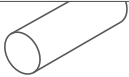
Object slide

TECAFORM AD natural (POM-H)
 High strength. Good chemical resistance. Good machinability. Schreyer Sondermaschinen GmbH



FDA conformity (on raw materials) tested on semi-finished products:
 (EC) No 1935/2004
 (EU) No 10/2011
 (EC) No 2023/2006

FOOD TECHNOLOGY Rods



	TECAFORM AH blue	TECAFORM AH ID blue	TECAFORM AH ID grey	TECAMID 6 blue	TECAMID 6 ID blue	TECAPEEK blue	TECAPEEK TF10 blue	TECAPEEK ID blue	
Polymer	POM-C	POM-C	POM-C	PA 6	PA 6	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.41	1.49	1.49	1.14	1.24	1.32	1.38	1.49	
Colour	blue opaque	blue opaque	grey opaque	ivory opaque	blue grey opaque	blue opaque	blue opaque	blue grey opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
10	0.122	0.129	0.129	0.099	0.107	0.114	0.120	0.129	+0.10/+0.70
12	0.176	0.187	0.187	0.143	0.155	0.165	0.173	0.187	+0.20/+0.80
14	0.237	0.251	0.251	0.192	0.209		0.232	0.251	
15	0.271	0.287	0.287	0.219	0.239	0.254	0.266	0.287	
16	0.308	0.325	0.325	0.249	0.270	0.288	0.301	0.325	
18	0.387	0.409	0.409	0.313	0.340	0.362	0.378	0.409	
20	0.475	0.502	0.502	0.384	0.417	0.444	0.465	0.502	
22	0.577	0.610	0.610	0.466	0.507	0.540	0.565	0.610	+0.20/+1.00
25	0.740	0.782	0.782	0.599	0.651	0.693	0.725	0.782	
28	0.924	0.976	0.976	0.747	0.813	0.865	0.904	0.976	
30	1.06	1.12	1.12	0.855	0.930	0.990	1.04	1.12	
32	1.21	1.28	1.28	0.977	1.06	1.13	1.18	1.28	+0.20/+1.20
36	1.52	1.61	1.61	1.23	1.34	1.42	1.49	1.61	
40	1.87	1.98	1.98	1.51	1.65	1.75	1.83	1.98	
45	2.37	2.50	2.50	1.92	2.08	2.22	2.32	2.50	+0.30/+1.30
50	2.91	3.08	3.08	2.36	2.56	2.73	2.85	3.08	
56	3.64	3.85	3.85	2.95	3.20	3.41	3.57	3.85	
60	4.20	4.43	4.43	3.39	3.69	3.93	4.11	4.43	+0.30/+1.60
65	4.91	5.19	5.19	3.97	4.32	4.60	4.81	5.19	
70	5.69	6.01	6.01	4.60	5.00	5.32	5.57	6.01	
75	6.56	6.93	6.93	5.30	5.77	6.14	6.42	6.93	+0.40/+2.00
80	7.45	7.87	7.87	6.02	6.55	6.97	7.29	7.87	
85	8.42	8.90	8.90	6.81	7.41				+0.50/+2.20
90	9.43	9.96	9.96	7.62	8.29	8.82		9.96	
100	11.65	12.31	12.31	9.42	10.24	10.90		12.31	+0.60/+2.50
110	14.13	14.93	14.93	11.43	12.43	13.23			+0.70/+3.00
120	16.85	17.81	17.81	13.63	14.82	15.78			+0.80/+3.50
125	18.26	19.30	19.30	14.76	16.06	17.10			
130	19.79	20.91	20.91	16.00	17.40	18.52			+0.90/+3.80
135	21.31	22.52	22.52	17.23	18.74	19.95			
140	22.89	24.19	24.19	18.51	20.13	21.43			
150	26.3	27.8	27.8	21.27	23.13	24.62			+1.00/+4.20
160	29.9			24.20					+1.10/+4.50
165	31.9			25.8					+1.20/+5.00
180	37.9			30.6					
200	46.7			37.8					+1.30/+5.50
250	72.8			58.9					+1.50/+6.20

Tolerances according to DIN:

Length 0 / +3%

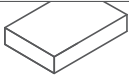
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

FOOD TECHNOLOGY Plates

	TECAFORM AH blue	TECAFORM AH ID grey	TECAFORM AH ID blue	TECAMID 6 blue	TECAMID 6 ID blue	TECAPEEK blue	TECAPEEK ID blue	
								
Polymer	POM-C	POM-C	POM-C	PA 6	PA 6	PEEK	PEEK	
Density [g/cm ³]	1.41	1.49	1.49	1.14	1.24	1.32	1.49	
Colour	blue opaque	grey opaque	blue opaque	ivory opaque	blue grey opaque	blue opaque	blue grey opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	4.04			3.26				+0.20/+0.70
6 × 500	4.78			3.86				
8 × 500	6.41			5.18	5.63	6.00		+0.20/+1.10
10 × 500	7.89	8.34	8.34	6.38	6.94	7.38	8.34	
10 × 1,000*	15.55							
12 × 500	9.55	10.10	10.10	7.73	8.40	8.94	10.10	+0.30/+1.50
12 × 1,000*	18.83			15.23				
15 × 500	11.78	12.44	12.44			11.02	12.44	
15 × 1,000*	23.21							
16 × 500	12.52	13.23	13.23	10.12	11.01	11.72	13.23	
16 × 1,000*	24.67			19.95				
18 × 500	14.00	14.79	14.79	11.32	12.31	13.11	14.79	
18 × 1,000*	27.6			22.31				
20 × 500	15.48	16.36	16.36	12.52	13.61	14.49	16.36	
20 × 1,000*	30.5			24.67				
22 × 500	16.96	17.92	17.92	13.71	14.92	15.88	17.92	
22 × 1,000*	33.4			27.0				
25 × 500	19.18	20.27	20.27	15.51	16.87	17.96	20.27	
25 × 1,000*	37.8			30.6				
30 × 500	23.33	24.65	24.65	18.86	20.52	21.84	24.65	+0.50/+2.50
30 × 1,000*	46.0			37.2				
35 × 500	27.0	28.6	28.6	21.86	23.78	25.3	28.6	
35 × 1,000*	53.3			43.1				
40 × 500	30.7	32.5	32.5	24.85	27.0	28.8	32.5	
40 × 1,000*	60.6			49.0				
45 × 500	34.4	36.4	36.4	27.8	30.3	32.2		
45 × 1,000*	67.9			54.9				
50 × 500	38.1	40.3	40.3	30.8	33.5	35.7		
50 × 1,000*	75.2			60.8				
60 × 500	45.9	48.5	48.5	37.1	40.4	43.0		+0.50/+3.50
60 × 1,000*	90.5			73.2				
70 × 500	53.3	56.4	56.4	43.1	46.9	49.9		
70 × 1,000*	105.1							
80 × 500	61.3	64.8	64.8	49.6	53.9	57.4		+0.50/+5.00
80 × 1,000*	120.8							
90 × 500	68.7			55.5	60.4			
90 × 620	84.7			68.5				
90 × 1,000*	135.4							
100 × 500	76.1			61.5	66.9			
100 × 1,000*	150.0							



Tolerances according to DIN:

Length 0/ +3%

Width +5/ +25 mm

Stock lengths: 3,000 mm

* Stock length: 2,000 mm

-  Stock item
-  Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

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Medical technology

Ensinger develops and engineers stock shapes, components and profiles made of thermoplastics which are designed to comply with the stringent demands of medical technology. The special demands imposed on these materials such as physiological safety are addressed by the outstanding properties of high temperature plastics:

- Examination of the semi-finished product for biocompatibility
- Very good resistance to cleaning agents and disinfectants
- Resistance against common sterilization methods such as hot steam, hot air, ethylene oxide or gamma radiation
- Compliance examination of the used processing agents
- Attentive storage and shipment with shrink packing

It is the combination of these MT-portfolio attributes that allows this type of high-quality medical products to be used intensively over long periods.

Ensinger quality in the world of medical technology

In the field of medical technology particularly, the demands made on quality, product documentation and product approvals are extremely stringent. Ensinger is certified in accordance with the quality standards set out in DIN EN ISO 13485 in the fields of compounding, stock shape and industrial profile production, as well as injection moulding and machining. Ensinger consequently fulfils a special duty of care when it comes to traceability.

For our customers, using pre-tested semi-finished products simplifies the process of obtaining approvals for their own medical technology products. Therefore all semi-finished stock items of the MT-portfolio have been tested for biocompatibility according to ISO 10993. The issued biocompatibility is order-related and includes not only the raw material conformity but as well the examination results of the semi-finished product according to ISO 10993. With the order-related issuing we ensure a seamless traceability from the customers order to the semi-finished product and the used raw material.

Ensinger materials for medical technology

Products suitable for direct contact with blood or tissue

TECAPEEK MT CLASSIX white (PEEK)

Tissue contact for up to 30 days. Extension of up to 180 days possible. Seamless cytotoxicity testing from the raw material to the stock shape.

TECAPEEK MT coloured (PEEK)

Very good resistance to chemicals and sterilization. High radiation resistance. Available in a variety of colours.

TECAPEEK MT XRO coloured (PEEK)

Same properties as TECAPEEK MT. Contrast medium allows visibility under X-ray fluoroscopy and radiation.

TECAPEEK MT CF30 black (PEEK CF)

Very good resistance to chemicals and sterilization. High radiation resistance.

TECATEC PEEK MT CW50 black (PEEK)

Unusually high strength and rigidity.

TECATEC PEKK MT CW60 black (PEKK)

Unusually high strength and rigidity.

TECASON P MT coloured (PPSU)

High strength, hardness and rigidity. Excellent thermal dimensional stability. Autoclavable. Available in a variety of colours.

TECASON P MT XRO coloured (PPSU, contrast medium)

Same properties as TECASON P MT. Contrast agent permits visibility under X-ray illumination and radiation.

TECAPEI MT coloured (PEI)

Very good mechanical and electrical properties. Available in a variety of colours.

TECANAT MT natural (PC)

Highly tough material. Its transparency facilitates optical control.

TECAFORM AH MT coloured (PDM-C)

Very good sliding and abrasion behaviour. Resistant to organic solvents. Available in a variety of colours.

TECANYL MT coloured (PPE)

High impact strength. Low density. Available in a variety of colours.

TECAPRO MT (PP)

Sterilization resistant and dimensionally stable. Good machining properties.

Products for no direct contact with blood or tissue

TECAPRO AM natural (PP)

Minimal moisture absorption. Antimicrobial property.

TECASON P VF (PPSU)

→ p. 42

TECAPEEK VF natural (PEEK)

→ p. 88

Application examples

Spring in support orthosis

TECAPEEK MT natural (PEEK)

High flexibility. Good strength. Easy formability. Light weight and "warm" to the touch.



Storage container

TECAPRO MT white / black (PP)

High strength. Sterilization resistant. Minimal weight.



Dental healing cap

TECAPEEK MT CLASSIX white (PEEK)

Temporary implant. Tissue contact for up to 30 days.



Knee cap trial implant

TECASON P MT green (PPSU)

Resistant to steam sterilisation. Biocompatible.



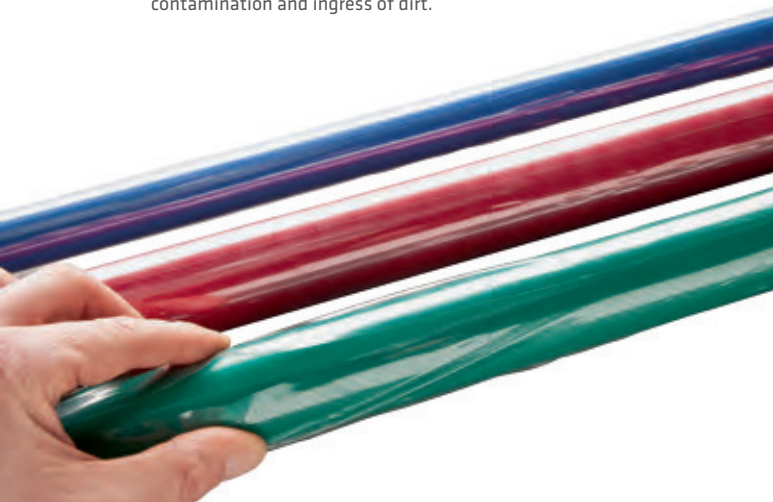
PercuTwist dilator for tracheotomy

TECAPEEK MT blue (PEEK)

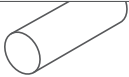
Good chemical resistance. Very good resistance to sterilization. High precision for a sharp-edged, burr-free thread.



Stock shapes for applications in medical technology are welded into a transparent film to protect the material from contamination and ingress of dirt.



MEDICAL TECHNOLOGY Rods

	TECAPEEK MT natural	TECAPEEK MT black	TECAPEEK MT blue	TECAPEEK MT green	TECAPEEK MT yellow	TECAPEEK MT ivory	TECAPEEK MT grey	
								
Polymer	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.31	1.31	1.34	1.32	1.38	1.42	1.32	
Colour	beige opaque	black opaque	blue opaque	green opaque	light yellow opaque	ivory opaque	grey opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5	0.030	0.030						+0.10/+0.60
6	0.042	0.042						
8	0.074	0.074	0.076	0.075	0.078	0.080	0.075	+0.10/+0.70
10	0.114	0.114	0.116	0.114	0.120	0.123	0.114	
12	0.164	0.164	0.168	0.165	0.173	0.178	0.165	+0.20/+0.80
15	0.252	0.252	0.258	0.254	0.266	0.273	0.254	
16	0.286	0.286	0.292	0.288	0.301	0.310	0.288	
18	0.359	0.359	0.367	0.362	0.378	0.389	0.362	
20	0.441	0.441	0.451	0.444	0.465	0.478	0.444	
22	0.536	0.536	0.548	0.540	0.565	0.581	0.540	+0.20/+1.00
25	0.688	0.688	0.704	0.693	0.725	0.746	0.693	
28	0.858	0.858	0.878	0.865	0.904	0.930	0.865	
30	0.983	0.983	1.01	0.990	1.04	1.07	0.990	
32	1.12	1.12	1.15	1.13	1.18	1.22	1.13	+0.20/+1.20
36	1.41	1.41	1.45	1.42	1.49	1.53	1.42	
40	1.74	1.74	1.78	1.75	1.83	1.88	1.75	
45	2.20	2.20	2.25	2.22	2.32	2.39	2.22	+0.30/+1.30
50	2.71	2.71	2.77	2.73	2.85	2.94	2.73	
56	3.39	3.39	3.46	3.41	3.57	3.67	3.41	
60	3.90	3.90	3.99	3.93	4.11	4.23	3.93	+0.30/+1.60
65	4.56	4.56	4.67	4.60	4.81	4.95	4.60	
70	5.28	5.28	5.40	5.32	5.57	5.73	5.32	
80	6.92	6.92	7.08	6.97	7.29	7.50	6.97	+0.40/+2.00
90	8.76	8.76						+0.50/+2.20
100	10.82	10.82						+0.60/+2.50
110	13.13							+0.70/+3.00
120	15.66							+0.80/+3.50
150	24.44							+1.00/+4.20
160	27.8							+1.10/+4.50
180*	35.2							+1.20/+5.00
200*	43.4							+1.30/+5.50

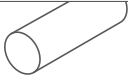
Tolerances according to DIN:
Length 0/+3%
Stock lengths: 3,000 mm

* Stock length: 1,000 mm

- Stock item
- Non-stock item - special production

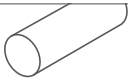
Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

MEDICAL TECHNOLOGY Rods

		TECAPEEK MT CF30 black	
Polymer		PEEK	
Density [g/cm ³]		1.42	
Colour		black opaque	
Diameter [mm]	[kg/m]	Tolerance [mm]	
10	0.124	+0.10/+0.80	
12	0.179	+0.20/+0.90	
15	0.275		
16	0.312		
18	0.391		
20	0.480		
22	0.586	+0.20/+1.20	
25	0.751		
28	0.937		
30	1.07		
32	1.22		
36	1.55	+0.20/+1.60	
40	1.90		
45	2.42	+0.30/+2.00	
50	2.98		

Tolerances according to DIN:
Length 0 / +3 %
Stock lengths: 3,000 mm

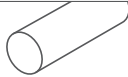
MEDICAL TECHNOLOGY Rods

		TECANAT MT natural	
Polymer		PC	
Density [g/cm ³]		1.19	
Colour		white transparent	
Diameter [mm]	[kg/m]	Tolerance [mm]	
10	0.104	+0.10/+0.80	
20	0.403	+0.20/+0.90	
30	0.898	+0.20/+1.20	
40	1.59	+0.20/+1.60	
50	2.49	+0.30/+2.00	
60	3.59	+0.30/+2.50	
70	4.86		
80	6.36	+0.40/+3.00	
90	8.06	+0.50/+3.40	
100	9.96	+0.60/+3.80	

Tolerances according to DIN:
Length 0 / +3 %
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

MEDICAL TECHNOLOGY Rods

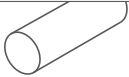
		TECAPEEK MT CLASSIX white	
Polymer		PEEK	
Density [g/cm ³]		1.40	
Colour		cream white opaque	
Diameter [mm]	[kg/m]	Tolerance [mm]	
6	0.040	-0.03/+0.00	
8	0.071	-0.04/+0.00	
10	0.112		
20	0.447	-0.05/+0.00	
30	1.01		
40	1.86	+0.20/+1.20	
45	2.35	+0.30/+1.30	

Tolerances according to DIN:
Length 0 / +3 %
Stock lengths: 3,000 mm
Surface ground



Modifications in colour and diameter on request. Other delivery lengths possible, also available ground. The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

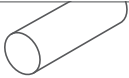
MEDICAL TECHNOLOGY Rods

	TECASON P MT black	TECASON P MT blue	TECASON P MT green	TECASON P MT red	TECASON P MT yellow	TECASON P MT ivory	TECASON P MT grey	
Polymer	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	
Density [g/cm ³]	1.31	1.31	1.31	1.31	1.31	1.31	1.31	
Colour	black opaque	blue opaque	green opaque	red opaque	yellow opaque	ivory opaque	grey opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
19.05	0.403	0.401	0.403	0.403	0.403	0.403	0.403	+0.20/+0.90
25.4	0.715	0.715	0.715	0.715	0.715	0.715	0.715	+0.20/+1.20
31.75	1.11	1.11	1.11	1.11	1.11	1.11	1.11	
38.1	1.60	1.60	1.60	1.60	1.60	1.60	1.60	+0.20/+1.60
44.45	2.18	2.18	2.18	2.18	2.18	2.18	2.18	+0.30/+2.00
50.8	2.83	2.83	2.83	2.83	2.83	2.85	2.83	
57.15	3.60	3.60	3.60	3.60	3.60	3.60	3.60	+0.30/+2.50
63.5	4.49	4.42	4.42	4.42	4.42	4.42	4.42	
69.85	5.33	5.35	5.35	5.33	5.33	5.33*	5.33	
76.2	6.34	6.37	6.37	6.37	6.37	6.37*	6.37	+0.40/+3.00
88.9	8.66	8.66	8.66	8.66	8.66	8.66	8.66	+0.50/+3.40

