Technical Plastics and Engineering Excellence in Medical Technology.

What plastics have to accomplish in medical technology.

ENSINGER develops and produces semi-finished products, components and profiles from thermoplastics which are particularly well suited for the very high demands of medical technology.
ENSINGER high temperature plastics possess properties which enable them to meet specific hygiene standards.

| Biocompatibility and FDA conformity provide the required physiological safety

| Very high resistance to
- Cleaning agents, disinfectants and many solvents
- Common sterilisation processes using super-heated steam, ethylene oxide, hot air or gamma rays

| Suitable electrical properties:
Good electrical insulation in high-frequency surgery

| Precision and stability of the finished parts and components

The combination of these properties contributes to the long useful life of quality instruments that are used frequently, thus reducing the costs of procurement and disposal.

Physiological harmlessness

Special materials from ENSINGER conform to the requirements of the Food and Drug Administration and equivalent European standards.

Materials compliant to United States Pharmacopoeia (USP class VI) and to ISO 10993 are also available.

ENSINGER clean room production

Production with clean room technology is becoming more important in medical technology, especially for materials used in diagnostic and therapeutic applications. ENSINGER has vast experience in clean-room production.

The current investments in a high-purity production building of clean-room class 100.000 adds to this competence.

ENSINGER. Project partner for medical technology.

Our project partners profit from the vast experience that ENSINGER possesses in different areas of medical technology. ENSINGER finds the optimal solution for each defined application by detailed consideration of every special requirement. This application-oriented project management approach includes all important key points for a successful development programme.

Diagnostics

With their transparency and resistance to electromagnetic waves, ENSINGER plastics are tried and tested for use in x-ray machines, CT scanners, blood analysers and imaging processes.

Surgery

ENSINGER's high performance plastics are used in many surgical instruments, e.g. surgical scissors, forceps, clamps, endoscopes, hand grips, fixation rods or for temporary implants.

Dentistry

Plastics for instruments used to remove plaque or to cure filling materials have to meet high requirements with regard to repeated sterilisation. ENSINGER plastics provide the best biocompatibility for rinsing grips used for water and air. TECAPEEK CLASSIX™ healing caps for dental implants can be left in the body for up to 30 days.

Therapy

High performance thermoplastics guarantee the correct functioning of respirators and medium diffusion units in dialysis machines.

Pharmaceutics

Drug delivery systems are becoming more complex and more patient friendly. ENSINGER plastics play a significant role in this important market.

Catheter pump by JOMED. For surgical use. **TECAFORM AH MT** is flexible and biocompatible, with a non-polar surface and high resilience (unbreakable).

ENSINGER Plastics for Medical Technology. An Overview.

| TECAPEEK (PEEK)

Very high resistance to chemicals. Excellent resistance to common methods of sterilisation. Good electrical insulation, even at high voltage. Good resistance to radiation. Low susceptibility to stress cracking. HIgh dimensional stability and easy to machine. Excellent tribological properties.

| TECATRON (PPS)

Very high resistance to chemicals. Good resistance to radiation. Very good thermal and mechanical properties. Sustained use at temperatures up to 230 °C. Very hard and rigid. Very stable dimensionally with low susceptibility to creeping.

| TECASON P MT black (PPSU, Radel®)

FDA conforming PPSU with excellent resistance to common methods of sterilisation. High thermal stability. Very tough, hard and rigid.

| TECAPEI MT (PEI)

Translucent. Transparent to high-frequency electromagnetic waves. Good thermal and mechanical properties. Sustained use at temperatures up to 170 °C. High dimensional stability. Available in different colours.

| TECASON S (PSU)

Translucent. Resistant to electromagnetic waves and gamma rays. Hydrolysis resistant. Good electrical insulation. Good thermal and mechanical properties.

| TECASON E (PES)

Translucent. Hydrolysis resistant. Transparent to high-frequency electromagnetic waves. High thermal and mechanical stability. Hard and tough. Good electrical and dielectric properties, therefore well suited as an electrical insulator.

| TECAFLON PTFE (PTFE)

Maximum resistance to chemicals. Resistant to common methods of sterilisation (except high-energy radiation). Sustained use at a temperature of 260 °C. Excellent sliding and electrical properties.

| TECANAT (PC)

Extremely tough and unbreakable. Excellent electrical insulation. Easy to machine and polish.

| TECAMID 66 (PA 66)

