

Plastic Table 1

iPlastics

Abreviation (DIN ISO 1629)	common denomination	typical technical values
CR (ISO)	Chlorbutadien-Rubber	Operating Temperature: -40°C ~ +110°C (short time use +130°C), Density: 1.25 g/cm³
Good resistance against mineral oil, very good resistance against ageing by exposure to exposure to ozone, resistance against acid and alkalines, good abrasion resistance, high flame resistant, restricted lightwighthed fuel resistance. (Similar to NBR in chem. and phys. area: smaller resistance against mineral oil, better resistance against ageing by exposure to ozone, resistance against acid and alkalines).		
CFK CRP (ISO)	Carbon Reinforced Plastic	
Carbon fibres are Fibres with very high strength and rigidity and very small elongation at break. Carbonization temperatures for the fibres are in the area from 1300 - 1500 °C, whereby the carbon content is increasing to 96% -%98%. In cooperation with thermoset resin or thermoplastic resin CFK's enable to create light, stiff and high strength composite materiale with small elongation. The properties of composite materiales are adjustable in a wide range depending on typ of plastic, lenth of fibres and thickness of fibres. Temperature resistance is primary depending on the basic plastic.		
EPDM (ISO)	PolyEthylenePropyleneDieneRubber	Operating Temperature: -40°C~+130°C (short time use +150A), steam up to 200°C, hot water / air up to 150°C; Density: 1.05~1.2 g/cm³
Exelent resistance against weathering, agening, exposure to ozone, chemicals, hot water and vapour. good resistance against medium like acetone, mathanol, acids, alkaline solutions, ketones and flame resistant hydraulic fluids. Small permeability to vapour, good thermal stability, excessively deep embrittlement temperature. very good electr. insulating properties.		
EPM (ISO) EPR	Ethylen Propylen Rubber	Operating Temperature: -25 °C~+200°C, short time use +250°C, (-40°C at static load), Density: 1.8 g/cm³
Properties as far as possible same to EPDM. EPR. Often used as insulator for wires and conduction.		
FPM (ISO) FKM (ASTM)	Fluorcarbon Fluorrrubber Polyfluoralkylmethylen	Operating Temperature: -25°C~+200°C, short time use +250°C (-40°C at static load), Density: 1.8 g/cm³
Very good Oil- and Chemical resistance, very good heat resistance, exelent exposure to ozone-, agening- and weathering resistance, high resistance against inflammation. very small elasticity, middlesized mechanical strength. Permeability to gas ist very small and similar to permeability of Butylrubber.		
GFK GRP (ISO)	glass reinforced plastic	Operating Temperature: 120°C+180°C max. 2h, bis 500A for high temperature resistant types (Epoxy basic), Density: 1.8 - 2.2 g/cm³
Glasfibres are fibres with high strength and stiffness and small elongation at break. In cooperation with thermoset resin or thermoplastic resin light, stable and strength composite materials with small elongation. The properties of composite materiales are adjustable in a wide range depending on typ of plastic, lenth of fibres and thickness of fibres. Temperature resistance is primary depending on the basic plastic.		
IIR (ISO)	Butyl-Rubber Isopren-Rubber Isobutylen-Rubber Polyisobutylen-Isoprene	Operating Temperature: -40°C~+130°C, short time use +150°C, Density: 1.5 g/cm³
Good resistance against acids and alkaline solutions, very good agening resistance, exposure to ozone, very good electric insulating properties, small permeability to gas. Low elasticity and no resistance against oil and grease. Extremely damping properties for aperiodic vibrations. Middlesized mechanical properties.		
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Abbreviation (DIN ISO 1629)	common denomination	typical technical values
NBR (ISO)	Acrylnitrilbutadiene Rubber Acrylnitril Rubber Nitrilrubber Polyacrylnitrilbutathen	Operating Temperature: Fluids up to +70°C, air up to +90°C, temp. depending on ACN-content max. -50°C, Density: 1.6 g/cm³, Elongation at Break: 100~350%
Acrylnitril content (small, middle, high). High Acrylnitril content = high Resistance against aromatic hydrocarbon. Small Acrylnitril content = high flexibility at low temperatures. The typ with normally best combination in normal using areas has a middlesized Acrylnitril content. Permeability to gas nearly same to IIR. Very good resistance against mineral oil.		
NR (ISO)	Natural Rubber Polyisoprene	Operating Temperature: -45°C~+100°C, Density: 1.2 g/cm³
Good mechanical properties(very high strength, high elongation at break and very high impact resilience, good abrasion resistance). No resistance against mineral oil and mineral grease; poor exposure to ozone and ageing. Natural rubber is comparable to with Polyisoprene. Permeability to gas for NR is approx 20 times higher IIR.		
PA (ISO)	Polyamide	Operating Temperature: +80°C~+110°C (short time use +140°C~+170°C), Density: 1.17 g/cm³
Semicrystalline thermoplastic resin, i.e. PA 6 and PA 6,6. The number is representing the amount of carbon atoms within amine- and acid monomeres. Low temperature resistance, shock resistant and impact resistant, even on rough surfaces abrasion resistant, high internal working capacity.		
PBT (ISO) PBTP	Polbutylenterephthalat Dimethyl Terephthalat und Butandiol Polyester	Operating Temperature: -30°C~+100°C (160°C short time use), Density: 1.3 g/cm³
Small tendency for leakage current, very high stability for dimensions (better than POM), low slip friction, high strength and stiffness (smaller than POM and PET, but higher impact resistance), very good abrasion resistance.		
PC (ISO)	Polycarbonate Lexan	Operating Temperature: -130°C~+130°C, Density: 1.2 g/cm³, Elongation at Break: 90~120%
Extremly high impact resistance, high strength, high temperature resistance, good optical properties and self-extinguishing. Sensibel against chemicals and sensible for stress cracking, not usable for continuous endurance above 20 Mpa, under temperature effect continuous load up to maximum 10 MPa, unusable at higher dynamic load , at edges and stepped shapes with small and sharp edges very notch sensitive.		
PE (ISO)	Polyethylene	Operating Temperature: ~+80°C (short time use +100°C), Density: hard condition: 0.95 g/cm³, soft condition: 0.92 g/cm³ / HDT/A42-49 (HDUHMW)
Waxy and non adhesive surface. Low density high tenacity, low strength and hardness, exelent chemical resistance, poor temperature resistance for steam and permeable for Oxygen, Carbon dioxide and aromatic substances.		
PET (ISO)	Polyethylenterephthalat Poly(ethylendioxytereftaloyl) Polyester	Operating Temperature: -50°C~+110°C (short tim use 180°C), Density: 1.34 g/cm³
Dimensionally stable (better than POM), low sliding resistance, high strength and stiffness (worse than POM), very good abrasion resistance.		
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Plastic Table 3