Tolerances according to DIN:
Length 0 / +3%
Stock lengths: 3,000 mm

* Stock length: 2,440 mm

MEDICAL TECHNOLOGY Rods

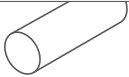
	TECASON P MT XRO black	TECASON P MT XRO blue	TECASON P MT XRO green	TECASON P MT XRO red	TECASON P MT XRO yellow	TECASON P MT XRO ivory	TECASON P MT XRO brown	
Polymer	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	
Density [g/cm ³]	1.36	1.36	1.36	1.36	1.36	1.36	1.36	
Colour	black opaque	blue opaque	green opaque	red opaque	yellow opaque	ivory opaque	brown opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
25.40	0.710	0.710	0.710	0.710	0.710	0.710	0.710	+0.00/+0.05
38.10	1.60	1.60	1.60	1.60	1.60	1.60	1.60	+0.00/+0.13
50.80	2.83	2.83	2.83	2.83	2.83	2.83	2.83	
63.50	4.42	4.42	4.42	4.42	4.42	4.42	4.42	+0.00/+0.76

Tolerances according to DIN:
Length 0 / +3%
Stock lengths: 2,440 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.
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MEDICAL TECHNOLOGY Rods


	<i>TECAFORM AH MT black</i>	<i>TECAFORM AH MT blue</i>	<i>TECAFORM AH MT green</i>	<i>TECAFORM AH MT red</i>	<i>TECAFORM AH MT yellow</i>	<i>TECAFORM AH MT grey</i>	<i>TECAFORM AH MT brown</i>	<i>TECAFORM AH MT rust red</i>	
Polymer	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C	
Density [g/cm ³]	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	
Colour	black opaque	blue opaque	green opaque	red opaque	yellow opaque	grey opaque	brown opaque	rustred opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
25.4	0.732	0.732	0.732	0.732	0.732	0.732	0.732	0.732	+0.00/+0.05
38.1	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	+0.00/+0.13
50.8	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	
63.5	4.61	4.61	4.61	4.61	4.61	4.61	4.61	4.61	+0.00/+0.76
76.2	6.62	6.62	6.62	6.62	6.62	6.62	6.62	6.62	
88.9	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	

Tolerances according to DIN:

Length 0 / +3%

Stock lengths: 2,440 mm

MEDICAL TECHNOLOGY Rods

	<i>TECANYL MT black</i>	<i>TECANYL MT blue</i>	<i>TECANYL MT green</i>	<i>TECANYL MT yellow</i>	<i>TECANYL MT grey</i>	<i>TECANYL MT brown</i>	
Polymer	PPE	PPE	PPE	PPE	PPE	PPE	
Density [g/cm ³]	1.05	1.08	1.09	1.05	1.10	1.08	
Colour	black opaque	blue opaque	green opaque	yellow opaque	grey opaque	red brown opaque	
Diameter [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
25.40	0.573	0.589	0.595	0.573	0.600	0.589	+0.00/+0.05
38.10	1.28	1.32	1.33	1.28	1.27	1.32	+0.00/+0.13
50.80	2.27	2.33	2.36	2.27	2.38	2.33	
63.50	3.54	3.64	3.68	3.54	3.71	3.64	+0.00/+0.76
88.90	6.94	7.14	7.21	6.94	7.27	7.14	

Tolerances according to DIN:

Length 0 / +3%

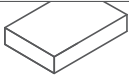
Stock lengths: 2,440 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

MEDICAL TECHNOLOGY Plates

	<i>TECAPEEK MT natural</i>	<i>TECAPEEK MT black</i>	<i>TECAPEEK MT blue</i>	<i>TECAPEEK MT green</i>	<i>TECAPEEK MT yellow</i>	<i>TECAPEEK MT ivory</i>	<i>TECAPEEK MT grey</i>	<i>TECAPEEK MT CF30 black</i>	
Polymer	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	
Density [g/cm ³]	1.31	1.31	1.34	1.32	1.38	1.42	1.32	1.42	
Colour	beige opaque	black opaque	blue opaque	green opaque	light yellow opaque	ivory opaque	grey opaque	black opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	3.75	3.75	3.84	3.78	3.95	4.07	3.78		+0.20/+0.70
10 × 500	7.33	7.33	7.50	7.38	7.72	7.94	7.38	7.94	+0.20/+1.10
20 × 500	14.38	14.38	14.71	14.49	15.15	15.59	14.49	15.59	+0.30/+1.50
25 × 500	17.82	17.82	18.23	17.96	18.78	19.32	17.96	19.32	
30 × 500	21.68	21.68	22.17	21.84	22.83	23.50	21.84	23.50	+0.50/+2.50
40 × 500	28.6	28.6	29.2	28.8	30.1	31.0	28.8	31.0	
50 × 500	35.4	35.4	36.3	35.7	37.3	38.4	35.7	38.4	
60 × 500	42.7	42.7							+0.50/+3.50
70 × 300	30.3								
80 × 300	34.8								+0.50/+5.00


Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

Stock lengths: 3,000 mm

MEDICAL TECHNOLOGY Plates

	<i>TECASON PMT black</i>	<i>TECASON PMT blue</i>	<i>TECASON PMT green</i>	<i>TECASON PMT red</i>	<i>TECASON PMT yellow</i>	<i>TECASON PMT ivory</i>	<i>TECASON PMT grey</i>	
Polymer	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	PPSU	
Density [g/cm ³]	1.31	1.31	1.31	1.31	1.31	1.31	1.31	
Colour	black opaque	blue opaque	green opaque	red opaque	yellow opaque	ivory opaque	grey opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
5 × 500	3.75	3.75	3.75	3.75	3.75	3.75	3.75	+0.20/+0.70
10 × 500	7.33	7.33	7.33	7.33	7.33	7.33	7.33	+0.20/+1.10
20 × 500	14.38	14.38	14.38	14.38	14.38	14.38	14.38	+0.30/+1.50
25 × 500	17.82	17.82	17.82	17.82	17.82	17.82	17.82	
30 × 500	21.68	21.68	21.68	21.68	21.68	21.68	21.68	+0.50/+2.50
40 × 500	28.6	28.6	28.6	28.6	28.6	28.6	28.6	
50 × 500	35.4	35.4	35.4	35.4	35.4	35.4	35.4	
60 × 500	42.7	42.7	42.7	42.7	42.7	42.7	42.7	+0.50/+3.50
70 × 300	30.3	30.3	30.3	30.3	30.3	30.3	30.3	
80 × 300	34.8	34.8	34.8	34.8	34.8	34.8	34.8	+0.50/+5.00

Tolerances according to DIN:

Length 0 / +3%

Width +5 / +25 mm

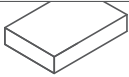
Stock lengths: 3,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com

MEDICAL TECHNOLOGY Plates

	<i>TECAFORM AH MT black</i>	<i>TECAFORM AH MT blue</i>	<i>TECAFORM AH MT green</i>	<i>TECAFORM AH MT red</i>	<i>TECAFORM AH MT yellow</i>	<i>TECAPRO MT white</i>	<i>TECAPRO MT black</i>	
Polymer	POM-C	POM-C	POM-C	POM-C	POM-C	PP	PP	
Density [g/cm ³]	1.41	1.41	1.41	1.41	1.41	0.93	0.92	
Colour	black opaque	blue opaque	green opaque	red opaque	yellow opaque	white opaque	black opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
12.7 × 610	11.31	11.31	11.31	11.31	11.31	7.52	7.44	+0.00/+0.64
25.4 × 610	22.34	22.34	22.34	22.34	22.34	14.85	14.69	
38.1 × 610	33.4	33.4	33.4	33.4	33.4	22.19	21.95	
50.8 × 610	44.4	44.4	44.4	44.4	44.4	29.5	29.2	
63.5 × 610	55.5	55.5	55.5	55.5	55.5	36.9	36.5	

Tolerances according to DIN:

Length 0 / +12.7 mm

Width 0 / +6.35 mm

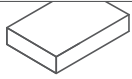
Stock lengths: 1,220 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

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MEDICAL TECHNOLOGY Plates



TECANAT
MT natural

Polymer	PC	
Density [g/cm ³]	1.19	
Colour	white transparent	
Dimensions [mm]	[kg/m]	Tolerance [mm]
10 × 500	6.66	+0.20/+1.10
20 × 500	13.06	+0.30/+1.50
30 × 500	19.69	+0.50/+2.50
40 × 500	25.9	
50 × 500	32.2	
60 × 500	38.8	+0.50/+3.50
70 × 500	45.0	
80 × 500	51.7	+0.50/+5.00
90 × 500	58.0	
100 × 500	64.2	

Tolerances according to DIN:

Length 0 / +3 %

Width +5 / +25 mm

Stock lengths: 3,000 mm

MEDICAL TECHNOLOGY Plates



TECAPRO
AM natural

Polymer	PP	
Density [g/cm ³]	0.93	
Colour	white opaque	
Dimensions [mm]	[kg/m]	Tolerance [mm]
12.7 × 610	7.44	+0.00/+0.64
25.4 × 610	14.66	
38.1 × 610	21.95	
50.8 × 610	29.2	
63.5 × 610	36.5	

Tolerances according to DIN:

Length 0 / +12.7 mm

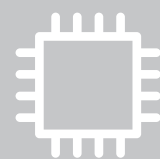
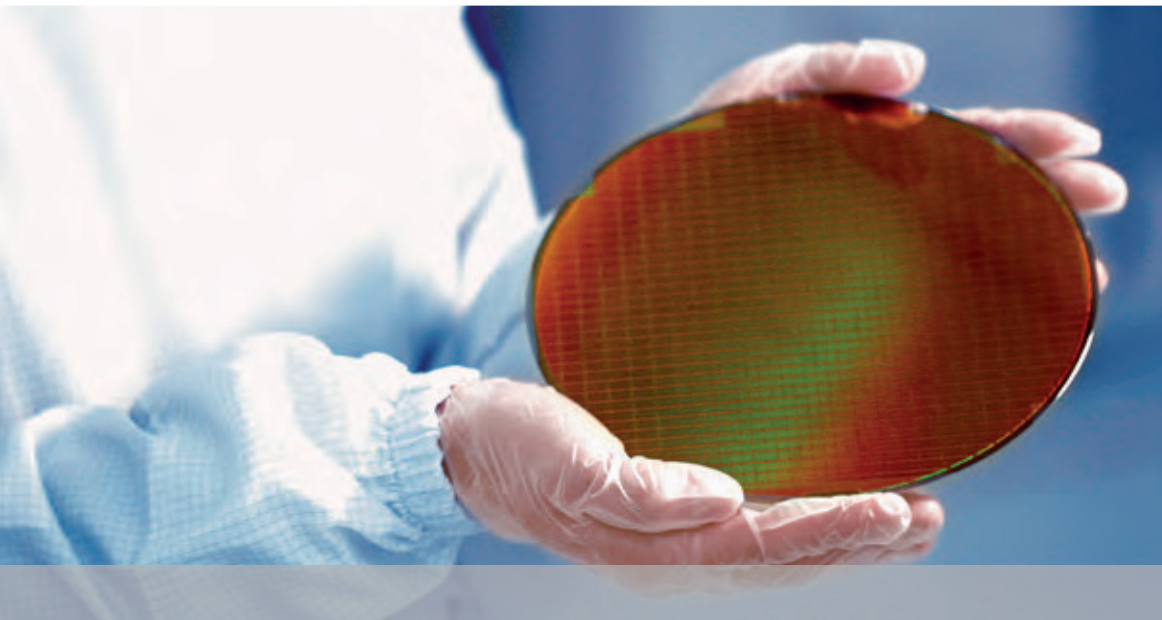
Width 0 / +6.35 mm

Stock lengths: 1,220 mm

- Stock item
- Non-stock item – special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planed.

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Semiconductor technology

In semiconductor technology, chemical-resistant, wear-resistant, and versatile-use systems have been used in different processing steps and testing of semiconductor products for many years. Their success is based on a combination of material benefits which are brought to bear even under harsh chemical or different temperature level conditions. Moreover the trend to even smaller and more powerful integrated circuits (ICs) raises new challenges to the entire production chain, from cutting the raw wafer to the final testing stage, which can be met by the deployment of technical plastics.

In the process of semiconductor production, technical plastics can be used in a wide range of applications. The special demands imposed upon these materials are addressed by the outstanding properties of high performance plastics:

- High thermo-mechanical strength
- Minimal thermal expansion
- Good wear resistance
- Good chemical resistance to acids, alkalis, greases and solvents, hydrogen peroxide, demineralised water, hot steam
- Good plasma resistance
- Minimal out-gassing under vacuum
- Minimal foreign ion content
- Good electrical insulating properties, or respectively a defined degree of conductivity

To make sure that we permanently meet all the relevant demands of the industry, we have set up a special range of semiconductor products with stock items or short-term availability. Some of these products are produced in clean rooms. The dimensions and tolerances we offer for the tubes intended for the production of CMP rings are also not according to the general industry standards, but adapted according to the special demands towards closer finished ring sizes of the semiconductor industry.

Additionally, Ensinger can provide full documentation and traceability on all materials. This is done by process control which is well proven in other sensitive industries and across all manufacturing types such as compounding, stock shapes and component production through injection moulding and machining.

Enginger is certified in accordance with ISO 9001:2008 and has a quality management system follows international standards, implements them and anchors them permanently in procedures.

Application examples

Retaining ring

TECATRON CMP natural
(PPS)

High wear resistance.
Improved toughness and
machinability.
High dimensional stability.



Support comb

TECAPEEK GF30 natural
(PEEK GF)

High degree of toughness.
High dimensional stability.
Good chemical resistance.
Electrically insulating.



Contact plate

TECAPEEK CMF white
(PEEK, ceramic)

Dimensionally stable.
Excellent hardness
and rigidity.
Good electrical insulation.
High abrasion resistance.



Workpiece holder

TECAPEEK CMF white
(PEEK, ceramic)

High dimensional stability.
Excellent hardness
and rigidity.
Good electrical insulation.
High abrasion resistance.



Snap Contact

TECATRON GF40 black
(PPS GF)

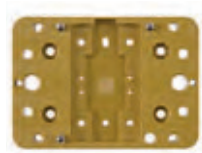
Tight tolerances.
Fibre reinforced plastic.



Contact frame

TECASINT 4051 brown
(PI GF)

Reduced thermal expansion
at high temperatures.
Wear resistance.
Dimensionally stable.
Good machinability.



Ensinger materials for semiconductor technology:

Products for CMP applications

TECATRON CMP natural
(PPS)

Higher abrasion and wear
resistance compared to
TECATRON SE, high
toughness, very good
chemical resistance, high
purity.

TECATRON SE natural
(PPS)

High abrasion and wear
resistance, high
toughness, very good
chemical resistance,
high purity.

TECAPEEK CMP natural
(PEEK)

Higher ductility compared
to TECAPEEK SE, excellent
chemical resistance,
abrasion resistant, high
purity.

TECAPEEK SE natural
(PEEK)

Excellent chemical
resistance, abrasion
resistant, high purity.

TECANAT CMP natural
(PC)

High abrasion resistance,
transparent, high purity.

TECADUR PET CMP
natural (PET)

High strength, good slide
and wear properties,
good machinability,
good chemical resistance,
high purity.

Products for further processes in the semiconductor production:

TECASINT
4111 / 4011 / 2011
(PI)
→ p. 57

TECAPEEK
(PEEK)
→ p. 48

TECAPEEK GF30
(PEEK GF)
→ p. 48

TECATRON
(PPS)
→ p. 45

TECATRON GF40
(PPS GF)
→ p. 45

TECAFLON PVDF natural
(PVDF)
→ p. 39

TECAFLON PTFE natural
(PTFE)
→ p. 39

TECADUR PET
(PET)
→ p. 32

Products for back-end applications:

TECASINT 5201 SD black
(PAI)
→ p. 57

TECASINT 5051 grey-green
(PAI GF)
→ p. 57

TECASINT 4111 / 4011
natural (PI)
→ p. 57

TECATOR 5013 natural
(PAI)
→ p. 55

TECAPEEK CMF
(PEEK, ceramic)
High dimensional
stability, lowest moisture
absorption, high strength
and stiffness.

TECAPEEK TS grey
(PEEK, mineral)
Excellent hardness and
rigidity, low coefficient
of thermal expansion,
high dimensional stability.

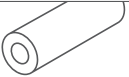
TECAPEEK ELS nano black
(PEEK, CNT)
→ p. 85

TECAPEEK
(PEEK)
→ p. 48

TECATRON
(PPS)
→ p. 45

TECAPEI GF30
(PEI GF)
→ p. 42

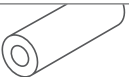
SEMICONDUCTOR Tubes

	<i>TECATRON CMP natural</i>	<i>TECATRON SE natural</i>	<i>TECAPEEK CMP natural</i>	<i>TECAPEEK SE natural</i>	<i>TECADUR PET CMP natural</i>		
							
Polymer	PPS	PPS	PEEK	PEEK	PET		
Density [g/cm ³]	1.34	1.36	1.31	1.31	1.39		
Colour	beige opaque	beige opaque	beige opaque	beige opaque	white opaque		
Diameter outside / inside [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance outside [mm]	Tolerance inside [mm]
190 / 140	21.50	21.83	21.02	21.02	22.31	+1.00/+6.00	-2.50/-10.00
190 / 150	18.45	18.73	18.04	18.04	19.14	+1.00/+6.00	-2.50/-10.00
200 / 125	30.90	31.40	30.20	30.20	32.10	+2.00/+9.00	-2.50/-10.00
230 / 190	24.62	24.99	24.07	24.07	25.50	+3.00/+9.00	-3.00/-12.00
230 / 195	22.07	22.40	21.58	21.58	22.90	+1.00/+9.00	-3.00/-12.00
250 / 200	31.50	31.90	30.80	30.80	32.60	+2.00/+9.00	-3.00/-14.00
255 / 190	38.00	38.60	37.20	37.20	39.40	+2.00/+9.00	-3.00/-12.00
255 / 195	36.00	36.50	35.20	35.20	37.30	+2.00/+9.00	-3.00/-12.00
280 / 210	45.80	46.50	44.80	44.80	47.50	+3.00/+12.00	-3.00/-12.00
305 / 190	70.80	71.80	69.20	69.20	73.40	+3.00/+12.00	-3.00/-12.00
305 / 195	67.40	68.40	65.90	65.90	69.90	+2.00/+9.00	-3.00/-12.00
305 / 200	67.10	68.10	65.60	65.60	69.60	+3.00/+12.00	-3.00/-14.00
360 / 295	55.60	56.40	54.40	54.40	57.70	+1.00/+9.00	-3.00/-12.00

Tolerances: length +30 / +60 mm

Stock lengths 1,000 mm

SEMICONDUCTOR Tubes

	<i>TECANAT CMP natural^a</i>		
			
Polymer	PC		
Density [g/cm ³]	1.34		
Colour	white transparent		
Diameter outside / inside [mm]	[kg/m]	Tolerance outside [mm]	Tolerance inside [mm]
230 / 200	18.90	+5.00/+10.00	-5.00/-10.00
255 / 200	31.10	+3.00/+12.00	-3.00/-12.00
360 / 295	49.40	+1.00/+9.00	-3.00/-12.00

Tolerances: length +30 / +60 mm

Stock lengths 1,000 mm

^a Other diameters on request

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available ground.