Good resistance to chemicals. Good electrical insulation. Good stiffness, toughness and resistance to abrasion. Good geometric stability under heat, and easy machining.

| TECAPET /TECADUR PET (PET)

Good resistance to chemicals. Good dielectric properties. Low susceptibility to wear in moist or dry surroundings, high dimensional stability through relatively low thermal expansion, low moisture absorption.

| TECAFORM AH MT (POM-C)

Good resistance to chemicals. Good electrical insulation. Very good sliding and abrasion properties. Stiff, strong and hard. Easy to machine. Available in different colours.

| Liquid Silicon Rubber (LSR)

High resistance to tear propagation and low permanent set. Hardness adjustable from Shore A 30 to Shore A 71. Components can be injection moulded.

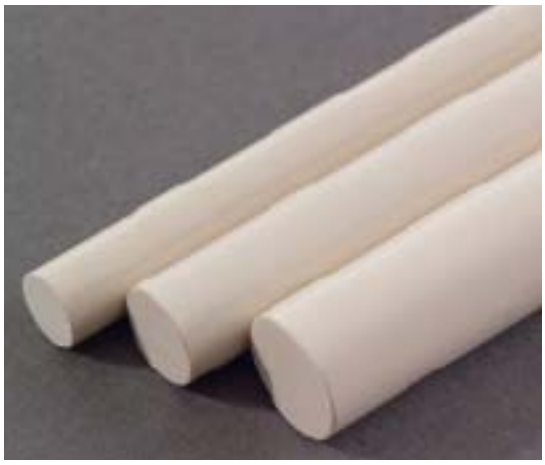
New Products Ensure Safety in Medical and Food Technology

New materials have been developed and modified specifically for medical technology. Available as semi-finished products in rods and sheets, they are also suitable in injection-moulded components. A large number of colours have been added to the range.

| TECAPEEK CLASSIX™ (PEEK)

TECAPEEK CLASSIX™ is suitable for medical-technical applications up to 30 days contact with tissue. Excellent resistance to chemicals. Conforms with FDA, and is biocompatibility-tested as defined in USP Class VI. Semi-finished and raw material is batch tested for cytotoxicity according to ISO 10993. Extremely high resistance to hydrolysis, even at high temperatures. Capable of repeated sterilisation using conventional methods. Particularly good combination of strength, stiffness, toughness and hardness. Excellent toughness with regard to abrasion and impact.

Applications: temporary dental implants, healing caps, catheters, surgical instruments, analysis units, drug dosing systems and devices for contact with tissue. Standard colours at present cream white; other colours and modifications on request.



| TECASON P MT (PPSU, Radel®)

Extremely resistant to common methods of sterilisation. Very good electrical insulation. High thermal stability: sustained use at temperatures up to 170 °C. High toughness on impact, and great hardness and stiffness. Low water absorption. Available in many standard colours.

Applications: Surgical instruments, instrument grips, sizing trials for implants.

TECASON P MT Rods in many different colors.

| TECASON P MT VF (PPSU, Radel®)

Properties comparable with TECASON P MT, but modified specially for the deep drawing and vacuum forming process for manufacturing sterilisation containers.

| TECAMAX SRP (PPP)

Harder and stiffer than other non-reinforced thermoplastics. Transparent for X-rays. Excellent resistance to chemicals. Hydrolysis resistant. Very high scratch resistance and good abrasion characteristics. Excellent mechanical properties. Low density.

Applications: External fixing supports; drilling and targeting jigs.

TECAMAX SRP is transparent for X-rays.

| TECAPRO MT (PP)

Resistant to cleaning agents and disinfectants, hydrolysis and super-heated steam. Heat stabilisation leads to improved reaction to sterilisation, with little warping. Low mostiure absorption. Good sliding properties. Easy to machine.

Applications: Instrument cases, sterilisation containers

Instrument case made of **TECAPRO MT.**

| TECAFORM AH SAN (POM-C) TECAPRO MT SAN (PP)

An antimicrobial additive gives more security to parts made of TECAFORM AH SAN or TECAPRO MT SAN in medical or food technology. It effects antibactricid on the surface of the plastic parts.

Applications: Grips, containers, components in medical, food and sanitary technology.

Container made of antimicorpial **TECAPRO MT SAN.**

Resistance against many chemicals

Because of the preparation procedures such as sterilisation and disinfection, medical instruments that are frequently reused must be resistant in many ways.