Abbreviation (DIN ISO 1629)	common denomination	typical technical values
PF (ISO)	Phenolformaldehyd Bakelite	-50~+100, up to 2h at 130°C, at 180°C breakdown, Density: 1.4 g/cm³
Hard and brittle, insoluble, infusible, flame-resistant, self-extinguishing, resistant against ageing. By Polycondensation from carbolicum acidum with formaldehyde manufactured phenoplast.		
PMMA (ISO)	Polymethylmethacrylate	Operating Temperature: -40°C~+90°C (short time use +100°C), Density: 1.2 g/cm³, HDT/A 95, HDT/B 100
Lightfast, glas clear, nearly unbreakable, sensitive against dust, scratch-resistant, UV-resistant, resistant against weak acids and alkaline solutions, resistant against mineral oil and gasoline, partially resistant to solvent.		
Polyolefine		
Polymer out of hydrocarbon (formula C _n H _{2n}) built up in one double link. (polymerized alkene). Polyolefines are semikrystalline thermoplastic resins, distinguished by good chemical resistance and good electrical insulation properties. This group is very reasonable in price and can be manufactured by conventional procedures. That's the reason for often use and that they are one of the most important group of plastics. In polymeric condition the Polyolefine are robust and flexible plastics with numerous possibilities in use. Inherent plastics: PE (Polyethylene), PP (Polypropylene), PB (Polybenzimidazol), PMP (Poly-4-methylpenten), PB (Polybuten-1), PIB (Polyisobuten). {Olefine = artificial word from fr. olefiant which is built out of lat. oleum and fiacre. Alkene = unsaturated, aliphatic hydrocarbon with one double link inside molecule}		
POM (ISO) POM-C	Polyformaldehyd Polyoxymethylen Copolymer Polyacetal	Operating Temperature: -40°C~+110°C (short time use +150°C), Density: 1.4 g/cm³
Low frictional resistance, good abrasion resistance, very good endurance limit, high insulating strength, good chemical resistance (especially against solvents), robust against stress fracturing.		
PP (ISO)	Polypropylene Neoprene® (DuPont)	Operating Temperature: 0°C~max. +110°C (embrittlement in cold condition), Density: 0.90 g/cm³
Higher stiffness, hardness and strength than PE, however lower than PA, average value for impact strength, low density, very good chemical resistance, high bending stress fatigue limit, good stress fracturing resistance(better than PE), very limited properties in cold condition, very good dielectric strength.		
PPO (ISO) PPE	Polyphenyleneoxide	Operating Temperature: -20°C~+90°C (short time use -35°C~ +130°C), HDT/A 88A, HDT/B 93°C
Stiff, high strength and dimension stable, good electrical and thermal properties, good hydrolysis- and chemical resistance, resistance against deformation at high temperatures and high humidity. For parts where humidity and temperature is a criterion but on the other hand difficult to machine.		
PPS (ISO)	Polyphenylensulfid	Operating Temperature: +200°C~+240°C (short time use +300°C), Density: 1.6 g/cm³
High hardness and stiffness, good abrasion resistance, low absorption of humidity, favorable insulation properties, small dielectric loss, high flame resistance, high chemical resistance.		
PTFE (ISO)	Polytetrafluorethylen Polytetrafluorethen Polytetrafluoräthylen	Operating Temperature: -270°C~+260°C (short time use +300°C, over 400°C toxic outgassing!), Density: 2.17 g/cm³
Resistant against nearly all organic and inorganic chemicals (except elementary fluor under pressure at high temperatures, lowest coefficient of friction (stat. 0.03; dyn. dry 0.05 - 0.20), not in any way adhasiv.		
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Plastic Table 4, Ceramics Table