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Aerospace technology

Technical plastics from Ensinger contribute to making applications more efficient and competitive in many industrial areas. The aerospace industry places high demands on materials. Here, high-performance plastics are expanding due to their low weight, fire behavior and other properties:

- Weight savings of up to 60% compared to aluminium reduce energy consumption
- Plastics can be processed better than other materials
- Greater freedom in component design results in reduced production and installation costs
- Good chemical resistance
- Inherent flame-resistance: High-performance plastics fulfil the requirements of UL 94 -V0 and meet fire behaviour standards in accordance with FAR 25.853
- Fire behaviour with regard to: smoke gas density, smoke gas toxicity, heat release
- High specific strength due to fibre-reinforced plastics
- Convincing gliding properties with outstanding dry-running characteristics and freedom from maintenance in the application
- Low outgassing in vacuum
- Good radiation resistance

The characteristics of our plastics products fulfil the detailed requirements of material specifications of final customers and system suppliers in the aerospace industry. Safety aspects and reduced energy consumption are written large here.

As requested by our customers, we have checked and qualified a large share of our materials against required specifications. We can qualify additional materials on request.

Due to the special requirements of the aerospace industry, Ensinger takes on responsibility for: raw materials receipt inspections, raw materials specifications, composition specifications for individual articles, final inspections, issuing of inspection certificates, and much more.

In addition, Ensinger can offer the complete documentation and traceability for all materials and manufacturing processes. The reliability of these processes is documented through all production procedures, such as compounding, semi-finished product extrusion and finished product production through injection moulding or machining.

**TECASINT 4121 /
TECASINT 2021**
(PI)
Low friction and abrasion.
HDT / A up to 470 °C.

**TECASINT 4111 /
TECASINT 2011**
(PI)
Unfilled,
best mechanical
characteristics,
highest purity.
Low outgassing
in vacuum.

TECASINT 2391
(PI)
Modified with MoS₂.
Best gliding properties
in vacuum.
Low outgassing
in vacuum.

TECATOR 5013 natural
(PAI)
Highest compression
strength and impact
resistance. Excellent
electrical insulation and
high dielectric constant.

TECAPEEK natural
(PEEK)
Long-term service
temperatures of up
to +260 °C.
Excellent mechanical
properties even at high
temperatures.

TECAPEEK CF30 black
(PEEK CF)
Very high strength value
due to carbon fibre
reinforcement.
Very abrasion-resistant.

TECAPEEK GF30 natural
(PEEK GF)
Glass-fibre reinforced.
Increased strength.
Outstanding chemical
resistance.

TECAPEEK ELS nano black
(PEEK CNT)
Electrically conductive.
Outstanding chemical
resistance.
Good machinability.

TECATRON GF40 natural
(PPS GF)
Extremely high strength
due to glass-fibre
reinforcement.
Very good chemical
resistance.

TECASON P natural
(PPSU)
High thermal
dimensional stability.
Good toughness.

TECAPEI natural
(PEI)
Long-term service
temperature up to 170 °C.
Resistance to
high-energy radiation.

TECAFLON PTFE natural
(PTFE)
Exceptional
chemical resistance.
Particularly low
coefficient of friction.
Ideally suited for soft
mating partners.

TECAMID 66 natural
(PA 66)
Easily glued and welded.
Electrically insulating and
good machining properties.

TECAMID 66 MO black
(PA 66 MoS₂)
Good UV-resistance.
Low abrasion.

TECAMID 66 GF35 natural
(PA 66 GF)
Glass-fibre reinforced.
High strength.

TECAFORM AH natural
(POM-C)
Good chemical resistance.
High resilience.

TECAFORM AH ELS black
(POM-C, Conductive
carbon)
Electrically conductive.

TECAFORM AH SD natural
(POM-C, Anti-static agent)
Static dissipating,
carbon-free.
Inherently effective,
permanently
non-contaminating
anti-static agent.

TECAFORM AD natural
(POM-H)
High mechanical
strength.
Very good machining
properties.

TECAFORM AD AF natural
(POM-H TF)
Very good slide friction
properties.
Low water absorption.

Wire coil for solar panel
TECASINT 2391 black
(PI)
Low outgassing
in accordance with
ESA standard.
High rigidity with
low weight.



Sensor plate
(Component of aircraft
air conditioning system)
TECAPEEK GF30 natural
(PEEK GF)
High temperature
resistance.
Dimensionally stable.



Twin Pulley
(Assembly for
baggage-tray lift)
TECAPEI GF30 natural mod.
(PEI GF)
High temperature resistance.
Inherently flame-retardant.
Very strong and rigid.



Attenuation tube
(Use in landing unit)
TECAFORM AH white
(POM-C)
Dimensionally stable.
Grease-resistant.



Output Pulley
(Assembly for
baggage-tray lift)
TECAPEI GF30 natural mod.
(PEI GF)
High temperature resistance.
Inherently flame-retardant.
Very strong and rigid.





Electrics and Electronics

With excellent electrical properties ranging from fully insulating to electrically conductive, plastics are an essential material in the electrotechnical industry.

Plastics, which when unmodified are generally electrically insulating, can be adjusted to provide properties ranging from antistatic to conductive by modification with conductivity additives. At the same time, the basic polymers can be selected for their inherent suitability to the application in question. This opens up extensive material diversity and consequently a broad range of possible applications in the electronic and mechanical engineering industries.

The wide range of different electrotechnical applications is reflected in the diverse requirements imposed on the plastics used. To ensure the reliable handling of highly sensitive electronic components, statically dissipating materials may also have to be used.

This allows damage or destruction of the components to be significantly reduced during production. Electrically active materials are also used in the mechanical engineering industry, in conveyor technology and in the field of explosion protection. In these applications, the ability to selectively dissipate electrical charges is a decisive factor in the prevention of explosive discharges. Plastics with modified conductivity also have a range of benefits to offer over metal when used in electrical components or when exposed to the effects of weather or damp. Consequently some of these materials have good resistance to weathering, provide protection against thermomechanical stress and are only minimally susceptible to corrosion. Because of these properties, they enjoy increasing use in automotive applications and in the field of renewable energies.

Depending on the required degree of conductivity, Ensinger has a variety of materials to offer in the field of engineering or high-performance plastics.

Ensinger materials for the electrotechnical industry

TECASINT 5201 black
(PAI)

High thermal-mechanical load properties, statically dissipating.

TECAPEEK ELS nano black
(PEEK, CNT)

Electrically conductive, excellent chemical resistance, good machining properties.
→ p. 48

TECAFLON PVDF ELS black
(PVDF, conductive soot)

Very good chemical resistance, thermal applications up to 150 °C, electrically conductive.

TECAFORM AH SD natural
(POM-C, antistatic)

Static dissipating, carbon-free. Inherently effective, permanently non-contaminating anti-static agent.
→ p. 14

TECAFORM AH ELS black
(POM-C, conductive soot)

Electrically conductive with special carbon black for general applications.
→ p. 14

Application examples

Fibre guide

TECAFORM AH ELS black
(POM-C, conductive carbon)

Dissipation of electrostatic charging. Good toughness and strength. Good sliding friction properties.



Fixing flange

TECAFLON PVDF natural
(PVDF)

Very good chemical resistance. Very good UV-resistance. Good compression strength.



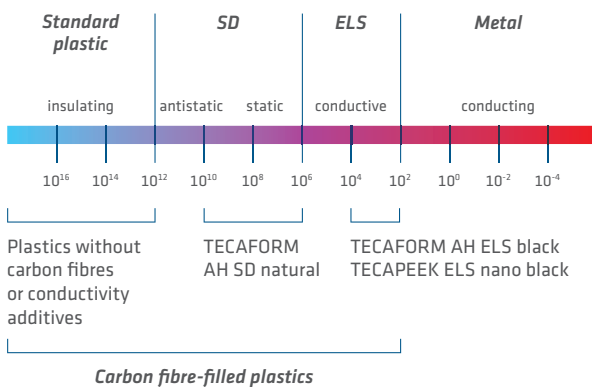
Contact socket

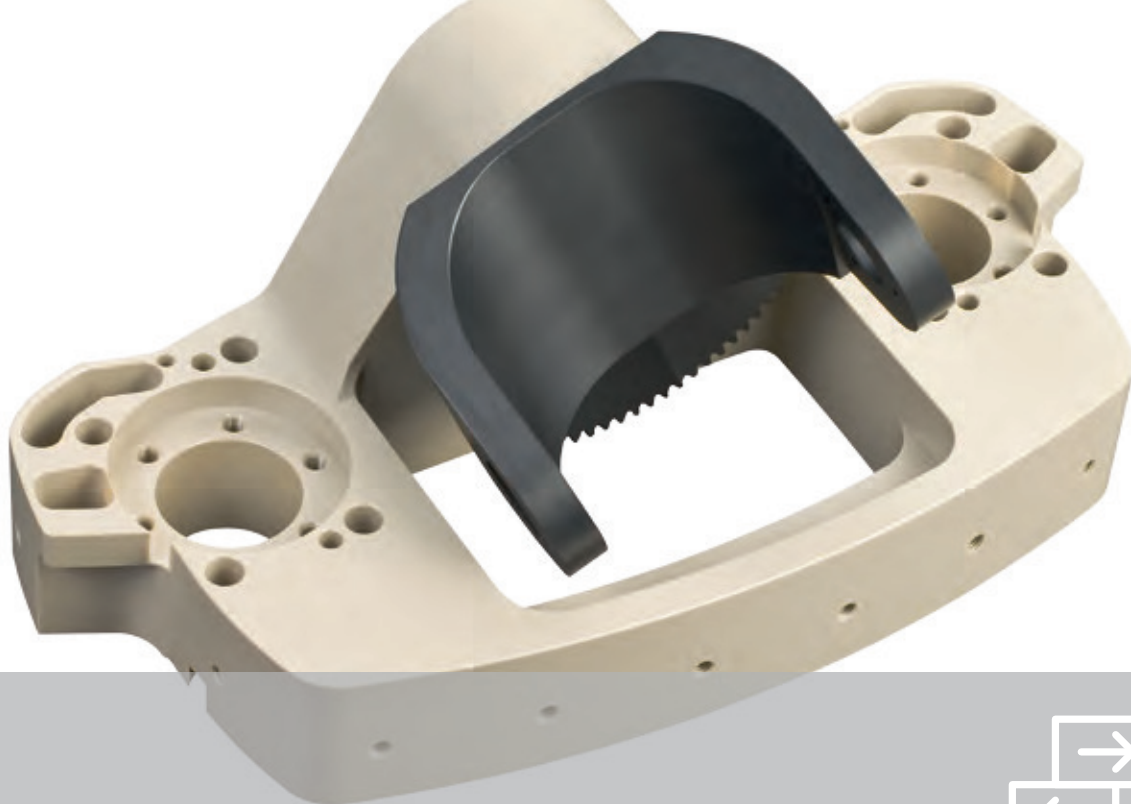
TECADUR PBT GF30 natural
(PBT GF)

Very good electrical insulation. Low water absorption. Excellent dimensional stability.



Conductivity ranges
Surface resistance [Ω]





Sliding applications

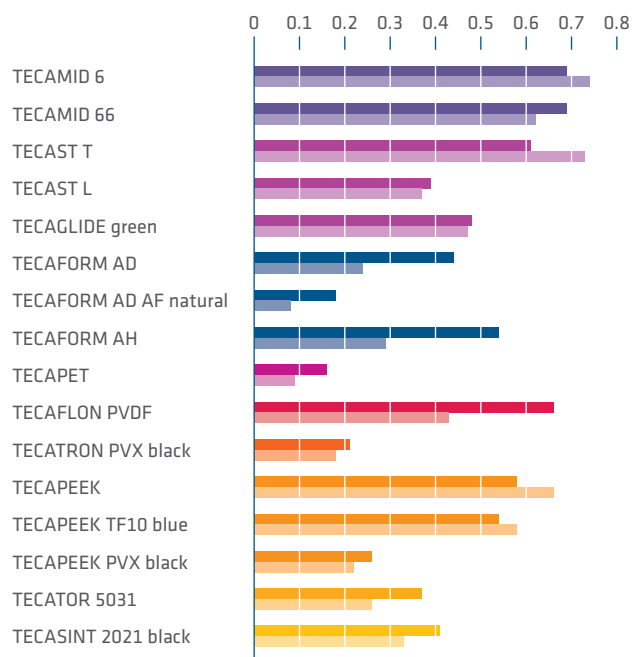
Sliding bearings, gears, guide elements and rollers frequently call for materials with good tribological characteristics.

Ensinger has extensive experience in the field of sliding applications, and offers a wide portfolio of tribological materials. A range of different additives to improve sliding properties can be used in order to ensure optimum compliance with requirements depending on the application. Together with the individual properties of plastics, these offer a range of possibilities for wide-ranging tribological applications.

However, selection of a suitable material depends not only on the thermal or mechanical requirements of the application. To allow suitable material recommendations to be made, a range of other system conditions such as pressure, relative sliding velocity, the structural design and the properties of the mating partner (surface roughness) are determining factors.

With the aid of calculation modules, our application technicians will be pleased to help you with the material selection process to ensure that you find the most suitable material for the construction of your sliding application.

Coefficient of friction



■ Mean coefficient of friction
■ Mean coefficient of static friction
 Pin on disc tests against steel, dry, RT; load stages: 3N at medium velocity

Ensinger materials for slide-friction applications

TECAFORM AH LA blue
(POM-C, solid lubricant)
Very good sliding and wear values.
Low water absorption.

TECAFORM AD AF natural
(POM-H, TF)
Very good sliding properties due to PTFE component.
Low water absorption.
→ p. 17, 18

TECAMID 66 MO black
(PA 66 MoS₂)
Good UV resistance.
Low abrasion.
→ p. 21, 23

TECAMID 66 LA natural
(PA 66, solid lubricant)
Very good sliding and wear properties with soft contact surfaces.
Tough with good strength.
→ p. 21, 23

TECAMID 6 MO black
(PA 6 MoS₂)
Good UV resistance and surface hardness.
Good machining properties and dimensional stability.
→ p. 21, 23

TECAST MO black
(PA 66 MoS₂)
Good UV stability.
High surface hardness.
→ p. 27, 28

TECAST L natural
(PA 6 C, oil)
Good sliding properties, also in dry running conditions. Good stick-slip behaviour. Tough.
Good thermal stability.
Good electrical insulation.
→ p. 27, 28

TECAGLIDE green
(PA 6 C, solid lubricant)
Low coefficient of friction.
Polymer lubricants (no silicon additives).
→ p. 27, 28

TECAPET TF grey
(PET TF)
High abrasion resistance.
Excellent sliding friction properties.
→ p. 33, 34

TECAFLON PTFE natural
(PTFE)
Exceptional chemical resistance.
Particularly low coefficient of friction, suitable for soft sliding surfaces.
→ p. 40, 41

TECAPEEK PVX black
(PEEK CF CS TF)
Very good sliding values.
Suitable for bearings under high levels of stress.
→ p. 50, 51

TECAPEEK TF10 blue
(PEEK TF)
Very good sliding properties.
Electrically insulating, free of carbon.

Also possible in sliding applications:
TECAFORM AH
TECAFORM AD
TECAMID 66
TECAMID 6
TECAMID 66 CF20 black
TECAPET
TECAPEEK
TECASINT

Application examples

Trolley
TECAFORM AH natural
(POM-C)
Good sliding properties.
Good strength.
Minimal moisture absorption.
Good dimensional stability.



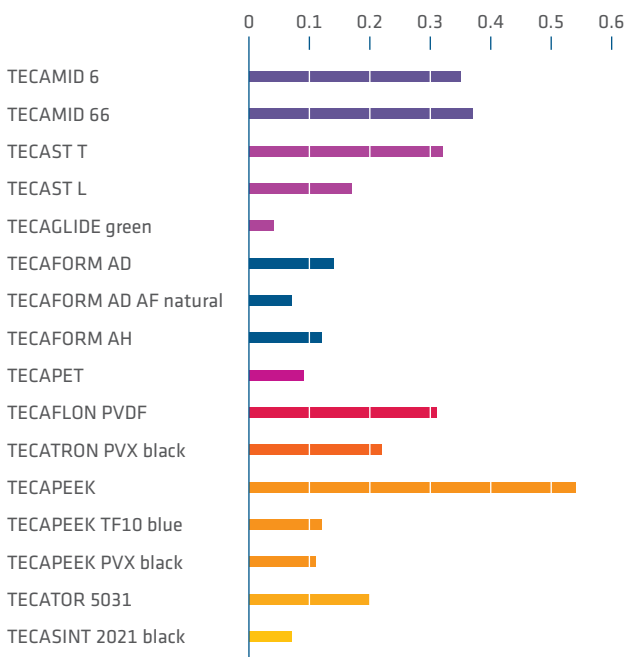
Guide rails
TECAPET TF grey
(PET TF)
Good sliding properties.
High dimensional stability.
Low wear.
High strength.



Gear
TECAFORM AH black
(POM-C)
Good strength.
Good sliding properties.
Minimal moisture absorption.
Good dimensional stability.



Abrasion indicators



Rotating ball prism against steel, dry, RT, load stage: 30N over 100h at medium velocity

Calendered plates

Thin plates in the range of just a few millimetres and below with a relatively large width are manufactured using calendering technology. This process permits close tolerances to

be achieved. These plates are used as the starting material for punching processes (seals) or also in a special version for thermoforming.

Overview of types

TECAFORM AH (POM-C)

Good chemical resistance.
High resilience.

TECAMID 6 (PA 6)

Extreme toughness and impact resistance.
Good chemical resistance.

TECAMID 66 (PA 66)

Good adhesion and welding properties.
Electrically insulating.
Good machining properties.

TECADUR PET (PET)

Good machining properties.
High strength.

TECANAT (PC)

High toughness and transparency.
High service temperature.

TECAPEEK VF natural (PEEK)

Thermoformable PEEK.
Long-term service temperature up to 260 °C.
Excellent chemical resistance.

TECASON P VF (PPSU)

Thermoformable PPSU.
Excellent thermal dimensional stability.
Good sterilization resistance.