Material	DIN-Abbreviation	Acids		Bases		Solvents				Water	
		weak	strong	weak	strong	Alcohol	Ester	Ether	Ketone	cold	hot
TECAPEEK CLASSIX™	**PEEK**	+	o	+	+	+	+	+	+	+	+
TECAPEEK	**PEEK**	+	o	+	+	+	+	+	+	+	+
TECAFLON	**PTFE**	+	+	+	+	+	+	+	+	+	+
TECATRON	**PPS**	+	+	+	+	+	+	+	+	+	+
TECASON E	**PES**	+	o	+		o			-	+	+
TECAPEI	**PEI**	+	o	-	-	+			-	+	+
TECASON P MT	**PPSU**	+	o	+		+			-	+	+
TECASON S	**PSU**	+	-	+		o			-	+	+
TECAFLON	**PVDF**	+	o	o	-	+		+	o	+	+
TECAMAX SRP	**PPP**	+	+	+	-	+	+	+	+	+	+
TECANAT	**PC**	o	-	-	-	o	-	-	-	+	+
TECADUR/PET	**PET**	+	o	o	-	+	o	+	o	+	o
TECAMID 66	**PA 66**			+	o						
TECAFORM AH MT	**POM-C**	+	o	+	-	+	o	o	o	+	+
TECAPRO MT	**PP**									+	+

\+ Resistant (Only slight change in weight, if any)
o Conditionally resistant (Brief contact with the medium possible)
\- Not resistant (change in weight > 5 %, severe impairment of the mechanical properties)

FDA conforming materials and biocompatibility.

Foodstuff and medical technology place special requirements on physiological suitability and durability.

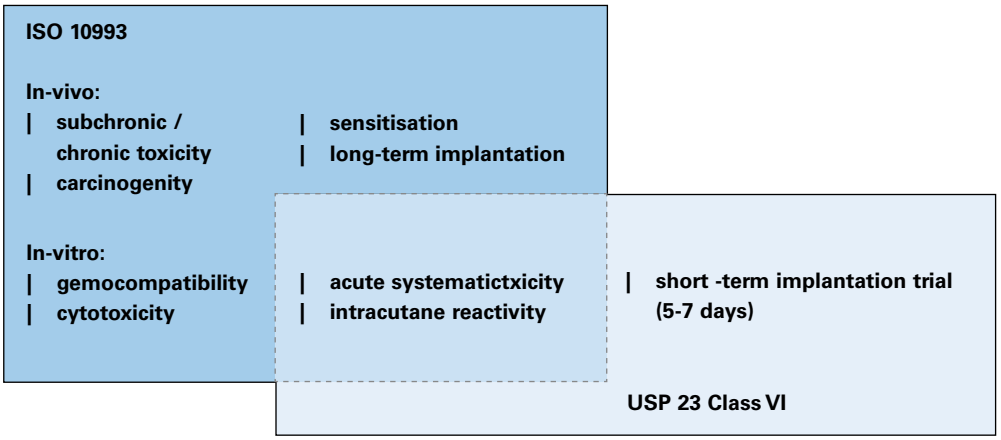
FDA Conformity

The American Food and Drug Administration (FDA) inspects the suitability of materials for contact with food. Raw materials, additives and properties of plastics are specified by the FDA in the „Code of Federal Regulations" CFR 21. Materials that meet the relevant requirements are regarded as FDA-conforming.

Biocompatibility

Biocompatibility is the measure of the compatibility of a material with the tissue or physiological system of the patient. Assessment takes place after a number of investigations as defined in USP (U.S. Pharmacopeia) Class VI or ISO 10993.
Biocompatibility depends not only on the type of material, but also on:

- Where it is used (skin, mucus membranes/ blood, tissue)
- The intended function (superficial contact with the body, contact with the interior of the body, product for implantation)
- The length of time that the material remains in the body (< 24 hours, < 30 days, indefinitely)



Comparison of the testing methods according to USP 23 Class VI and ISO 10993.