TECAMID 6 GF12 VF black (PA 6 GF)

Glass fibre reinforced polyamide with very high strength.
Thermoformable.
Good chemical resistance.

Application examples

Housing cover

TECAPEEK VF natural (PEEK)

Good thermoformability.
High level of thermal stability. Good resistance to oil and grease even at high temperatures.
Electrically insulating.



Engine cover

TECAMID 6 GF12 VF black (PA 6 GF)

High strength.
Resistant to oil and grease.
Good thermal formability.
Good vibration strength.



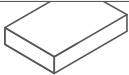
Sterilization container

TECASON P VF grey (PPSU)

Good thermal formability.
Good sterilization resistance.
Minimal weight.
High rigidity.



CALENDERED Plates

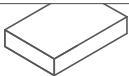
	<i>TECAFORM AH natural</i>	<i>TECAMID 6 natural</i>	<i>TECAMID 66 natural</i>	<i>TECADUR PET natural</i>	
Polymer	POM-C	PA 6	PA 66	PET	
Density [g/cm ³]	1.41	1.14	1.15	1.39	
Colour	white opaque	ivory opaque	ivory opaque	white opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
0.5 × 1,000	0.774	0.590			-0.02/+0.08
1 × 1,000	1.46	1.18			-0.10/+0.10
2 × 1,000	2.92	2.36	2.38	2.88	-0.15/+0.15
3 × 1,000	4.38	3.54	3.57	4.32	-0.20/+0.20
4 × 1,000	5.84	4.72	4.76	5.76	
5 × 1,000	7.30	5.90	5.95	7.20	-0.25/+0.25
6 × 1,000	8.76	7.08	7.14	8.63	

Tolerances according to DIN:

Length 0 / +3% - Width +5 / +25 mm

Stock lengths: 2,000 mm

CALENDERED Plates


	<i>TECASON P VF smoke</i>	<i>TECASON P VF beige</i>	<i>TECASON P VF yellow</i>	<i>TECASON P VF grey</i>	
Polymer	PPSU	PPSU	PPSU	PPSU	
Density [g/cm ³]	1.29	1.29	1.29	1.29	
Colour	grey transparent	beige opaque	yellow opaque	grey opaque	
Dimensions [mm]	[kg/m]	[kg/m]	[kg/m]	[kg/m]	Tolerance [mm]
3 × 400	1.55				-0.20/+0.20
4 × 400		2.06	2.06	2.06	

Tolerances according to DIN:

Length 0 / +3% - Width +5 / +25 mm

Stock lengths: 700 mm

CALENDERED Plates

	<i>TECANAT natural</i>	
Polymer	PC	
Density [g/cm ³]	1.19	
Colour	white transparent	
Dimensions [mm]	[kg/m]	Tolerance [mm]
1 × 1,250	1.54	-0.10/+0.10
2 × 1,250	3.10	-0.15/+0.15
3 × 1,250	4.65	-0.20/+0.20
4 × 1,250	6.19	
5 × 1,250	7.68	-0.25/+0.25
6 × 1,250	9.21	

Tolerances according to DIN:

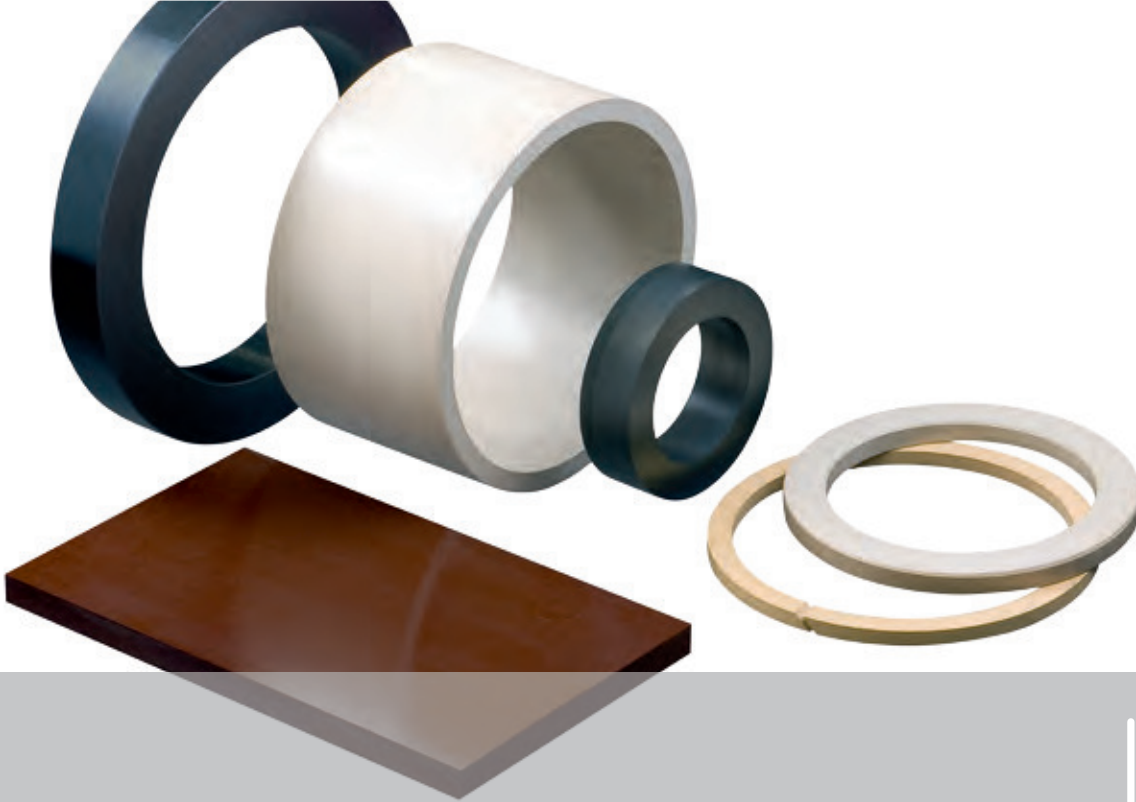
Length 0 / +3% - Width +5 / +25 mm

Stock lengths: 2,000 mm

- Stock item
- Non-stock item - special production

Modifications in colour and diameter on request. Other delivery lengths possible, also available planned.

The specified kg/m weights are purely arithmetic figures. Weight on delivery will deviate from the figures given above. All figures given without obligation. Please find the latest information at www.ensinger-online.com



Compression moulding

Compression moulding is a processing method for the manufacture of stock shapes or finished and semi-finished components which may require further processing.

The compression moulding process is primarily suited for finished parts in medium piece numbers, as the tooling costs are generally lower than other processes such as injection moulding. For stock shapes, this process allows larger dimensions to be achieved than is the case for extrusion. The benefits of compression moulded components and stock shapes:

- Semi-finished part geometries close to finished measurement
- Extreme economy due to material savings
- Low tendency to warp due to almost isotropic characteristics
- Extremely low intrinsic stress levels
- Consequently also easier to machine

However, the costs of producing stock shapes are higher compared to extrusion due to the discontinuous production process.

Application examples

Piston rings

TECASINT 2022 black (PI)

Very good sliding properties.
Low wear.
High strength.



Slide bush

TECASINT 2011 natural (PI)

Very high toughness.
High strength.
Very good thermal resistance.
Good sliding properties.



Overview of types

Polyimide

(PI)

Available unfilled or modified with glass fibres, carbon fibres, PTFE and graphite and combinations of these materials.

→ p. 57

Polyamidimide

(PAI)

Available unfilled or modified with glass fibres, carbon fibres, PTFE and graphite and combinations of these materials.

Polyetheretherketone

(PEEK)

Unfilled or in modifications with glass fibres, carbon fibres, PTFE and graphite and combinations of these materials, also static dissipative available.

e.g. TECAPEEK CM natural (XP-96), TECAPEEK GF30 CM (XP-91), TECAPEEK CM GR15 TF10 black (XP-101), TECAPEEK CM CF10 GR10 TF10 black (XP-100)

Polyphenylsulphide

(PPS)

May be modified with glass fibres, carbon fibres, PTFE and graphite and combinations of these materials.

e.g. TECATRON GF40 CM (XP-86), TECATRON GF15 GR10 TF10 CM (XP-88)

Polytetrafluorethylene

(PTFE)

Available as modification with mica.

Polyvinylidenefluoride

(PVDF)

Available unfilled.

Perfluoralkoxylalkane

(PFA)

Available unfilled.

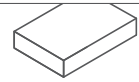
Polychlorotrifluorethylene

(PCTFE)




Available unfilled.

Many other modifications on request.

Plates



Polymer	Dimensions [mm]	Width x Length [mm]
PAI	6.3 – 50.8	254.0 x 254.0
	6.3 – 50.8	330.2 x 330.2
	6.3 – 38.1	304.8 x 381.0
	9.5 – 38.1	381.0 x 762.0
	9.5 – 38.1	609.6 x 609.6
PEEK (unfilled / filled)	6.3 – 76.2	254.0 x 254.0
	6.3 – 63.5	330.2 x 330.2
	6.3 – 50.8	304.8 x 381.0
	6.3 – 63.5	381.0 x 762.0
	9.5 – 63.5	609.6 x 609.6
PPS / PEI	6.3 – 76.2	254.0 x 254.0
	6.3 – 63.5	330.2 x 330.2
	6.3 – 50.8	304.8 x 381.0
	6.3 – 63.5	381.0 x 762.0
	9.5 – 63.5	609.6 x 609.6
PCTFE / PFA	6.3 – 76.2	254.0 x 254.0
	6.3 – 63.5	330.2 x 330.2
	6.3 – 50.8	304.8 x 381.0
	6.3 – 63.5	381.0 x 762.0
	9.5 – 63.5	609.6 x 609.6

Polymer	Rods 		Discs 		Tubes 	
	Diameter [mm]	Length [mm]	Diameter [mm]	Length [mm]	Outer diameter [mm]	Length [mm]
PAI	25.4 – 79.4	76.2 – 152.4	82.6 – 508.0	12.7 – 50.8	38.1 – 2070.1	76.2 – 152.4
PEEK (unfilled)	25.4 – 79.4	76.2 – 152.4	82.6 – 660.4	12.7 – 76.2	38.1 – 2070.1	76.2 – 152.4
PEEK (filled)	25.4 – 79.4	76.2 – 152.4	82.6 – 660.4	12.7 – 76.2	38.1 – 203.2 209.6 – 2070.1	76.2 – 203.2 76.2 – 152.4
PPS / PEI	25.4 – 101.6	76.2 – 304.8	107.9 – 660.4	12.7 – 88.9	38.1 – 203.2 209.6 – 2070.1	76.2 – 304.8 76.2 – 152.4
PCTFE / PFA	25.4 – 63.5	76.2 – 152.4	69.8 – 660.4	12.7 – 63.5	38.1 – 2070.1	76.2 – 152.4

Technical data for Compression Moulding Products may differ from the data on pages 96 – 105 and the data sheets at ensinger-online.com. Please contact the Ensinger technical service for more information.

Product handling

Ensinger plastics are used as the raw material for a wide range of high-quality components and end products in fields such as the food industry and medical technology, as well as mechanical and automotive engineering, semiconductor technology and in the aerospace industry. To ensure the high standard of quality and functionality in our materials for these applications, and also over extended storage periods, certain factors must be taken into consideration in the storage, treatment and handling of Ensinger stock shapes. By taking these precautions, it is possible to ensure that external influences are unable to significantly diminish the material properties. In the case of finished parts, the manufacturer or user is required to individually submit a statement of this, as conditions can differ considerably depending on the storage or utilization period.

1. Storage and handling should take place in such a way that the material designations and product numbers (batch number) are clearly recognizable on the semi-finished products and can be maintained. This allows clear identification and traceability of products in the event of a possible complaint, allowing the possible root cause of the problem to be determined.

2. Weathering effects can impact on the properties of plastics. As result of the impact of solar radiation (UV radiation), atmospheric oxygen and moisture (precipitation, humidity) can exert a lasting negative impact on material characteristics. These influences can result in colour changes, oxidation of surfaces, swelling, warping, brittleness or even a change in mechanical properties. For this reason, semi-finished products should not be exposed to direct sunlight or the effects of weather over protracted periods. Ideally, the semi-finished products should be stored in closed rooms under normal climatic conditions (23 °C / 50 % rH).

The following materials in particular should be protected against the influence of the weather:

- TECAPEEK (PEEK)*
- TECATRON (PPS)*
- TECASON P (PPSU)*
- TECASON S (PSU)*
- TECASON E (PES)*
- TECAFORM AH, AD (POM-C, POM-H)**
- TECAPET (PET)**
- TECAMID 6, 66, 11, 12, 46 (PA 6, 66, 11, 12, 46)**
- TECAST (PA 6 C)**
- TECAFINE (PE, PP)**
- TECARAN ABS (ABS)*

* All variations should be protected generally

** Not black-coloured variants should be protected

3. Wherever possible, plastics should not be exposed to low temperatures over long periods. In particular, marked fluctuations in temperature should be avoided, as this can cause stock shapes to warp or become brittle. Where this type of partially reversible brittleness occurs in stock shapes which have been stored at temperatures below freezing, careful handling is required. Hard knocks caused by throwing or dropping should be avoided, as otherwise cracks and fracture damage can occur. In addition, semi-finished products stored in cold conditions should be allowed sufficient time to acclimatize to room temperature before processing. This can help to prevent defects such as cavities occurring during processing. It will also help to compensate for shrinkage or also elongation after exposure to hot atmospheres caused by the high coefficient of linear thermal expansion of plastics.

4. Semi-finished products made of plastic should consequently always be stored flat or on a suitable support (in the case of rods and tubes) and with the greatest possible surface contact in order to avoid deformation through their own intrinsic weight or heat.

5. When handling plastic semi-finished products, ensure that suitable warehousing equipment is used. Ensure that storage facilities, lifting gear, slings and other lifting equipment are stable and secure. Stock shapes must also be stored and stacked so as to eliminate any danger of tipping or falling. Bear in mind here that plastics often have a relatively low coefficient of friction and are consequently easily able to slip out of load suspension devices, with the possibility of serious injury to staff members.

6. Avoid the effects of high-energy radiation such as gamma or X rays wherever possible due to possible microstructure damage through molecular breakdown.
7. Plastic stock shapes should be kept away from all kinds of chemicals and water in order to prevent possible chemical attack or the absorption of moisture. Contact with chemicals or water can result in swelling, chemical decomposition or stress cracking.
8. Plastics are organic substances and consequently combustible. The combustion or decomposition products may have a toxic or corrosive effect. If correctly stored, plastics themselves do not pose a fire risk. However, they should not be stored together with other combustible substances. On this subject, observe the product handling information sheets for the individual materials.
9. Under normal conditions, plastic semi-finished or finished products do not release any toxic constituents and permit risk-free surface contact. Tobacco products should not be allowed in the vicinity when handling and machining plastics, as particles of some plastics (in particular fluoropolymers) can release strong toxic gases in some cases during pyrolyzation of the smouldering tobacco. In respect of health protection, please also note the product handling information sheets for the individual materials.
10. If the above recommendations are adhered to, it may be assumed that no significant changes to typical properties will occur during the storage period. It is possible that minimal surface discolouration may occur due to environmental influences. However, this does not represent any significant deterioration of material properties, as the surface is generally only affected down to a few microns in depth.
11. Plastic waste and chips can be processed and recycled by professional recycling companies. However, it is also possible to send the waste for thermal processing to generate energy by a professional company in a combustion plant with a suitable emission control in place. This applies in particular to applications where the plastic waste produced is contaminated, e.g. in the case of machining swarf contaminated with oil.

In order to store finished and semi-finished products for high levels of manufacturing precision, we consequently recommend storage under constant conditions in a normal climate (23 °C / 50 % rH). This allows external influences to be minimized and dimensional stability to be maintained over long periods.

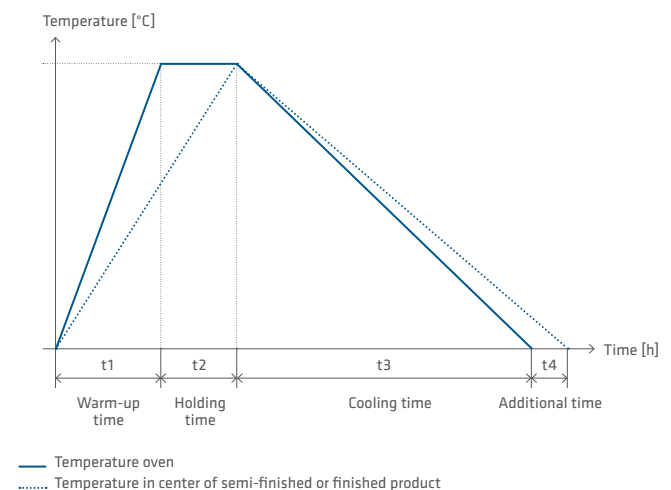
It is not possible to specify a maximum storage period, as this depends heavily on the materials, storage conditions and external influences.

These recommendations should always be adjusted in line with individual requirements and circumstances. They do not replace the fundamentally applicable statutory regulations, or exonerate customers using the products from their responsibility or individuals from their duty of care. These are merely intended as recommendations drawn up on the basis of current knowledge. They do not constitute any generally applicable assurance.

Annealing

Ensinger stock shapes are always subjected in principle to a special annealing process after production to reduce the internal tension created during manufacture. Annealing is carried out in a special recirculating air oven, but can also take place in an oven with circulating nitrogen or in an oil bath. Annealing results in increased crystallinity, as well as improved strength and chemical resistance. It also brings about a reduction of inner tension as described above and increases dimensional stability over a wide temperature range.

Typical annealing cycle



Processing of plastics

General information*

Non-reinforced thermoplastic polymers can be machined using high speed steel tools. For reinforced materials, carbide-tipped tools are necessary. In all cases, only correctly sharpened tools should be used. Due to the poor thermal conductivity of plastics, good heat dissipation must be ensured. The best form of cooling is heat dissipation via the chip.

Dimensional stability

Dimensionally accurate parts presuppose the use of stress relieved semi-finished products. Heat from machining will otherwise result in the release of machining stresses and distortion of the part. If large amounts of material are to be removed, an interstage annealing may be necessary after rough machining to relieve the resulting thermal stresses. For temperatures and times please contact the Ensinger technical service. Materials with high moisture absorption (e.g. polyamides) may have to be conditioned in water before machining. Plastics require higher production tolerances than metals. Furthermore, the very much higher thermal expansion needs to be taken into consideration.

Machining methods

1. Turning Guide values for tool geometry are given in the table. For surfaces with particularly high quality demands, the tool must be designed as a wide smoothing tool as shown in Figure 1. For parting off, the lathe tool should be ground as shown in Figure 2 to prevent the formation of burrs. For thin-walled and particularly flexible workpieces, on the other hand, it is better to work with tools that are ground to a knife-like cutting geometry (Figure 3).

Figure 1
Wide smoothing tool

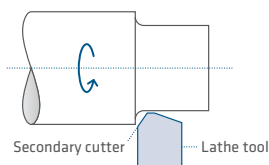


Figure 2
Grinding prevents burr formation

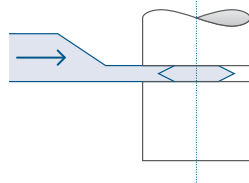
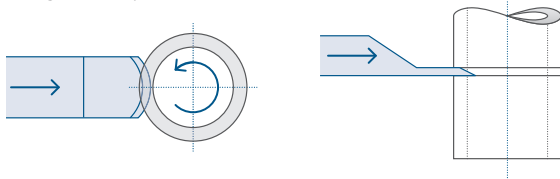


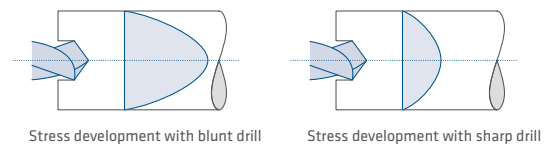
Figure 3
Parting off flexible plastics



* Our applications advice, both written and oral, is intended to help you in your work. It must be regarded as a recommendation without obligation, also with respect to possible third-party property rights. We can assume no liability for any damage occurring during machining.

2. Milling For planed surfaces, face milling is more economical than peripheral milling. For peripheral and profiling milling, the tools should not have more than two cutters so that vibrations caused by the number of cutters are kept low and the gaps between the chips are sufficiently large. Optimum cutting performances and surface finishes are obtained with single-cutter tools.

3. Drilling Twist drills can generally be used. These should have a twist angle of 12° to 16° and very smooth spiral grooves for good chip removal. Larger diameters should be predrilled or should be produced using hollow drills or by cutting out. Particular attention should be paid to properly sharpened drills when drilling into solid material, as otherwise the resulting compressive stresses can increase to the extent that the material splits.



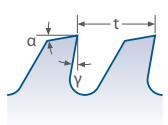
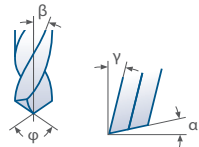
Reinforced plastics have higher residual processing stresses and a lower impact resistance than non-reinforced plastics and are therefore particularly susceptible to cracking. Where possible, they should be heated to around 120° C before drilling. (Heating time approx. 1 hour per 10 mm cross-section). This method is also to be recommended for polyamide 66, polyester and large diameter cast nylon.

4. Sawing Unnecessary heat generation caused by friction must be avoided, as thick-walled parts are generally cut with relatively thin tools during sawing. Well sharpened sawblades with large tooth offsets are therefore expedient.

5. Thread cutting Threads are best cut using thread chasers. Burr formation can be avoided by using twin-toothed chasers. Die nuts are not to be recommended as post-cutting must be anticipated during removal of the nut. A machining allowance (dependent on material and diameter; guide value: 0.1 mm) must frequently be made when using tap drills.

6. Safety precautions Failure to observe the machining guidelines can result in localised overheating which can lead to material degradation. Released decomposition products, e.g. from PTFE fillers, must be removed using extraction facilities. In this context, tobacco products must be kept out of the production area due to the risk of polymer flu fever.

Machining guidelines

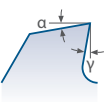
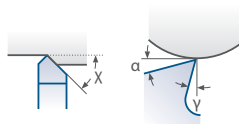
	Sawing				Drilling				
	 n rotation speed [rpm] alpha clearance angle [°] gamma rake angle [°] t pitch [mm]				 alpha clearance angle [°] beta twist angle [°] gamma rake angle [°] phi point angle [°] V Cutting speed [rpm] S Feed rate [mm/r]				
	Circular saw		Band saw						
	rotation speed [rpm]	pitch	cutting speed	pitch	number of teeth	twist angle	rake angle	cutting speed	feed rate
TECAFINE PE/PP	2800 – 3000	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 150	0.1 – 0.3
TECAFINE PMP	2800 – 3000	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 150	0.1 – 0.3
TECARAN ABS	2600	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 200	0.2 – 0.3
TECANYL	2800 – 3000	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 100	0.2 – 0.3
TECAFORM AD/AH	2800 – 3000	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 150	0.1 – 0.3
TECAMID, TECARIM, TECAST	2000 – 2600	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 150	0.1 – 0.3
TECADUR/TECAPET	2200 – 2600	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 100	0.2 – 0.3
TECANAT	2400	31 – 38	130 – 180	11 – 15	Z2	25	90	50 – 100	0.2 – 0.3
TECAFLON PTFE/PVDF	2800 – 3000	20 – 24	130 – 180	11 – 15	Z2	25	90	150 – 200	0.1 – 0.3
TECAPEI	3000	20 – 24	130 – 180	11 – 15	Z2	25	90	20 – 80	0.1 – 0.3
TECASON S, P, E	3000	20 – 24	130 – 180	11 – 15	Z2	25	90	20 – 80	0.1 – 0.3
TECATRON	3000	20 – 24	130 – 180	11 – 15	Z2	25	90	50 – 200	0.1 – 0.3
TECAPEEK	3000	20 – 24	130 – 180	11 – 15	Z2	25	90	50 – 200	0.1 – 0.3
TECATOR	3000	20 – 24	130 – 180	11 – 15	Z2	25	90	80 – 100	0.02 – 0.1
TECASINT	3000	20 – 24	130 – 180	11 – 15	Z2	25	120	80 – 100	0.02 – 0.1
Reinforced/filled TECA products*	2400 – 2800	20 – 24	110 – 150	11 – 15	Z2	25	100	80 – 100	0.1 – 0.3

* Reinforcing agents/fillers:
Glass fibres, glass beads, carbon fibres, graphite, mica, talcum, etc.

Heat before sawing:
from Ø 60 mm TECAPEEK GF/PVX, TECATRON GF/PVX
from Ø 80 mm TECAMID 66 GF, TECAPET, TECADUR PBT GF
from Ø 100 mm TECAMID 6 GF, 66, 66 MH

Heat before drilling in the centre:
from Ø 60 mm TECAPEEK GF/PVX, TECATRON GF/PVX
from Ø 80 mm TECAMID 66 MH, 66 GF, TECAPET, TECADUR PBT GF
from Ø 100 mm TECAMID 6 GF, 66, TECAM 6 MO, TECANYL GF

Recommendation
Diameter of circular saw blade = 450 – 480 mm
Circular saw tooth type = Alternating teeth
Circular saw blades from hard metal. For reinforced materials a diamond-studded sawing blade is recommended for better tool life.
Band saw blades from hard metal, well set.

	Milling			Turning				
	 alpha clearance angle [°] gamma rake angle [°] V Cutting speed [rpm] S Feed rate [mm/r] Tangential feed Feed rate can be up to 0,5 mm / tooth			 alpha clearance angle [°] gamma rake angle [°] chi side angle [°] V Cutting speed [rpm] S Feed rate [mm/r] The nose radius r must be at least 0,5 mm				
	number of teeth	cutting speed	feed rate	clearance angle	rake angle	side angle	cutting speed	feed rate
TECAFINE PE, PP	Z2 – Z4	250 – 500	0.1 – 0.45	6 – 10	0 – 5	45 – 60	250 – 500	0.1 – 0.5
TECAFINE PMP	Z2 – Z4	250 – 500	0.1 – 0.45	6 – 10	0 – 5	45 – 60	250 – 500	0.1 – 0.5
TECARAN ABS	Z2 – Z4	300 – 500	0.1 – 0.45	5 – 15	25 – 30	15	200 – 500	0.2 – 0.5
TECANYL	Z2 – Z4	300	0.15 – 0.5	5 – 10	6 – 8	45 – 60	300	0.1 – 0.5
TECAFORM AD, AH	Z2 – Z4	300	0.15 – 0.5	6 – 8	0 – 5	45 – 60	300 – 600	0.1 – 0.4
TECAMID, TECARIM, TECAST	Z2 – Z4	250 – 500	0.1 – 0.45	6 – 10	0 – 5	45 – 60	250 – 500	0.1 – 0.5
TECADUR/TECAPET	Z2 – Z4	300	0.15 – 0.5	5 – 10	0 – 5	45 – 60	300 – 400	0.2 – 0.4
TECANAT	Z2 – Z4	300	0.15 – 0.4	5 – 10	6 – 8	45 – 60	300	0.1 – 0.5
TECAFLON PTFE, PVDF	Z2 – Z4	150 – 500	0.1 – 0.45	5 – 10	5 – 8	10	150 – 500	0.1 – 0.3
TECAPEI	Z2 – Z4	250 – 500	0.1 – 0.45	10	0	45 – 60	350 – 400	0.1 – 0.3
TECASON S, P, E	Z2 – Z4	250 – 500	0.1 – 0.45	6	0	45 – 60	350 – 400	0.1 – 0.3
TECATRON	Z2 – Z4	250 – 500	0.1 – 0.45	6	0 – 5	45 – 60	250 – 500	0.1 – 0.5
TECAPEEK	Z2 – Z4	250 – 500	0.1 – 0.45	6 – 8	0 – 5	45 – 60	250 – 500	0.1 – 0.5
TECATOR	Z2 – Z4	60 – 100	0.05 – 0.35	6 – 8	0 – 5	7 – 10	100 – 120	0.05 – 0.08
TECASINT	Z2 – Z4	90 – 100	0.05 – 0.35	2 – 5	0 – 5	7 – 10	100 – 120	0.05 – 0.08
Reinforced/filled TECA products*	Z2 – Z4	80 – 150	0.05 – 0.4	6 – 8	2 – 8	45 – 60	80 – 150	0.1 – 0.5

* Reinforcing agents/fillers:
Glass fibres, glass beads, carbon fibres, graphite, mica, talcum, etc.

● Preheat material to 120 °C
● Caution when using coolants:
susceptible to stress cracking

Material standard values

Material		TECASINT 8001 yellow-brown	TECASINT 5051 grey-green	TECASINT 5201 SD black	TECASINT 4011 natural	TECASINT 4021 black	TECASINT 4111 natural	TECASINT 4121 black	TECASINT 2011 natural	TECASINT 2021 black	TECASINT 2031 black
Polymer		PTFE	PAI	PAI	PI	PI	PI	PI	PI	PI	PI
Fillers		20% polyimide	30% glass fibres	carbon fibres, glass fibres		15% graphite		15% graphite		15% graphite	40% graphite
Density (DIN EN ISO 1183)	[g/cm ³]	1.88	1.57	1.54	1.41	1.49	1.46	1.53	1.38	1.45	1.59
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]		5,800	4,500	4,000	4,943	6,700	6,600	3,700	4,400	6,300
Tensile strength (DIN EN ISO 527-2)	[MPa]	15	94	85	130	93	100	34	118	101	65
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]										
Elongation at yield (DIN EN ISO 527-2)	[%]										
Elongation at break (DIN EN ISO 527-2)	[%]	200	3.4	4.0	4.5	3	1.7	0.5	4.5	3.7	2.1
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]		6,625	4,200	4,300	4,930	6,100	6,100	3,600	4,300	5,200
Flexural strength (DIN EN ISO 178)	[MPa]		163	135	180	131	160	113	177	145	87,5
Compression modulus (EN ISO 604)	[MPa]		2,590		2,100	2,067	2,500	2,200	1,713	1,900	2,027
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]										
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]		27.3	17.8	87	24.4	24	11	87.9	36.7	14.2
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]		5.1	2.8	9.6	4.8	1.1	1.4	9.3	2.9	3.3
Ball indentation hardness (ISO 2039-1)	[MPa]		360	375	265		345		260		
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	-20	340	340	260	260	n.a.	n.a.	370	370	370
Melting temperature (DIN 53765)	[°C]										
Service temperature, short term	[°C]										
Service temperature, long term	[°C]	250	300	300					-	-	-
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]										
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]		3	3	4		3		4		
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1			1.04				0.925		
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.25			0.4		0.35		0.22		
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]		10 ¹⁴	10 ¹¹	10 ¹⁶		10 ¹⁶		10 ¹⁵		
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ¹³			10 ¹⁶		10 ¹⁶		10 ¹⁵		
Dielectric strength (DIN EN 60243-1)	[kV/mm]										
Resistance to tracking (CTI) (DIN EN 60112)	[V]										
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]		0.12 / 0.27	0.16 / 0.33	0.02 / 0.06		0.01 / 0.02		0.14 / 0.30		
Resistance to hot water / bases											
Resistance to weathering											
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	V0	V0	V0	V0	V0	V0

Data generated directly after machining (standard climate Germany). For polyamides the values strongly depend on the humidity content.



Test specimen to DIN EN ISO 527-2

- + good resistance
- (+) limited resistance
- poor resistance (depending on concentration, time and temperature)
- n.b. not broken
- n.a. not applicable

- (a) Glass transition temperature testing according to DIN EN ISO 11357
- (b) Thermal conductivity testing according to ISO 8302
- (c) Thermal conductivity testing according to ASTM E 1530
- (d) Surface resistance testing according to ASTM D 257
- (e) No listing at UL (yellow card).
- (f) Thermal expansion (CLTE), 50 - 200 °C
- (g) Specific surface resistance and volume resistance testing according to DIN EN 61340-2-3
- (h) Dielectric strength testing according to ASTM D 149
- (i) Thermal expansion testing according to ASTM D 695

Material		TECASINT 2391 black	TECASINT 1011 natural	TECASINT 1021 black	TECASINT 1031 black	TECASINT 1041 black	TECASINT 1061 black	TECASINT 1101 natural	TECASINT 1611 brown	TECATOR 5013 natural	TECATOR 5031 PV black
Polymer		PI	PI	PI	PI	PI	PI	PI	PI	PAI	PAI
Fillers		15% MoS ₂		15% graphite	40% graphite	30% MoS ₂	15% graphite, 10% PTFE		30% PTFE		graphite, PTFE
Density (DIN EN ISO 1183)	[g/cm ³]	1,54	1,34	1,42	1,57	1,67	1,48	1,34	1,51	1,4	1,46
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	4,400	3,600	4,000		4,340		4,000		3,800	5,900
Tensile strength (DIN EN ISO 527-2)	[MPa]	95	116	97	65	82	77	153	82	151	135
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]									151	135
Elongation at yield (DIN EN ISO 527-2)	[%]										
Elongation at break (DIN EN ISO 527-2)	[%]	2.9	3.8	2.8	2.2	2.8	2.9	7.4	4.1	21	7
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	4,136	3,700	4,000		4,330		4,000		3,900	6,200
Flexural strength (DIN EN ISO 178)	[MPa]	137	170	150	88	126	120	209	122		
Compression modulus (EN ISO 604)	[MPa]	2,200	2,000	1,880				4,000			
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]										
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]		75.8	35.1	16.5	29.6	25.8	67.6	-		87
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]		5	4.8	3.6	2.8	3.9	-	-	13.2	5.6
Ball indentation hardness (ISO 2039-1)	[MPa]	265								240	228
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	370	368	330	330	330	330	330	330	280	280
Melting temperature (DIN 53765)	[°C]									n.a.	n.a.
Service temperature, short term	[°C]									270	270
Service temperature, long term	[°C]		-	-	-	-	-	-	-	250	250
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]										
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	4								4	
Specific heat (ISO 22007-4:2008)	[J/(g×K)]		1.04	1.13				1.04			
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]		0.22	0.53				0.22		0.29	0.60
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]		10 ¹⁶	10 ⁷	10 ³			10 ¹⁵	10 ¹⁶	10 ¹⁸	10 ¹⁷
Specific volume resistance (DIN IEC 60093)	[Ω×cm]		10 ¹⁷					10 ¹⁷	10 ¹⁷	10 ¹⁵	10 ¹³
Dielectric strength (DIN EN 60243-1)	[kV/mm]									23	
Resistance to tracking (CTI) (DIN EN 60112)	[V]										
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.12 / 0.24								0.06 / 0.13	
Resistance to hot water / bases										-	-
Resistance to weathering											
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	V0	V0	V0	V0	V0	V0

The corresponding values and information are no minimum or maximum values, but guideline values that can be used primarily for comparison purposes for material selection. These values are within the normal tolerance range of product properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes. Unless otherwise noted, these values were

determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded, cast, compression moulded and machined specimens. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without separate testing under individual circumstances.

Data sheet values are subject to periodic review, the most recent update can be found at www.ensinger-online.com

Technical changes reserved.

Material standard values

Material		TECAPEEK natural	TECAPEEK black	TECAPEEK bright red	TECAPEEK GF30 natural	TECAPEEK CF30 black	TECAPEEK PVX black	TECAPEEK ELS nano black	TECAPEEK ID blue	TECAPEEK TF10 blue	TECAPEEK MT natural
Polymer		PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK
Fillers					glass fibres	carbon fibres	carbon fibres, PTFE, graphite	CNT	detectable filler	PTFE	
Density (DIN EN ISO 1183)	[g/cm ³]	1.31	1.31	1.36	1.53	1.38	1.44	1.36	1.49	1.38	1.31
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	4,200	4,100	4,200	6,400	6,800	5,500	4,800	4,600	3,400	4,200
Tensile strength (DIN EN ISO 527-2)	[MPa]	116	100	108	105	122	84	106	111	95	116
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	116	100	108	105	122	84	106	111	95	116
Elongation at yield (DIN EN ISO 527-2)	[%]	5	3	4	3	7	3	4	4	5	5
Elongation at break (DIN EN ISO 527-2)	[%]	15	3	6	3	7	3	4	6	8	15
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	4,200	4,100	4,500	6,600	6,800	6,000	4,700	3,700	3,900	4,200
Flexural strength (DIN EN ISO 178)	[MPa]	175	171	177	164	193	142	178	166	149	175
Compression modulus (EN ISO 604)	[MPa]	3,400	3,300	3,500	4,800	5,000	4,000	3,600	4,800	3,000	3,400
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	23 / 43	22 / 41	22 / 40	29 / 52	25 / 47	23 / 44	27 / 47	25 / 46	22 / 39	23 / 43
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	75	50	33	62	28	58	72	48	n.b.
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	4									4
Ball indentation hardness (ISO 2039-1)	[MPa]	253	253	244	316	355	250	253	260	220	253
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	150	151	151	147	147	146	147	150	157	150
Melting temperature (DIN 53765)	[°C]	341	341	341	341	341	341	341	341	340	342
Service temperature, short term	[°C]	300	300	300	300	300	300	300	300	300	300
Service temperature, long term	[°C]	260	260	260	260	260	260	260	260	260	260
Thermal expansion (CLTE), 23 – 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	5	5	5	4	4	3	5	5	6	5
Thermal expansion (CLTE), 23 – 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	5	5	5	4	4	3	5	5	6	5
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.1	1.1	1.1	1.0	1.2	1.1	1.1	1.1		1.1
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.27	0.30	0.27	0.35	0.66	0.82	0.46	0.27		0.27
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁵	10 ¹²	10 ¹⁴	10 ¹⁴	10 ⁸	10 ¹¹	10 ⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ¹⁵		10 ¹⁴	10 ¹⁴	10 ¹¹	10 ¹²	10 ⁵	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]	73			36						
Resistance to tracking (CTI) (DIN EN 60112)	[V]	125									
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03
Resistance to hot water / bases		+	+	+	+	+	+	+	+	+	+
Resistance to weathering		-	-	-	-	-	-	(+)	-	-	-
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	V0	V0	V0	V0	V0	V0

Data generated directly after machining (standard climate Germany). For polyamides the values strongly depend on the humidity content.