Material	DIN-Abbreviation	Raw material	FDA conformity	Biocompatibility
TECAPEEK CLASSIX™	**PEEK**	Invibio® PEEK®	x	x
TECAPEEK MT	**PEEK**	Victrex® PEEK®	x	(1)
TECAFLON PTFE	**PTFE**	Hostaflon, Teflon	x	(2)
TECATRON MT	**PPS**	Fortron®	x	(2)
TECASON E	**PES**	Radel® A	x	-
TECAPEI MT	**PEI**	Udel®	x	(3)
TECASON P MT	**PPSU**	Radel® R	x	(1)
TECASON S	**PSU**	Ultem®	x	(2)
TECAFLON PVDF	**PVDF**	Solef, Kynar	x	(2)
TECAMAX SRP	**PPP**	in testing		
TECANAT	**PC**	Lexan, Makrolon	x	(2)
TECADUR PET, TECAPET	**PET**	Arnite, Crastin	x	-
TECAMID 66	**PA 66**		x	(2)
TECAFORM AH MT	**POM-C**	Celcon	x	(2)
TECAPRO MT	**PP**		x	(3)

(1) Applies to MT black, other colours on request
(2) On request
(3) Applies to natural, colours on request

* FDA conformity and biocompatibility apply to natural materials. The pigments used are tested for their suitability according to the FDA regulations. Biocompatibility is not a material specification, and requires prior testing, and if necessary special production.

Resistance to sterilisation.

The deliberate sterilisation of plastic equipment and components serves to kill off all living micro-organisms such as bacteria, viruses, algae and their spores

Hot steam

According to DIN EN 285, all surfaces of the objects for sterilisation must be subjected to pure, saturated water vapour at 134 °C in a vacuum for at least three minutes. Steam sterilisation is regarded as the safest and cheapest method of sterilisation, but the high process temperature makes it less suitable for materials that are sensitive to heat and hydrolysis.

Hot air

In hot-air sterilisation, germs are killed off by means of dry heat under high thermal load (180 °C) over a period of at least 30 minutes. This process is prohibited because of numerous uncertainties. It is no longer up to date, and is therefore usually replaced by other methods.

Plasma

Sterilisation with hydrogen-peroxide plasma is suitable for all plastics, but it is costly and requires elaborate equipment. Highly reactive hydroxy and hydroxyl radicals kill off the micro-organisms at temperatures of only 45 °C over periods of 45 to 80 minutes; the plasma is removed by ventilation. The risk of corrosion is almost non-existent, and there is no toxic residue that would require prolonged degassing.

Formaldehyde and ethylene oxide

Sterilisation by means of a microbiocidal gas such as formaldehyde or ethylene oxide is always carried out at temperatures between 48 and 60 °C. Because of the low temperatures, this process is suitable for temperature-sensitive materials. The efficiency of formaldehyde is comparable with that of ethylene oxide, but its lower toxicity permits shorter degassing times. Both are mainly used for disposable articles.

Sterilisation by radiation

For radiation sterilisation, which is suitable for almost all plastics, either gamma rays or a beam of greatly accelerated electrons are used. These processes are cost and equipment intensive, so they are mainly used for the sterilisation of disposable products on an industrial scale.

Material	DIN-Abbreviation	Hot steam 134 °C	Hot air (ca. 180 °C)	Plasma	Form-aldehyde	Ethylene oxide	Gamma radiation
TECAPEEK CLASSIX™	**PEEK**	++	++	+	+	+	++
TECAPEEK MT	**PEEK**	++	++	+	+	+	++
TECAFLON PTFE	**PTFE**	++	++	+	+	+	-
TECATRON MT	**PPS**	++	++	+	+	+	++
TECASON E	**PES**	+	+	+	+	+	+
TECAPEI	**PEI**	+	+	+	+	+	+
TECASON P MT	**PPSU**	+	+	+	+	+	+
TECASON S	**PSU**	+	o	+	+	+	+
TECAFLON PVDF	**PVDF**	+	-	+	+	+	+
TECAMAX SRP	**PPP**	+	in testing				+
TECANAT	**PC**	-	-	+	+	+	+
TECADUR PET	**PET**	-	-	+	+	+	+
TECAPET	**PET**	-	-	+	+	+	+
TECAFORM AH MT	**POM-C**	o	-	+	+	+	-
TECAPRO MT	**PP**	o	-				o

\+ Resistant (Only slight change in weight, if any)
o Conditionally resistant (Brief contact with the medium possible)
\- Not resistant (change in weight > 5 %, severe impairment of the mechanical properties)

Various process techniques for zero-defect production.

For each application ENSINGER uses the most suitable and most economical process. The zero-defect production standard is generally applied.

Semi-finished products

ENSINGER produces semi-finished goods from more than 100 different plastic materials, using various process techniques. ENSINGER produces rods, plates, tubes and coils. The requirements of medical technology customers are systematically considered. These come from almost all sectors of industry.

Injection moulding

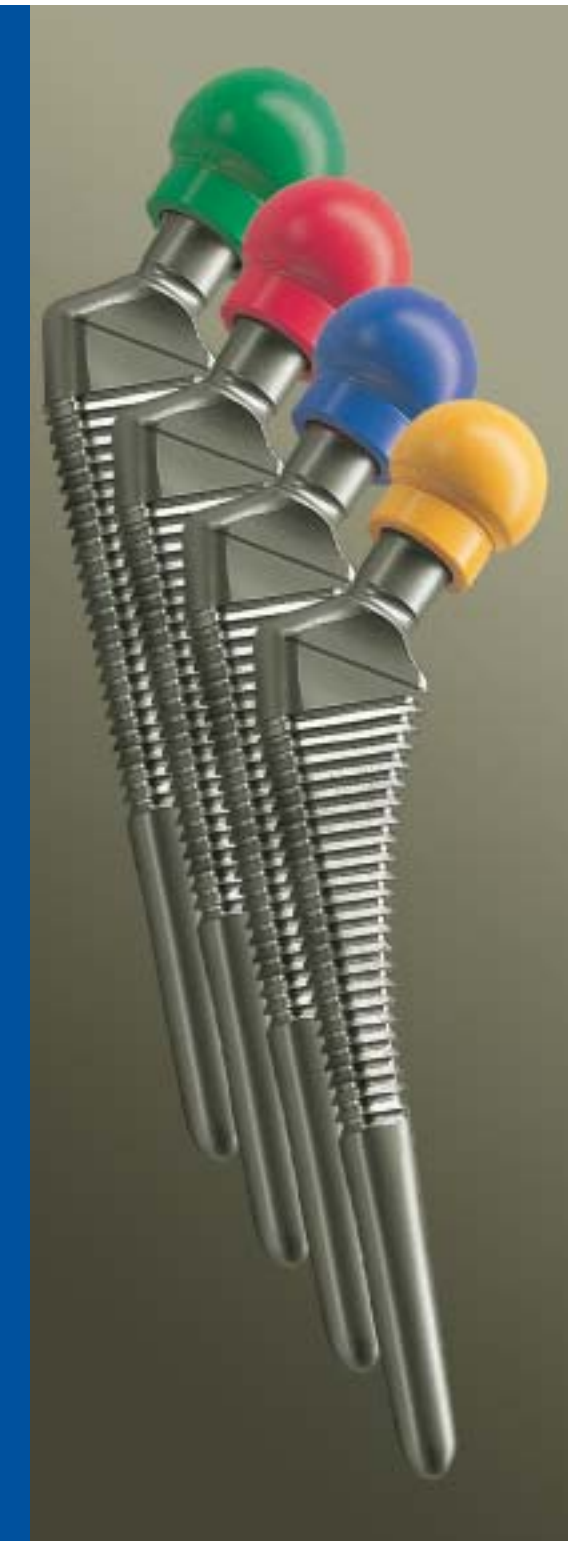
High quality injection moulded parts from ENSINGER are used in diagnostics, surgery, dentistry, MIC/MIT and dosing. In-house tool design and manufacture, as well as the most modern high-performance machinery, provide the basis for these developments.

Industrial profiles

Our products in the sector of industrial profiles and tubes are used in medical-technology units and systems. We develop products for the various applications in co-operation with the customer. The most varied, complex cross-sections are extruded in the specified thermoplastics, and produced to customer's requirements.

Machining

CNC machining centres produce plastic components of the highest precision. This is an advantage for instruments used in surgery, therapy, diagnostics, MIC and dentistry, and for dosing medicines.



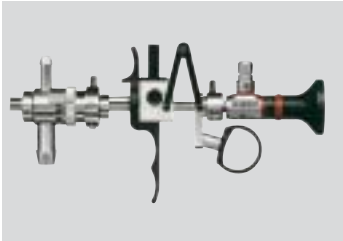
TECAFORM AH
Sizing trials for hip implants. Different colours allow easy differentiation of sizes.

Applications for all sectors of medical technology.

Technical plastics can be used in many medical applications and in all sectors of medical technology. Combinations of different plastics, or of plastics and metals, are also possible. The table shows you a selection of applications and the materials used. This will give you an idea of the opportunities that plastics offer in this area.