Test specimen to DIN EN ISO 527-2

- + good resistance
- (+) limited resistance
- poor resistance (depending on concentration, time and temperature)
- n.b. not broken
- n.a. not applicable

- (a) Glass transition temperature testing according to DIN EN ISO 11357
- (b) Thermal conductivity testing according to ISO 8302
- (c) Thermal conductivity testing according to ASTM E 1530
- (d) Surface resistance testing according to ASTM D 257
- (e) No listing at UL (yellow card).
- (f) Thermal expansion (CLTE), 50 – 200 °C
- (g) Specific surface resistance and volume resistance testing according to DIN EN 61340-2-3
- (h) Dielectric strength testing according to ASTM D 149
- (i) Thermal expansion testing according to ASTM D 695

Material		TECAPEEK MT black	TECAPEEK MT blue	TECAPEEK MT green	TECAPEEK MT yellow	TECAPEEK MT bright red	TECAPEEK MT ivory	TECAPEEK MT CF30 black	TECATEC PEEK MT CW50 black	TECATEC PEEK MT CW60 black	TECAPEEK MT CLASSIX white
Polymer		PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK
Fillers								carbon fibres			
Density (DIN EN ISO 1183)	[g/cm ³]	1.31	1.34	1.32	1.38	1.36	1.42	1.42	1.49	1.61	1.4
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	4,200	4,300	4,100	4,400	4,200	4,400	6,000	53,200	54,300	4,700
Tensile strength (DIN EN ISO 527-2)	[MPa]	114	113	116	113	108	114	115	491	585	117
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	114	113	116	113	108	114	115			117
Elongation at yield (DIN EN ISO 527-2)	[%]	5	5	5	5	4	4	5			5
Elongation at break (DIN EN ISO 527-2)	[%]	13	11	17	10	6	12	5			11
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	4,100	4,300	4,200	4,300	4,500	4,400	6,000	48,900	50,900	4,400
Flexural strength (DIN EN ISO 178)	[MPa]	171	173	172	169	177	171	188	813	960	177
Compression modulus (EN ISO 604)	[MPa]	3,400	3,400	3,400	3,400	3,500	3,400	4,500	4,050	5,100	3,500
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	23 / 44	17 / 35	17 / 35	17 / 35	22 / 40	24 / 44	23 / 44			25 / 45
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	n.b.	n.b.	n.b.	50	n.b.	58			n.b.
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	5	7	4	5		4				5
Ball indentation hardness (ISO 2039-1)	[MPa]	243	248	250	257	244	250	318			263
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	151	151	151	151	151	150	146	143	165	150
Melting temperature (DIN 53765)	[°C]	341	341	341	341	341	340	341	343	380	341
Service temperature, short term	[°C]	300	300	300	300	300	300	300			300
Service temperature, long term	[°C]	260	260	260	260	260	260	260	260	260	260
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	5	5	5	5	5	5	5			5
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	5	5	5	5	5	5	5			5
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.1	1.1	1.1	1.1	1.1		1.7			1.0
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.3	0.28	0.28	0.28	0.27		0.59			0.30
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁰			10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴		10 ¹⁴	10 ¹¹			10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]										
Resistance to tracking (CTI) (DIN EN 60112)	[V]										
Miscellaneous data											
Water absorption 24h / 96h (23 °C) (DIN EN ISO 62)	[%]	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03			0.02 / 0.03
Resistance to hot water / bases		+	+	+	+	+	+	+	+	+	+
Resistance to weathering		-	-	-	-	-	-	-	-	-	-
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	V0	V0	V0	V0	V0	V0

The corresponding values and information are no minimum or maximum values, but guideline values that can be used primarily for comparison purposes for material selection. These values are within the normal tolerance range of product properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes. Unless otherwise noted, these values were

determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded, cast, compression moulded and machined specimens. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without separate testing under individual circumstances.

Data sheet values are subject to periodic review, the most recent update can be found at www.ensinger-online.com

Technical changes reserved.

Material standard values

Material		TECAPEEK T5 grey	TECAPEEK CMF white	TECAPEEK CMF grey	TECAPEEK HT black	TECAPEEK ST black	TECATRON natural	TECATRON GF40 natural	TECATRON GF40 black	TECATRON PVX black	TECASON S natural
Polymer		PEEK	PEEK	PEEK	PEK	PEKEKK	PPS	PPS	PPS	PPS	PSU
Fillers		mineral filler	ceramic	ceramic				glass fibres	glass fibres	carbon fibres, PTFE, graphite	
Density (DIN EN ISO 1183)	[g/cm ³]	1.49	1.65	1.65	1.31	1.32	1.36	1.63	1.63	1.5	1.24
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	5,700	5,500	5,500	4,600	4,600	4,100	6,500	6,500	4,600	2,700
Tensile strength (DIN EN ISO 527-2)	[MPa]	110	105	105	120	134	102	83	83	53	89
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	110	102	102	120	134	100	83	83	53	89
Elongation at yield (DIN EN ISO 527-2)	[%]	4	3	4	4	5	4	3	3	2	5
Elongation at break (DIN EN ISO 527-2)	[%]	4	4	5	5	13	4	3	3	2	15
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	5,900	5,500	5,500	4,600	4,600	4,000	6,600	6,600	4,800	2,600
Flexural strength (DIN EN ISO 178)	[MPa]	175	170	170	192	193	151	145	145	91	122
Compression modulus (EN ISO 604)	[MPa]	4,300	4,300	4,300	3,500	3,500	3,300	4,600	4,600	3,300	2,300
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	17 / 34	25 / 46	25 / 46	25 / 45	24 / 42	20 / 38	21 / 41	21 / 41	19 / 36	15 / 28
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	65	35	n.b.	n.b.	29	24	24	14	175
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	7			4	4					4
Ball indentation hardness (ISO 2039-1)	[MPa]	290	286	286	282	275	248	333	343	238	167
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	151	151	151	160	165	97	93	93	94	188
Melting temperature (DIN 53765)	[°C]	339	339	339	375	384	281	280	280	281	n.a.
Service temperature, short term	[°C]	300	300	300	300	300	260	260	260	260	180
Service temperature, long term	[°C]	260	260	260	260	260	230	230	230	230	160
Thermal expansion (CLTE), 23 – 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	4	5	5	5	5	6	4	4	5	6
Thermal expansion (CLTE), 23 – 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	4	5	5	5	5	7	5	5	6	6
Specific heat (ISO 22007-4:2008)	[J/(g×K)]		1.0	1.0			1.0	1.0	0.9	0.9	1.2
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]		0.38	0.38			0.25	0.35	0.33	0.58	0.21
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁰	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹²	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]		57		62				32		
Resistance to tracking (CTI) (DIN EN 60112)	[V]		175		200				125		
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.04	0.02 / 0.03	<0.01 / 0.01	<0.01 / 0.01	<0.01 / 0.01	<0.01/<0.01	0.06 / 0.1
Resistance to hot water / bases		+	+	+	+	+	+	+	+	+	+
Resistance to weathering		-	-	-	(+)	(+)	-	-	(+)	(+)	-
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	V0	V0	V0	V0	V0	V0

Data generated directly after machining (standard climate Germany). For polyamides the values strongly depend on the humidity content.



Test specimen to DIN EN ISO 527-2

- + good resistance
- (+) limited resistance
- poor resistance (depending on concentration, time and temperature)
- n.b. not broken
- n.a. not applicable

- (a) Glass transition temperature testing according to DIN EN ISO 11357
- (b) Thermal conductivity testing according to ISO 8302
- (c) Thermal conductivity testing according to ASTM E 1530
- (d) Surface resistance testing according to ASTM D 257
- (e) No listing at UL (yellow card).
- (f) Thermal expansion (CLTE), 50 – 200 °C
- (g) Specific surface resistance and volume resistance testing according to DIN EN 61340-2-3
- (h) Dielectric strength testing according to ASTM D 149
- (i) Thermal expansion testing according to ASTM D 695

Material		TECASON P white	TECASON P MT	TECAPEI natural	TECAFLON PVDF natural	TECANAT natural	TECANAT GF30 natural	TECAPET white	TECAPET black	TECAPET TF grey	TECADUR PET natural
Polymer		PPSU	PPSU	PEI	PVDF	PC	PC	PET	PET	PET	PET
Fillers							glass fibres			solid lubricant	
Density (DIN EN ISO 1183)	[g/cm ³]	1.31	1.31	1.28	1.78	1.19	1.42	1.36	1.39	1.43	1.39
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	2,300	2,300	3,200	2,200	2,200	4,400	3,100	3,400	3,200	3,300
Tensile strength (DIN EN ISO 527-2)	[MPa]	81	81	127	62	69	85	79	91	78	91
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	81	81	127	62	69	87	79	91	78	91
Elongation at yield (DIN EN ISO 527-2)	[%]	7	7	7	8	6	4	5	4	4	4
Elongation at break (DIN EN ISO 527-2)	[%]	50	50	35	17	90	6	10	15	6	14
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	2,300	2,300	3,300	2,100	2,300	4,500	3,200	3,400	3,300	3,400
Flexural strength (DIN EN ISO 178)	[MPa]	107	107	164	77	97	138	121	134	119	134
Compression modulus (EN ISO 604)	[MPa]	2,000	2,000	2,800	1,900	2,000	3,300	2,700	2,800	2,700	2,800
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	18 / 30	18 / 30	23 / 41	16 / 28	16 / 29	21 / 39	19 / 35	19 / 36	21 / 38	21 / 38
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	n.b.	113	150	n.b.	71	81	27	42	150
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	13	13			14		4			
Ball indentation hardness (ISO 2039-1)	[MPa]	143	143	225	129	128	190	175	195	183	194
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	218	218	216	-40	149	147	81	81	82	81
Melting temperature (DIN 53765)	[°C]	n.a.	n.a.	n.a.	171	n.a.	n.a.	244	244	249	244
Service temperature, short term	[°C]	190	190	200	150	140	140	170	170	170	170
Service temperature, long term	[°C]	170	170	170	150	120	120	110	110	110	110
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	6	6	5	16	8	5	8	8	8	8
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	6	6	5	18	8	5	10	10	10	10
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.1	1.1	1.2	1.3	1.3	1.1				
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.25	0.25	0.21	0.25	0.25	0.32				
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]		10 ¹⁴	10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]		76								
Resistance to tracking (CTI) (DIN EN 60112)	[V]		125					600			
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.1 / 0.2	0.1 / 0.2	0.05 / 0.1	<0.01/<0.01	0.03 / 0.06	0.03 / 0.05	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03	0.02 / 0.03
Resistance to hot water / bases		+	+	+	+	-	-	-	-	-	-
Resistance to weathering		-	(+)	-	+	(+)	-	-	(+)	-	-
Flammability (UL94) (DIN IEC 60695-11-10)		V0	V0	V0	V0	HB	HB	HB	HB	HB	HB

The corresponding values and information are no minimum or maximum values, but guideline values that can be used primarily for comparison purposes for material selection. These values are within the normal tolerance range of product properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes. Unless otherwise noted, these values were

determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded, cast, compression moulded and machined specimens. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without separate testing under individual circumstances.

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Technical changes reserved.

Material standard values

Material		TECADUR PBT GF30 natural	TECAMID 6 natural	TECAMID 6 MO black	TECAMID 6 GF25 black	TECAMID 6 GF30 black	TECAMID 6 ID blue	TECAMID 66 natural	TECAMID 66 MO black	TECAMID 66 GF30 black	TECAMID 66/X GF50 black
Polymer		PBT	PA 6	PA 6	PA 6	PA 6	PA 6	PA 66	PA 66	PA 66	PA 66
Fillers		glass fibres		MoS ₂	glass fibres	glass fibres	detectable filler		MoS ₂	glass fibres	glass fibres
Density (DIN EN ISO 1183)	[g/cm ³]	1.46	1.14	1.14	1.33	1.36	1.24	1.15	1.15	1.34	1.61
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	3,400	3,300	3,300	5,100	5,700	3,600	3,500	3,200	5,500	8,700
Tensile strength (DIN EN ISO 527-2)	[MPa]	46	79	84	96	98	80	85	84	91	115
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	46	78	82	96	98	80	84	83	91	115
Elongation at yield (DIN EN ISO 527-2)	[%]	5	4	5	9	4	4	7	10	8	2
Elongation at break (DIN EN ISO 527-2)	[%]	6	130	37	11	5	21	70	40	14	2
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	3,400	2,900	3,100	4,900	5,200		3,100	3,100	4,700	9,000
Flexural strength (DIN EN ISO 178)	[MPa]	78	100	110	143	140		110	114	135	200
Compression modulus (EN ISO 604)	[MPa]	2,800	2,700	2,900	3,900	4,200		2,700	2,700	4,100	6,200
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	20 / 38	24 / 41	17 / 32	21 / 42	21 / 42		20 / 35	20 / 38	25 / 46	28 / 56
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	37	n.b.	n.b.	78	60	n.b.	n.b.	n.b.	97	
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]		7	5			4	5	5		
Ball indentation hardness (ISO 2039-1)	[MPa]	190	155	160	230	232		175	168	216	
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]		45	51	49	49	45	47	52	48	78
Melting temperature (DIN 53765)	[°C]	224	221	220	217	218	220	258	253	254	256
Service temperature, short term	[°C]	200	160	160	180	180	160	170	170	170	200
Service temperature, long term	[°C]	110	100	100	100	100	100	100	100	110	130
Thermal expansion (CLTE), 23 – 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	8	12	8	7	6		11	10	5	4
Thermal expansion (CLTE), 23 – 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	10	13	8	8	6		12	10	5	5
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.2	1.6	1.6	1.4	1.3		1.5	1.5	1.2	
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.33	0.37	0.37	0.40	0.41		0.36	0.36	0.39	
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹³	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]		31	30		32			35	35	
Resistance to tracking (CTI) (DIN EN 60112)	[V]		600	600		475			600	475	
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.02 / 0.04	0.3 / 0.6	0.3 / 0.6	0.2 / 0.3	0.2 / 0.3	0.3 / 0.6	0.2 / 0.4	0.2 / 0.4	0.1 / 0.2	0.1 / 0.2
Resistance to hot water / bases		-	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	-
Resistance to weathering		-	-	(+)	(+)	(+)	-	-	(+)	(+)	(+)
Flammability (UL94) (DIN IEC 60695-11-10)		HB	HB	HB	HB	HB	HB	HB	HB	HB	HB

Data generated directly after machining (standard climate Germany). For polyamides the values strongly depend on the humidity content.



Test specimen to DIN EN ISO 527-2

- + good resistance
- (+) limited resistance
- poor resistance (depending on concentration, time and temperature)
- n.b. not broken
- n.a. not applicable

- (a) Glass transition temperature testing according to DIN EN ISO 11357
- (b) Thermal conductivity testing according to ISO 8302
- (c) Thermal conductivity testing according to ASTM E 1530
- (d) Surface resistance testing according to ASTM D 257
- (e) No listing at UL (yellow card).
- (f) Thermal expansion (CLTE), 50 – 200 °C
- (g) Specific surface resistance and volume resistance testing according to DIN EN 61340-2-3
- (h) Dielectric strength testing according to ASTM D 149
- (i) Thermal expansion testing according to ASTM D 695

Material		TECAMID 66 CF20 black	TECAMID 66 HI brown	TECAMID 66 LA natural	TECAMID 46 red brown	TECAMID 12 natural	TECAST T natural	TECAST T MO black	TECAST L natural	TECAST L black	TECAST L yellow
Polymer		PA 66	PA 66	PA 66	PA 46	PA 12	PA 6 C	PA 6 C	PA 6 C	PA 6 C	PA 6 C
Fillers		carbon fibres	heat stabilized	lubricant				MoS ₂	oil	oil	oil
Density (DIN EN ISO 1183)	[g/cm ³]	1.23	1.15	1.11	1.19	1.02	1.15	1.15	1.13	1.14	1.14
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	5,100	3,400	3,100	3,300	1,800	3,500	3,200	2,900	3,100	3,100
Tensile strength (DIN EN ISO 527-2)	[MPa]	104	89	76	106	53	83	82	69	70	70
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	104	72	76	106	53	80	80	66	68	68
Elongation at yield (DIN EN ISO 527-2)	[%]	12	7	11	21	9	4	4	8	4	4
Elongation at break (DIN EN ISO 527-2)	[%]	13	25	14	32	200	55	55	50	50	50
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	4,300	3,300	2,800	3,300	1,700	3,200	3,000	2,900	2,900	2,900
Flexural strength (DIN EN ISO 178)	[MPa]	135	112	102	132	68	109	102	95	95	95
Compression modulus (EN ISO 604)	[MPa]	3,800	2,900	2,400	2,800	1,600	2,900	2,800	2,700	2,700	2,700
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	16 / 33	14 / 29	20 / 35	20 / 35	13 / 24	19 / 36	22 / 38	19 / 35	21 / 37	21 / 37
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	116	n.b.	37	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]		5		9	7	4	4	5	5	6
Ball indentation hardness (ISO 2039-1)	[MPa]	200	191	145	187	105	170	170	150	150	150
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	48	57	54	72	37	40	43	48	42	42
Melting temperature (DIN 53765)	[°C]	251	263	261	299	180	215	217	218	216	216
Service temperature, short term	[°C]	170	180	120	220	150	170	170	170	170	170
Service temperature, long term	[°C]	100	115	90	130	110	100	100	100	100	100
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	9	12	11	13	15	12	11	13	13	13
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	10	12	12	13	16	12	11	13	13	13
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.4	1.5	1.6	1.7	1.8	1.7	1.6	1.7	1.7	1.7
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.72	0.36	0.36	0.37	0.30	0.38	0.33	0.37	0.37	0.37
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁰	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ⁹	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]									21	
Resistance to tracking (CTI) (DIN EN 60112)	[V]									600	
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.1 / 0.3	0.2 / 0.3	0.2 / 0.4	0.4 / 0.7	0.04 / 0.07	0.2 / 0.4	0.2 / 0.5	0.2 / 0.4	0.2 / 0.4	0.2 / 0.4
Resistance to hot water / bases		(+)	(+)	(+)	(+)	+	(+)	(+)	(+)	(+)	(+)
Resistance to weathering		(+)	-	-	-	-	-	(+)	-	(+)	-
Flammability (UL94) (DIN IEC 60695-11-10)		HB	HB	HB	V2	HB	HB	HB	HB	HB	HB

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determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded, cast, compression moulded and machined specimens. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without separate testing under individual circumstances.