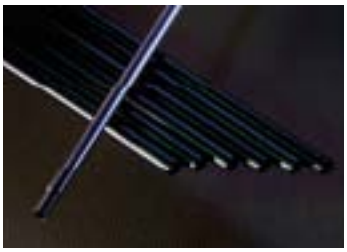
Material	DIN-Abbreviation	Surgical instruments	Containers and tablets	Trial implants	Dialysis units	Medicine dosage systems	Diagnosis units	Dental equipment	Dental healing caps	Pumps	Housings	Motors	Sterilisation equipment	Grips	Endoscopic instruments	Fixture and drilling units	Analysis and laboratory equipment	Anaesthesis equipment
TECAPEEK CLASSIX™	**PEEK**	x		x	x	x	x		x	x					x		x	
TECAPEEK MT	**PEEK**	x		x				x		x	x		x	x	x		x	
TECAPEEK CF MT	**PEEK CF**										x		x			x		
TECATRON MT	**PPS**	x								x		x		x	x		x	x
TECASON P MT	**PPSU**	x		x	x			x					x	x	x		x	
TECASON P MT VF	**PPSU**		x										x					
TECASON E	**PES**				x												x	
TECAPEI	**PEI**	x		x													x	
TECASON S	**PSU**					x											x	x
TECAMAX SRP	**PPP**	x												x		x		
TECAFLON PTFE	**PTFE**																x	
TECAFLON PVDF	**PVDF**																x	
TECAFORM AH MT	**POM-C**			x		x								x				
TECAPRO MT	**PP**		x							x				x			x	
TECANAT	**PC**					x	x										x	x
TECADUR PET/ TECAPET	**PET**					x												
TECAMID 66	**PA 66**						x											

Applications for all sectors of medical technology.

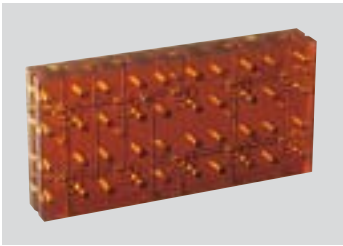


Endoscope from RICHARD WOLF GmbH. The ocular funnel in **TECAPEEK MT** black can be sterilised and is light-proof.

Equipment used to make a windpipe incision. PercuTwist Dilatator from RUESCH GmbH. Its physiological compatibility in direct contact with the human organism and body fluids were the main reasons for choosing **TECAPEEK MT blue**.



TECAPEEK- capillaries are used for endoscopic instruments.



The use of **TECASON E** for a dialysis block fulfils the requirements on biocompatibility, sterilisation and chemical resistance.

Inset tray for trial joint implants. Excellent geometrical stability under repeated sterilisation makes **TECASON P VF** the material of choice for the deep-drawn inset tray.

Targeting and fixture for an orthopaedic drill made of **TECAMAX SRP.** Light and yet stiff and geometrically stable, and also transparent to X-rays.

TECANAT PC sealing strips for the SIEMENS CT scanner. ENSINGER engineering has made a reliable production process possible by ultrasonic welding of different extruded profiles. The material is transparent, extremely tough, and resistant to radiation.

Suture instrument from AESCULAP. The requirements of ease of cleaning and very good tactile properties were decisive for the use of **TECAFORM AH MT**.

Sizing trials for knee capstrial implants in **TECASON P MT**. The different colours indicate different sizes.

Container for surgical instruments. **TECAPRO MT**. High dimensional stability even after many sterilisations cycles.

ENSINGER Engineering plastics. Material standard values.

Mechanical properties

Trade name	DIN-Abbreviation	Additives and/or colour	Service temperature °C long term	Density (ASTM D 792, DIN EN ISO 1183) ρ g/cm³	Tensile strength at yield (ASTM D 638, DIN EN ISO 527) σ_S MPa	Tensile strength at break (ASTM D 638, DIN EN ISO 527, ASTM D 1708 (a)) σ_R MPa	Elongation at break (ASTM D 638, DIN EN ISO 527, ASTM D 1708 (a)) ε_R %	Modulus of elasticity after tensile test (ASTM D 638, DIN EN ISO 527) E_Z MPa	Modulus of elasticity after flexural test (ASTM D 790, DIN EN ISO 178) E_B MPa	Hardness (ball indentation: ISO 2039/1; Shore D: ASTM D 2240, DIN 53 505 (d), Rockwell: ASTM D 785 (a), DIN 43 456 (s)) ISO 2039/2 (r); others: ASTM D 785) H_K MPa	Impact resistance see footnote 4) a_n kJ/m²	Creep rupture strength after 1000 h with static load $\sigma_{B/1000}$ MPa	Time yield limit for 1% elongation after 1000 h $\sigma_{1/1000}$ MPa	Coefficient of friction p = 0,05N/mm2 v = 0.6 m/s on steel, hardened and ground μ –	Wear (conditions as previous) V μ/km	Trade name
TECAPEEK CLASSIX™	PEEK	white	260	1,38	95		> 25		4200		7,6 (d)					**TECAPEEK CLASSIX™**
TECAPEEK	PEEK	also black[1]	260	1,30	95		25	3000	4100	M99	o. B. (c)			0,30-0,38		**TECAPEEK**
TECAPEEK MT	PEEK	coloured, also black[1]	260	1,30	95		20	3000	4100	M99(r)	o. Br. (c)			0,30-0,38		**TECAPEEK MT**
TECATRON MT sw	PPS	black	230	1,35	75		4	3700	3600	190	50 (c)					**TECATRON MT sw**
TECASON P MT	PPSU	coloured	170	1,29	70		> 50	2350	2600							**TECASON P MT**
TECASON P VF	PPSU		170	1,29	70		> 50	2350	2600							**TECASON P VF**
TECASON E	PES	translucent	180	1,37	90	6	6,5	2700		148	o. Br. (c)		20			**TECASON E**
TECAPEI MT	PEI	coloured	170	1,27	105		> 50	3200	3300	140	4 (c)					**TECAPEI MT**
TECASON S	PSU	translucent	160	1,24	80	6	> 50	2600		147	o. Br. (c)	42	22	0,4		**TECASON S**
TECAMAX SRP	PPP		140[3]	1,21	207			8300	8300	80B (r)	41,9 (ai)					**TECAMAX SRP**
TECAFLON PTFE	PTFE	natural	260	2,18	25		> 50	700		30	o. Br. (c)	5	1,58	0,08/0,10	21	**TECAFLON PTFE**
TECAFLON PVDF	PVDF		150	1,78	50		> 30	2000	2000	80	o. Br. (c)	34	3	0,3		**TECAFLON PVDF**
TECAMID 66	PA 66		100	1,14	80/60*		40/150*	3100/2000*	2830	170/100*	o. Br. (c)	55	8	0,35-0,42	0,9	**TECAMID 66**
TECANAT	PC	transparent	120	1,20	60			2300		100	o. Br. (c)	48	18	0,52-0,58	22	**TECANAT**
TECAFINE PMP	PMP	transparent	120	0,83		15			1500		o. Br. (c)					**TECAFINE PMP**
TECADUR PET	PET	natural, also black[1]	110	1,37	80			2800		95	o. Br. (c)	36	13	0,25	0,35	**TECADUR PET**
TECAFORM AH MT farbig	POM-C	also black	100	1,41	55		30	2100		145	o. Br. (c)	40	13	0,32	8,9	**TECAFORM AH MT farbig**
TECAPRO MT	PP		100	0,92	35				1470	100 (r)	0,69(i)					**TECAPRO MT**

Conditions of Delivery can be found in our Semi-finished products catalogue or under www.ensinger-online.com.

victrex®
MADE WITH VICTREX PEEK POLYMER

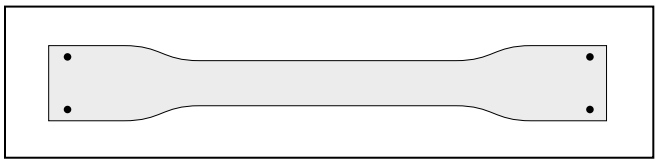
PEEK- CLASSIX™
Made by Invibio® biomaterial solutions