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Technical changes reserved.

Material standard values

Material		TECAGLIDE green	TECARIM 1500 yellow	TECAFORM AH natural	TECAFORM AH black	TECAFORM AH GF25 natural	TECAFORM AH ELS black	TECAFORM AH SD natural	TECAFORM AH ID grey	TECAFORM AH LA blue	TECAFORM AH AM natural
Polymer		PA 6 C	PA 6 C	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C	POM-C
Fillers		solid lubricant	elastomer			glass fibres	conductive carbon black	antistatic agent	detectable filler	solid lubricant	antimicrobial
Density (DIN EN ISO 1183)	[g/cm ³]	1.13	1.11	1.41	1.41	1.59	1.41	1.35	1.49	1.36	1.41
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	3,200	2,200	2,800	2,800	4,200	1,800	1,300	3,200	2,100	2,900
Tensile strength (DIN EN ISO 527-2)	[MPa]	76	53	67	67	51	42	39	68	48	67
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	76	53	67	67	51	42	39	68	48	69
Elongation at yield (DIN EN ISO 527-2)	[%]	14	13	9	9	9	11	23	8	9	7
Elongation at break (DIN EN ISO 527-2)	[%]	18	58	32	32	12	11	23	10	9	18
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	3,100	2,200	2,600	2,600	4,100	1,500	1,200	3,100	2,000	2,800
Flexural strength (DIN EN ISO 178)	[MPa]	103	73	91	91	88	56	46	100	70	93
Compression modulus (EN ISO 604)	[MPa]	2,500	2,100	2,300	2,300	3,600	1,500	1,100	2,400	1,800	2,200
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	18 / 34	14 / 26	20 / 35	20 / 35	23 / 39	16 / 25	12 / 19	17 / 31	16 / 27	18 / 31
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	n.b.	n.b.	150	36	74	n.b.	59	27	102
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	4	16	8	6			9	11		
Ball indentation hardness (ISO 2039-1)	[MPa]	159	95	165	165	180	96	74	174	120	163
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	45	53	-60	-60	-60	-60	-60	-60	-60	-60
Melting temperature (DIN 53765)	[°C]	218	216	166	166	170	169	165	169	166	166
Service temperature, short term	[°C]	130	160	140	140	140	140	140	140	140	140
Service temperature, long term	[°C]	100	95	100	100	100	100	100	100	100	100
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	11	13	13	13	8	13	16	13	13	13
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	12	13	14	14	8	14	17	14	14	14
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.7	1.7	1.4	1.4	1.2	1.3	1.6	1.3	1.4	1.4
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.38	0.32	0.39	0.39	0.47	0.46	0.30	0.39	0.39	0.39
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ⁴	10 ¹¹	10 ¹³	10 ¹⁴	
Specific volume resistance (DIN IEC 60093)	[Ω×cm]	10 ¹⁴	10 ¹⁴	10 ¹³	10 ¹⁴	10 ¹⁴	10 ⁵	10 ⁹		10 ¹⁴	
Dielectric strength (DIN EN 60243-1)	[kV/mm]			49	38			5			
Resistance to tracking (CTI) (DIN EN 60112)	[V]			600	600			600			
Miscellaneous data											
Water absorption 24 h / 96 h (23 °C) (DIN EN ISO 62)	[%]	0.2 / 0.3	0.6 / 1.2	0.05 / 0.1	0.05 / 0.1	0.07 / 0.2	0.05 / 0.2	0.9 / 1.8	0.05 / 0.1	0.05 / 0.1	0.05 / 0.1
Resistance to hot water / bases		(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
Resistance to weathering		-	-	-	(+)	-	(+)	-	-	-	-
Flammability (UL94) (DIN IEC 60695-11-10)		HB	HB	HB	HB	HB	HB	HB	HB	HB	HB

Data generated directly after machining (standard climate Germany). For polyamides the values strongly depend on the humidity content.



Test specimen to DIN EN ISO 527-2

- + good resistance
- (+) limited resistance
- poor resistance (depending on concentration, time and temperature)
- n.b. not broken
- n.a. not applicable

- (a) Glass transition temperature testing according to DIN EN ISO 11357
- (b) Thermal conductivity testing according to ISO 8302
- (c) Thermal conductivity testing according to ASTM E 1530
- (d) Surface resistance testing according to ASTM D 257
- (e) No listing at UL (yellow card).
- (f) Thermal expansion (CLTE), 50 - 200 °C
- (g) Specific surface resistance and volume resistance testing according to DIN EN 61340-2-3
- (h) Dielectric strength testing according to ASTM D 149
- (i) Thermal expansion testing according to ASTM D 695

Material		TECAFORM AH MT	TECAFORM AD natural	TECAFORM AD black	TECAFORM AD AF natural	TECAPRO MT white	TECAFINE PMP natural	TECANYL 731 grey	TECANYL GF30 natural	TECANYL MT	TECARAN ABS grey
Polymer		POM-C	POM-H	POM-H	POM-H	PP	PMP	PPE	PPE	PPE	ABS
Fillers					PTFE	heat stabilized			glass fibres		
Density (DIN EN ISO 1183)	[g/cm ³]	1.41	1.43	1.43	1.49	0.93	0.83	1.1	1.3	1.04 - 1.10	1.04
Mechanical properties											
Modulus of elasticity (tensile test) (DIN EN ISO 527-2)	[MPa]	2,800	3,400	3,600	3,000	2,000	1,000	2,400	4,100	2,400	1,700
Tensile strength (DIN EN ISO 527-2)	[MPa]	69	79	80	53	34	26	57	73	65	32
Tensile strength at yield (DIN EN ISO 527-2)	[MPa]	70	79	80	53	34	26	57	73	67	32
Elongation at yield (DIN EN ISO 527-2)	[%]	15	37	32	8	5	6	15	5	4	3
Elongation at break (DIN EN ISO 527-2)	[%]	30	45	43	8	67	67	22	5	8	49
Modulus of elasticity (flexural test) (DIN EN ISO 178)	[MPa]	2,800	3,600	3,600	3,000	1,800	800	2,500	3,900	2,400	1,600
Flexural strength (DIN EN ISO 178)	[MPa]	94	106	106	85	54	31	85	116	95	49
Compression modulus (EN ISO 604)	[MPa]	2,200	2,700	2,800	2,400	1,600	1,000	2,100	3,300	2,100	1,400
Compressive strength (1% / 2%) (EN ISO 604)	[MPa]	18 / 32	19 / 33	22 / 38	19 / 33	16 / 26	11 / 19	18 / 33	23 / 41	17 / 30	15 / 26
Impact strength (Charpy) (DIN EN ISO 179-1eU)	[kJ/m ²]	n.b.	n.b.	n.b.	n.b.	140	17	69	37	70	n.b.
Notched impact strength (Charpy) (DIN EN ISO 179-1eA)	[kJ/m ²]	9	15	14	25						34
Ball indentation hardness (ISO 2039-1)	[MPa]	158	185	185	166	100	58	146	205	140	74
Thermal properties											
Glass transition temperature (DIN 53765)	[°C]	-60	-60	-60	-60	-10		145	150	174	104
Melting temperature (DIN 53765)	[°C]	169	182	182	179	165		n.a.	n.a.	n.a.	
Service temperature, short term	[°C]	140	150	150	150	140	170	110	110	110	100
Service temperature, long term	[°C]	100	110	110	110	100	120	85	85	95	75
Thermal expansion (CLTE), 23 - 60 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	13	12	11	12	13		8	4	8	
Thermal expansion (CLTE), 23 - 100 °C (DIN EN ISO 11359-1;2)	[10 ⁻⁵ K ⁻¹]	14	13	11	13	14		8	4	8	
Specific heat (ISO 22007-4:2008)	[J/(g×K)]	1.4	1.3	1.3	1.3			1.3	1.2	1.3	
Thermal conductivity (ISO 22007-4:2008)	[W/(m×K)]	0.39	0.43	0.43	0.46			0.21	0.28	0.21	
Electrical properties											
Specific surface resistance (DIN IEC 60093)	[Ω]	10 ¹²	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Specific volume resistance (DIN IEC 60093)	[Ω×cm]			10 ¹⁴		10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric strength (DIN EN 60243-1)	[kV/mm]			38							
Resistance to tracking (CTI) (DIN EN 60112)	[V]			600							
Miscellaneous data											
Water absorption 24h / 96h (23 °C) (DIN EN ISO 62)	[%]	0.05 / 0.1	0.05 / 0.1	0.05 / 0.1	0.05 / 0.1	0.01 / 0.02	<0.01/<0.01	0.02 / 0.04	0.01 / 0.02	0.02 / 0.04	0.07 / 0.2
Resistance to hot water / bases		(+)	-	-	-	(+)	(+)	(+)	(+)	(+)	-
Resistance to weathering		-	-	-	-	-	-	-	-	-	-
Flammability (UL94) (DIN IEC 60695-11-10)		HB	HB	HB	HB	HB	HB	HB	HB	HB	HB

The corresponding values and information are no minimum or maximum values, but guideline values that can be used primarily for comparison purposes for material selection. These values are within the normal tolerance range of product properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes. Unless otherwise noted, these values were

determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded, cast, compression moulded and machined specimens. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without separate testing under individual circumstances.

Data sheet values are subject to periodic review, the most recent update can be found at www.ensinger-online.com

Technical changes reserved.

Chemical resistance

Important criteria for testing chemical resistance are temperature, the concentration of the agents, the residence time and the mechanical load. The resistance against various chemicals is listed in the following table. These details correspond to the present state of our knowledge and are meant to provide information about our products and their applications. They do not mean that the chemical resistance

of products or their suitability for a particular purpose is guaranteed in a legally binding way. Any existing commercial proprietary rights are to be taken into account. For specific applications it is recommended that suitability is first established. Standard testing is performed in normal climatic conditions 23/50 according to DIN EN ISO 291.

	TECASINT (PI)	TECAPEEK HT, ST (PEK, PEKEKK)	TECAPEEK (PEEK)	TECATRON (PPS)	TECAPEI (PEI)	TECASON E (PES)	TECASON P (PPSU)	TECASON S (PSU)	TECAFLON PTFE (TF)	TECAFLON PVDF (PVDF)	TECAMID G (PAG)	TECAMID 46, 66 (PA46, 66)	TECAMID 11, 12 (PA11, 12)	TECARIM (PAG C + elastomer)	TECANAT (PC)	TECAPET (PET), TECADUR PBT (PBT)	TECAFORM AH (POM-C)	TECAFORM AD (POM-H)	TECAFINE PP (PP)	TECAFINE PE (PE)	TECARAN ABS (ABS)	TECANYL (PPE)
Acetamide 50%			+						+	+	+	+	+	+			+	+		+	+	
Acetone	+	+	+	+	-	-	-	-	+	o	+	+	o	+	-	o	+	+	+	+	-	-
Formic acid, aqueous solution 10%	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	o	-	-	+	+	+	+
Ammonia solution 10%	-	+	+	+	-	o		o	+	+	o	o	o	o	-	-	+	o	+	+	+	+
Anone					-				+	o	+	+	+	+	-			+	+	o		
Benzene	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	o	o	o	-
Bitumen	+								+	+	+	o			-		+	+	o	+		
Boric acid, aqueous solution 10%		+	o		+		o	+	+	-	-	-	-	+	-	-	-	-	+	+	+	
Butyl acetate	+	+	+	-	-	-	-	+	-	+	+	+	+	+	-	-	+	+	o	o	-	
Calcium chloride, solution 10%	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	o	+	+	+	
Chlorobenzene	+		+	o	o	-	-	-	+	o	+	+	+	+	-	-	+	+	o	-	-	
Chloroform	+	+	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	o	-	-	-
Cyclohexane	+	+	+	+	+	+	+	o	+	+	+	+	+	+	-	+	+	+	+	+	+	+
Cyclohexanone	+	+	+	-	-	-	-	+	o	+	+	+	+	+	-	-	+	+	+	+	-	+
Diesel oil	+	+	+	+	+	+	+	+	+	+	+	+	+	+	o	+	+	+	o	+	+	+
Dimethyl formamide	o	+	+	-	-	-	-	+	-	+	+	o	+	-	+	+	o	+	+	-		
Diethyl phthalate			+	+	o	+	+	o	+	o	+	+	+	+	o	+	+	+	+	+	+	+
Dioxane	+	+	+	+	o	-	-	+	+	+	+	+	+	+	-	o	o	o	+	+	o	
Acetic acid, concentrated	o	o	+	-	+	+	-	+	o	-	-	-	-	-	-	-	-	-	o	o	-	+
Acetic acid, aqueous solution 10%	+	+	+	+	+	+	+	+	+	-	-	o	-	+	o	+	o	+	+	+	+	+
Acetic acid, aqueous solution 5%	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	o	+	+	+	+
Ethanol 96%	+	+	+	+	+	+	+	+	+	+	o	o	o	o	o	+	+	+	+	+	+	+
Ethyl acetate	+	+	+	o	-	o	-	+	o	+	+	+	+	+	-	o	+	+	+	+	+	+
Ethyl ether	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	
Ethylene chloride	+			+				+	+	+	+	o	+	-	-	-	-	-	+	o	-	
Hydrofluoric acid, 40%			-	o	-	-	-	o	+	-	-	-	-	-	-	-	-	-	+	+	o	+
Formaldehyde, aqueous solution 30%		+	+	+	+	+	+	+	+	o	o	o	o	+	+	+	+	+	+	+	+	+
Formamide			+					+	+	+	+	o	+	+	+	o						
Freon, Frigen, liquid	+	-	-	+	+		+	+	+	+	+	+	+	+	-	+	+	+	-	o	o	+
Fruit juices	+	+	+	+	+	+	+	+	+	+	+	+	+	+	o	+	+	o	+	+	+	+
Glykol	+	+	+	+	o	+	+	+	+	+	+	+	+	+	+	o	o	o	+	+	+	+
Glysantine, aqueous solution 40%	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Glycerine	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
Urea, aqueous solution	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Heating oil	+	+	+	+	+	+	o	+	+	+	+	+	+	+	o	+	+	+	o	+	+	+
Heptane, Hexane	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+
Iso-octane	+	+	+	+	+	+	o	+	+	+	+	+	+	+			+	+	+	+	+	+
Isopropanol	+		+	+	+	+	o	+	+	+	+	o	+	-	o	+	+	+	+	o	+	+
Iodine solution, alcohol solution	+	o				+	o	+	+	-	-	-	-	-	-		o	+	+	o	+	
Potassium lye, aqueous 50%	-	+	+			+	+	o	+	o	o	o	o	o	-	-	+	-	+	+	+	+
Potassium lye, aqueous 10%	o	+	+	o	+	+	+	+	+	o	+	+	+	+	-	-	+	-	+	+	+	+
Potassium dichromate, aqueous solution 10%	-								+	+	+	+	o		+	+	+	o	+	+	+	+

+ resistant o limited resistance - not resistant (also dependent on concentration, time and temperature)

	TECASINT (PI)	TECAPEEK HT, ST (PEK, PEKEKK)	TECAPEEK (PEEK)	TECATRON (PPS)	TECAPEI (PEI)	TECASON E (PES)	TECASON P (PPSU)	TECASON S (PSU)	TECAFLON PTFE (TF)	TECAFLON PVDF (PVDF)	TECAMID 6 (PA6)	TECAMID 46, 66 (PA46, 66)	TECAMID 11, 12 (PA11, 12)	TECARIM (PA6 C + elastomer)	TECANAT (PC)	TECAPET (PET), TECADUR PBT (PBT)	TECAFORM AH (POM-C)	TECAFORM AD (POM-H)	TECAFINE PP (PP)	TECAFINE PE (PE)	TECARAN ABS (ABS)	TECANYL (PPE)	
Potassium permanganate, aqueous solution 1%	+	+	+	+	+		+	+	+	+	-	-	-	-	+	+	+	+	+	+	0	+	
Cupric sulphate, 10%	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+
Linseed oil	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Methanol	+		+	+	0	+	0	0	+	0	+	+	0	+	-	+	+	+	+	+	0	+	
Methyl ethyl ketone	+	+	+	+	-	-	0	-	+	0	+	+	+	+	-	0	0	0	0	0	-	-	
Methylene chloride	+	+	0		-	-	-	-	+	+	0	0	-	0	-	-	0	0	-	0	-	-	
Milk	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Lactic acid, aqueous solution 90%	+		+	+	+	0			+	+	-	-	0	-	+	+	+	-	+	+	-	-	
Lactic acid, aqueous solution 10%	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+
Sodium bisulphite, aqueous solution 10%	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+
Sodium carbonate, aqueous solution 10%	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sodium chloride, aqueous solution 10%	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+	
Sodium nitrate, aqueous solution 10%	+	+	+						+	+	+	+	+	+	0	+	+	+	+	+	+	+	
Sodium thiosulphate 10%		+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Soda lye, aqueous 5%	0		+	+	0	+	+	+	+	0	+	+	+	+	-	0	+	-	+	+	+	+	+
Soda lye, aqueous 50%	-	+	+	+	-	+	+	+	0	0	0	0	0	0	-	-	+	-	+	+	+	+	+
Nitrobenzene	+		0	0	-				+	0	-	-	-	-	-	0	0	0	+	+	-	-	
Oxalic acid, aqueous solution 10%	+	+	+	+		+	+	+	+	+	0	0	0	0	+	+	-		+	+	+	+	+
Ozone	0	+					+	+	+	+	-	-	-	-	+	0	-	-		0			
Paraffin oil	+		+	+	+	+	+		+	+	+	+	+	+	-	+	+	+	+	+	+	+	+
Perchloroethylene	+	+	+	+	-	0	-	+	+	0	0	-	0	-	0	0	0	-	0	-	0	-	+
Petroleum	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+
Phenol, aqueous solution	+		0	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	+	0	+	+
Phosphoric acid, concentrated	0	+	+	+			+	+	+	-	-	-	-		+			+	+	+	+	+	+
Phosphoric acid, aqueous solution 10%	0	+	+	+	+		+	+	+	+	-	-	-	-	+	+	0	-	+	+	+	+	+
Propanol	+	+	+	+			+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
Pyridine	-	+	0	-	-				+	0	+	+	0	+	-		0	0	0	0	-		
Salicylic acid	+		-						+	+	+	+	+	+		0	-			+	+		
Nitric acid, aqueous solution 2%	+	+	+	+	+	+	+	+	+	+	-	-	-	-	0	+	-	-	+	+	+	+	-
Hydrochloric acid, aqueous solution 2%	+	+	+	+	+	+	+	+	+	+	-	0	-	+	+	+	-	-	+	+	+	+	+
Hydrochloric acid, aqueous solution 36%	-	+	+	0	+	+	0			-	-	-	0	-	-	-	-	-	+	+	+	+	+
Sulphur dioxide	+		+	+	0				+	+	+	+	+	+	-	+	+	+	0	0	-		
Sulphuric acid, concentrated 98%	-	-	-	+	-	-	-	-	+	0	-	-	-	-	-	-	-	-	+	0	-	-	-
Sulphuric acid, aqueous solution 2%	+	+	+	+	+	+	+	+	+	+	-	-	-	-	+	+	+	-	+	+	+	+	+
Hydrogen sulphide, saturated		+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+
Soap solution, aqueous solution	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Silicone oils	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Soda solution, aqueous solution 10%	0								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Edible fats, Edible oils	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Styrene	+	+							+	0	+	+	+	+	-	0	+	+	0	0	-		-
Tar	+	+		+	+	+			+	0	0	0	0		+	+	+	+					
Carbon tetrachloride	+		+	+	+	0	-	+	+	+	+	-	+	-	+	0	0	-	-	-	-	-	-
Tetrahydrofurane	+	+	+	+	-	-			+	0	+	+	+	+	-	0	0	0	0	0	-		
Tetralin	+	+							+	+	+	+	+	-	+	0							
Toluene	+	+	+	0	-	0	-	+	+	+	+	+	+	-	0	+	0	+	0	+	0	-	-
Transformer oil	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+
Triethanolamine	-		0	0					+	0	+	+	+	+	-	+	+	-	+	+	+	+	+
Trichloroethylene	+	+	+	0	-	-	-	+	+	0	0	0	0	-	-	-	-	0	0	-	-		
Vaseline	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+
Wax, molten	+	+	+		+	+			+	+	+	+	+	+	+	+	+	+	0	0			+
Water, cold	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Water, warm	-	+	+	+	+	+	+	+	+	0	0	0	0	0	-	0	-	0	0	0	+	+	+
Hydrogen peroxide, aqueous solution 30%	-	0	0		+	+	+	+	0	-	-	-	-	-	+	+	-	-	+	+	+	+	+
Hydrogen peroxide, aqueous solution 0,5%	+	+	+		+	+	+	+	+	-	-	-	-	-	+	+	+	0	+	+	+	+	+
Wine, Brandy	+	+			+	+	+	+	+	0	0	0	0	0	+	+	+	+	+	+	+	+	+
Tartaric acid	+	+	+		+				+	+	+	+	+	+	+	+	0	0	+	+	+	+	+
Xylene	+	+	+	+	-	0	0	-	+	+	+	+	0	+	-	0	+	+	-	-	-	-	-
Zink chloride, aqueous solution 10%	+	+	+	+	+	+	+	+	+	0	0	0	0	0	+	+	+	-	+	+	+	+	+
Citric acid, aqueous solution 10%	+	+	+		+	+	+	0	+	+	0	0	0	0	+	+	0	-	+	+	+	+	+