	Thermal properties								Electrical properties						Miscellaneous data					
Trade name	T_m °C	T_g °C	HDT/A °C	HDT/B °C	°C	λ W/(K·m)	c J/(g·K)	α 10^{-5} 1/K	ε_r –	tan δ –	R_D Ω···cm	R_O Ω	E_d kV/mm	Grade	W(H_2O) %	W_s %	–	–	–	Trade name
TECAPEEK CLASSIX™	343	143			300															**TECAPEEK CLASSIX™**
TECAPEEK	343	143	140	182	300	0,25	0,32	5,0	3,2-3,3	0,001-0,004	10^{16}	10^{15}	20		0,1	0,5	+	V0	-	**TECAPEEK**
TECAPEEK MT	343	143	140	182	300	0,25	0,32	5,0	3,2-3,3	0,001-0,004	10^{16}	10^{15}	20		0,1	0,5	+	V0	-	**TECAPEEK MT**
TECATRON MT sw	280	90	110		260	0,25		5			10^{13}	10^{15}			0,01		+	V0	+	**TECATRON MT sw**
TECASON P MT		220	207	214	190	0,35		5,6	3,45		10^{15}	10^{13}	15		0,37	1,1	+	V0	+	**TECASON P MT**
TECASON P VF		220	207	214	190	0,35		5,6	3,45		10^{15}	10^{13}	15		0,37		+	V0		**TECASON P VF**
TECASON E		225	204	214	220	0,18	1,12	5,5	3,5	0,005	10^{16}	10^{14}	40		0,7	2,1	+	V0	-	**TECASON E**
TECAPEI MT		217	180	200	200	0,22		5	3,15	0,001	10^{15}	10^{15}	33		0,27	1,25	+	V0	-	**TECAPEI MT**
TECASON S		180	169	181	180	0,25	1	5,5	3,1	0,005	10^{16}	10^{14}	42	KA 1 KB 175	0,2	0,8	+	V0	-	**TECASON S**
TECAMAX SRP		155	152		150(3)			3-4		3,1	>10^{15}	10^{14}			0,5		+	V0		**TECAMAX SRP**
TECAFLON PTFE	327	-20	55	121	260	0,25	1	12	2,1	0,0002	10^{16}	10^{16}	48	KA 3c KB>600	< 0,05		+	V0	+	**TECAFLON PTFE**
TECAFLON PVDF	172	-18	95	140	150	0,11	1,2	13	8	0,06	10^{14}	10^{13}	40	KA 1	<0,05	<0,05	+	V0	+	**TECAFLON PVDF**
TECAMID 66	260	72/5*	100	>200	170	0,23	1,7	8	3,6-5	0,026-0,200	10^{12}	10^{10}	28*/ 30	CTI 600	2,8	8,5	(+)	HB	-	**TECAMID 66**
TECANAT		148	135	140	140	0,19	1,2	7	3	0,006	10^{13}	10^{15}	27	KA 1	0,15	0,36	-	V2	-	**TECANAT**
TECAFINE PMP		20	51	85		0,17	2,18	12	2,12		10^{14}	10^{13}	65	KA 3c KB>600	<0,05	0,01	+	HB	-	**TECAFINE PMP**
TECADUR PET	255	70	95	170	170	0,24	1,1	7	3,2	0,021	10^{13}	10^{15}	60	KC 350	0,25	0,5	-	HB	-	**TECADUR PET**
TECAFORM AH MT colored	165	-60	110	160	140	0,31	1,5	10	3,5	0,003	10^{14}	10^{14}	> 50	KA 3c	< 0,3	0,5	(+)	HB	-	**TECAFORM AH MT farbig**
TECAPRO MT	163	86			140						>10^{15}		>40		0,05	0,1	+	HB	-	**TECAPRO MT**

The information corresponds with current knowledge, and indicates our products and possible applications. We cannot give you a legally binding guarantee of the physical properties or the suitability for a specific application. Existing commercial patents are to be taken into account. A definite quality guarantee is given in our general conditions of sale.
Tests are carried out in a standard atmosphere of 23° C 50 RH according to DIN 50 014.

We reserve the right to make technical alterations.
These values represents the average of a number of individual measurements. Unless otherwise stated the test results apply to injection moulded samples.

Our products are not suitable for use in medical or dental implants.
Information concerning the exclusion of liability and Terms.



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Remark: For polyamides the values strongly depend on the humidity contents.
* humid, after storage in standard atmosphere 23°C 50 RH (DIN 50 014) until saturation.
n. b.= not broken
\+ = Resistant
(+) = Limited resistance
– = Not resistant
(depending on concentration, time and temperature)

(1) When plastics are listed under „additives and colour" as available „also in black", the electrical properties are not valid for the black variant.
(2) Testing on semi-finished products.
(3) Expected values.
(4) Impact resistance is measured with different methods.
The values in the following tables are marked with the following letters:
(c) Charpy: DIN EN ISO 179: an kJ/m²
(ai) Izod: ASTM D 256: an J/m
(di) Izod: DIN EN ISO 180, an kJ/m²
(k) Notch impact strength: DIN EN ISO 179: an kJ/m²

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