+ resistant o limited resistance - not resistant (also dependent on concentration, time and temperature)

Important notes on the Ensinger product range

You can order semi-finished products with alternative fillers and reinforcing agents and other filler contents than specified (e.g. with bronze, talcum, MoS₂, graphite, mica, PTFE, PE, wax or silicone oil, etc.).

Colours are also possible. We can naturally also extrude plastics not listed here for you. If no alternative colours are given, Ensinger plastics are produced in their natural colour.

For plates with a thickness from 0,5 to 4 mm and for our materials SINTIMID and TECAST, please refer to the tables for different stock sizes. Extruded heavy wall tubes can be supplied up to 500 mm outside diameter, centrifugally cast polyamide tubes up to 710 mm, compression moulded rings up to 2,070 mm. Other delivery lengths, sections and discs are also available. Please let us have your enquiry. Rods, heavy and thin wall tubes can also be supplied with outside diameters ground to other special dimensions. Intermediate sizes or different tolerances can also be supplied.

Semi-finished product tolerances conform to the following DIN standards: DIN EN 15860.

Our technical terms of supply are based on DIN standards, e.g. DIN EN 15860. Please note that modified materials are not standard and that the tolerances quoted by us should be used as a guide only. We reserve the right to incorporate modifications in line with technical developments.

Publication of this brochure supercedes and invalidates all previous issues. You can find current changes at www.ensinger-online.com.

Exclusion of liability

Our information and statements do not constitute a promise or guarantee whether expressed or inferred. They are in accordance with the present state of our knowledge and are intended to provide information about our products and the possibilities for their use. Any information supplied is therefore not intended as a legally binding assurance or guarantee of the chemical resistance, the nature of the products or the marketable nature of the goods.

Suitability for the end use of the products is influenced by various factors such as choice of materials, additions to the material, design of shaped parts and tools, and processing or environmental conditions. Unless otherwise indicated, the measured values are guideline values which are based on laboratory tests under standardized conditions. The information provided does not, alone, form any sufficient basis for component or tool design. The decision as to the suitability of a particular material or procedure or a particular component and tool design for a concrete purpose is left exclusively to the customer in question. Suitability for a specific purpose or a particular use is not assured or guaranteed on a legally binding basis, unless we have been informed in writing about the specific purpose and conditions of use and we have confirmed in writing that our product is suitable for this purpose within the conditions notified.

The nature of our products conform to statutory provisions valid in Germany at the time of the transfer of risk, in so far as these statutory provisions contain regulations regarding the nature of these products specifically. The customer must expressly point out in writing that he intends to export our products – after processing or installation if applicable – only then will we confirm the suitability for export expressly in writing and also ensure compliance with the export regulations of the European Union, its member states, the other states who are signatory to the agreement on the European Economic Area (Norway, Iceland, Liechtenstein) and Switzerland and the USA. We are not obliged to take any steps to comply with the statutory regulations of other states.

We are responsible for ensuring that our products are free from any rights or claims by third parties based on commercial or other intellectual property (patents, patented designs, registered designs, authors' rights and other rights). This obligation applies for Germany; it also applies for the other member states of the European Union and the other states who are signatory to the agreement on the European Economic Area and Switzerland and the USA if the customer expressly points out to us in writing that he intends to export our products – after processing or installation if applicable – and we expressly confirm in writing that the products can be exported. We will not accept any liability for states other than those listed.

We reserve the right to make changes to the design or form, deviations in colour and changes to the scope of delivery or service in so far as the changes or deviations are reasonable for the customer whilst taking our interests into account.

Our products are not destined for use in medical and dental implants.

PEEK-CLASSIX® and Invibio® are registered trade marks of Invibio Ltd.

VICTREX® is a registered trademark of Victrex Manufacturing Ltd.

Ensinger®, TECA®, TECADUR®, TECAFLON®, TECAFORM®, TECAM®, TECAMID®, TECANAT®, TECANYL®, TECAPEEK®, TECAPET®, TECAPRO®, TECASINT®, TECASON®, TECAST®, TECATRON® are registered trade marks of Ensinger GmbH.

TECATOR® is a registered trade mark of Ensinger Inc.

General terms of delivery of Ensinger GmbH

I. Scope, Rejection of external GDC

1st We provide goods and services solely on the basis of these General Terms of Delivery, no matter whether the case in question is based on a purchase agreement, work agreement or factory supply contract or any other contractual relationship. This also applies for future transactions.

2nd We only agree to the inclusion of the General Terms and Conditions of our customers if we have expressly confirmed them in writing.

II. Technical Documentation, Moulds and Tools

1st If we send the customer technical documentation and specifications on our products, such as diagrams or technical drawings, then the customer is only allowed to use these for the purpose we intended and is not permitted to copy or give third parties access to them apart from government authorities and courts. We retain the title and copyright of such documentation. As requested by us, the customer has to return them to us immediately free of charge.

2nd Providing no alternative agreement has been reached, moulds and any other tools remain our property, even if the customer bears the cost of them.

III. Material provision

If the customer has to provide materials, then these are to be supplied by him on time, at his risk and expense with an appropriate quantity surplus of at least 5% and of a quality suitable for its purpose and specification. If the customer provides too little or defective material or provides it late, then he is responsible for the additional costs resulting from this including those resulting from interruption in production, with the exception of cases of force majeure.

IV. Confirmation of order

1st The contract is made binding by our confirmation of order in so far as we confirm the transaction directly, by whatever means, after oral, written or telephonic negotiations and the customer is a commercial entity or, as an independent trader, does not only play a minor part in business life and concludes the transaction within the operations of his company.

2nd This does not apply if we could not expect customer's consent or customer objects to our confirmation immediately.

V. Prices and Price Increases

1st Unless our prices and charges are agreed as fixed on ordering, our prices or remuneration rates shall be those valid on the day of delivery.

2nd Our prices are set ex works and not including VAT. Packaging, transport and other additional services (such as customs clearance) will be charged separately.

3rd For subsequent orders we are not bound by price agreements for preceding orders.

4th If part-deliveries are agreed to be delivered within a certain period of time or on certain dates or to be called off by the customer, then once 4 months after placing the order has passed, we reserve the right to increase the price for deliveries in accordance with our current pricing policy.

5th If the order is not executed within a year from it being placed, and this delay is not due to circumstances that are our responsibility, we reserve the right to increase the price with the customer to the same extent and to deliver the goods to complete the order and receive payment for the same.

VI. Terms of payment, offsetting

1st On complete receipt of payment within 10 days of the invoice date, we will grant a 2% discount on the amount invoiced deducting expenses listed in the invoice (e.g. transport).

2nd If payment is delayed, interest of 5 percent points above the ECB base rate, or if the customer is a trading company or business, 8 percent point above the ECB base rate, shall be paid on our remuneration. This shall not affect our claim for further damages.

3rd We accept bills of exchange and cheques only for payment purposes. The customer bears the cost of discounting and collection. In the case of payment by bill, we will not grant any cash discount.

4th Payments are only effective when the sum of money is finally at our disposal. The customer may only offset undisputed or legally agreed liabilities against payments due to us under this contract.

VII. Performance time, delay, retention, place of performance, part services

1st Delivery times do not start until we have agreed with the customer on all details of execution and all conditions for the transaction. Delivery times do not begin until the materials and technical documentation to be provided by the customer have been received, including all authorisations, technical specifications and approval by the customer. An agreed delivery date is delayed by the period of time by which these prerequisites are also delayed.

2nd If our services are provided late, we are not considered to be in default as long as the delay is based on circumstances which we could not have predicted or prevented given a reasonable level of care and which we cannot overcome by taking reasonable measures.

3rd As long as the customer does not fulfil an obligation arising from the business relations, we have the right to defer our performance.

4th If the contract is a commercial transaction for the customer, he may only retain payment for the goods or services if we violate our obligations under the contract by gross negligence or our services are seriously deficient.

5th Placement and fulfilment for our performance is the supplier's plant in Nuffingen.

6th We have the right to partial performance.

VIII. Bearing the Risk, Dispatch and Receipt

1st The risk for the goods is passed to the customer at the latest on dispatch of the goods to the customer. This also applies if we bear the transport costs for delivery. We are not obliged to insure the goods against in transit damage. If requested by the customer, we will insure the consignment against theft, transport damage as well as other insurable risks but the customer on placing the order must request this.

2nd If dispatch is delayed for reasons beyond our control, then the risk for the goods is passed to the customer as soon as the goods are ready to dispatch.

3rd The customer is to take delivery of the goods supplied, even if the goods are damaged, without affecting the customer's statutory rights. Defective goods are to be returned to us should we require it.

IX. Transport damage

The customer must give notification of damage caused in transport or losses immediately, or within twenty four hours of receipt of goods, and must leave the consignment for inspection to be viewed as soon as possible. This also applies if the transport damage does not become apparent until the goods are unpacked or at a later date.

X. Notice of defects and guarantee

1st The customer must notify us of obvious defects in our performance within a week of receipt of the same; if he misses this deadline, our performance shall be deemed to be in accordance with the contract. If the contract is a commercial transaction for the customer, then Clauses 377, 381 Para. 2 of the Commercial Code shall apply, even if a Quality Assurance Agreement has been concluded with the customer.

2nd If our performance is deficient on transfer of risk, we shall meet this obligation subsequently, either, as we choose, by repairing the defect or by supplying an item free from defects in exchange for the defective item. Replaced parts become our property. If the attempt to meet this obligation fails, the customer may reduce payment to us or, as he chooses, withdraw from the contract. If a defect is maliciously concealed or if a guarantee is undertaken for the properties of the item, the statutory provisions will apply.

3rd We do not take any responsibility for material supplied by the customer or obtained on the basis of specifications laid down by him or for structures specified by the customer. Also excluded is any liability for the suitability of the goods in respect of their intended use on the customer's premises, adherence to safety regulations and material suitability.

4th Any claims on the part of the customer for subsequent fulfilment or for damages expenditure or compensation of expenditure due to defects shall expire, in the case of deliveries, a year from delivery of the goods. If we maliciously conceal the defect or have undertaken a guarantee regarding the properties of the item, the statutory provisions will apply.

5th If there is a consumer goods purchase on the part of the customer, the statutory provisions will apply.

XI. Damages and Statutory Limitation

1st If we should default in our performance, then we will compensate the customer the damages due to ordinary occurrences up to the amount of 1% of the price of the relevant goods ordered for every day of default, with a maximum payable by us of 10% of the total price of the relevant goods ordered. We will pay the full damages in the case of intent or gross negligence.

2nd If we have to pay damages compensation instead of fulfilment, we will repay to the customer the damages occurring on the basis of the normal course of affairs up to the total sum of the relevant goods ordered. We will pay the full damages in the case of intent or gross negligence.

3rd Otherwise we are only liable for gross negligence or intentional infringement of our obligations. This also applies to information provided, advice as well as to unauthorised actions during preparation, conclusion and processing the contract.

4th Our general partner, the managing directors and our employees are liable to the customer for unauthorised actions carried out during preparation, conclusion and processing the contract only in the case of intention or gross negligence.

5th Claims for damages by the customer against us, our directors and our staff arising from the violation of precontractual and contractual obligations and from unauthorised actions committed in the preparation, conclusion and handling of the contract shall lapse a year from the end of the year in which the claim arose and the customer obtained knowledge of the circumstances justifying the claim and the identity of the party liable or should have obtained such knowledge without gross negligence.

6th Any claims by the customer for damages or compensation due to injury to life, body or health based on an intentional or negligent violation of obligations and against the violation of other major obligations which are important by the nature of the contract and for the achievement of the contractual purpose shall remain unaffected in every respect.

XII. Withdrawal and assignment

1st If we do not render service despite its being due or – with the exception of a defect in our goods or services – do not render service in accordance with the contract, the customer may define a reasonable deadline for such service or for subsequent fulfilment. The deadline must allow us to complete the service that has already been started; generally, the deadline period may not be less than two weeks. If we nonetheless do not provide the service or subsequent fulfilment within a reasonable period of time, the customer may withdraw from the contract. This does not apply if the service or fulfilment is not provided due to circumstances beyond our control.

2nd If the asset situation of the customer deteriorates materially, if an application for his insolvency is made or if insolvency proceedings have been started, we are entitled to withdraw from the contract.

3rd The customer may only assign his rights under this contract without our prior agreement to insurance companies and only in so far as these undertake to pay the damages claimed by the customer. Clause 354 a of the Commercial Code remains unaffected.

XIII. Security

1st Notwithstanding delivery the property in the Goods shall not pass to the Buyer until the Buyer has paid in full the price of the Goods and all outstanding claims in connection with the business relationship.

2nd Processing or working with the reserved property by the customer takes place free of charge for us without it resulting in any obligations for us; the new object becomes our property. If the goods are processed with other goods which do not belong to the customer, then we acquire co-ownership of the new object in the ratio of the value of the reserved property to the value of the other goods; in the case of mixing, combining or blending we acquire co-ownership according to legal provisions. If the customer acquires sole ownership through mixing, combining or blending, then he already transfers co-ownership to us now in the ratio of the value of the reserved property to the value of the other goods at the time of the mixing, combining or blending.

In the above mentioned cases, the customer has to keep in safe custody and free of charge the objects which we are owners or co-owners of which are also reserved property in the sense of the following provisions.

3rd The customer already assigns to us claims arising from resale of the reserved property to the value of the reserved goods with all ancillary rights. The corresponding applies if the reserved property is installed into the property of a third party as a key component. If we retain title to the reserved goods, then the claims are assigned to the amount that corresponds to the value of our share of the overall value. The assignment of future claims also covers a possible balance claim from the current account. The customer is authorised to collect the claim.

4th As long as the customer does not default in his obligations to us, he has the right to avail himself of the reserved property in the ordinary course of business and under retention of title, providing the claims according to fig. XI.3 are effectively transferred. Extraordinary dispositions, such as pledges, chattel mortgage and any assignments are not permitted. We must immediately be informed of access of third parties to the reserved property or assigned claims, in particular pledges.

5th If the customer is in default of a payment due to us for longer than a week or if he undergoes forfeiture of assets, where he in particular ceases payment, our claims shall become payable immediately and any deferment of payment ends. In these cases, we are entitled to take the retention goods and to revoke the collection authorisation. The customer is – with rights of retention excluded – obliged to return same. If the customer is a consumer, he only has to return the retained goods

to us if we have withdrawn from the contract. The acceptance and seizure of the retained goods by us shall not be considered as a withdrawal from the contract, except in consumer credit transactions. All the costs of the recovery and realisation shall be borne by the customer; we are entitled to sell the goods in the open market. Upon request, the customer shall provide us immediately with a list of the liabilities assigned to us according to Fig. 3 and shall give us all further information and documents necessary to apply our rights and notify the party liable of the assignment.

6th We undertake to release securities as we choose if the realisable value exceeds the total of our claims under the business arrangement by more than 15%.

7th If the retention of title or the assignment is not legally effective according to the laws of the country which the goods are in, then the security which comes as close as possible to the retention of title or assignment is considered to be agreed, if according to this the cooperation of the customer is required, then he has to undertake all legal transactions necessary to establish and retain such rights.

XIV. Proprietary rights

If we have to render service on the basis of drawings, models, samples or using parts provided by the customer, the customer herewith states that this shall not violate the statutory rights of third parties. The customer releases us from any claims by third parties due to the violation of any rights and will reimburse us any damages arising and our costs and expenses. If the customer and/or we are forbidden to manufacture or deliver by a third party with reference to a proprietary right, we are entitled, without closer examination of the legal position, to cease the works.

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XV. Legal system and legal venue

1st If any provision of these conditions and the further agreements reached are or become invalid this shall not affect the validity of the remaining conditions. The contract partners are obliged to replace the invalid provision by a provision that comes as close as possible to it in terms of commercial success.

2nd German law shall apply excluding Collision Law and the United Nations Agreement on contracts for the international sale of goods (CISG).

3rd If the customer is a commercial entity, legal entity in public law or a special fund under public law, then Nuffingen is the legal venue for all disputes arising directly or indirectly from contractual relationships based on these General Terms of Delivery. For legal action against the customer, the court at the customer's registered offices is also competent locally.

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