Abbreviation (DIN ISO 1629)	common denomination	typical technical values
PU (ISO) AU (ISO)	Polyurethan Esterbase Polyurethan Etherbase	Operating Temperature: -40°C (from approx. -20°C increasing stiffness) ~+80°C (+120°C short time use), charring at +500°C, Density: 1.2 g/cm³, Elongation at Break: 350-700%
<p>Very good wear resistance, high resilience, good up to very good resistance against weathering, good UV-resistance and good exposure to ozone (Yellowing due to influence of wathering over longer time incl. small surface brittleness and small reduction of mechanical values), flexible in a wide temperature range, high buckling strength and tensile strength (high tear growth resistance), good dynamic load properties, hydrolysis- and mikrobe resistance (for polyether typ), oil resistant, grease resistant, solvent resistant (especially at higher aromatic content). No resistance to hot water! There is an endangering for typ without mikrobe resistance, to be destingerated by longer existing infestation by microbes. Humidity together with heat and a higher amount of organism can push up this process. Due to released enzymes the Ester links will be divided and the material will be destroyed. Mostly there is a selective infestation, in opposite to hydrolytic infestation, which takes place on the whole surface. (Hydrolysis)</p>		
PVAC (ISO)	Polyvinylacetate	Operating Temperature: +30°C, max. 80°C afterwards softening, Density: g/cm³
<p>Soft, at normal temperatures elastic up to hard, resistant against weathering and light resistant, no solubility in water, oil and paraffines, soluble in organic solvent, aromatic and halogenated hydrocarbon).</p>		
SIR (ISO) MVQ (ISO)	Silicon (SIR) Silicon Rubber Styrol - Isopren - Rubber Polysiloxan (MVQ)	Operating Temperature: -90°C~+180°C (short time use +250°C), without influence of water or steam, Density: 1.2 g/cm³
<p>High heat resistance, soft and high flexibility, exelent properties in cold use , very good resistance against oxygen, very good exposure to ozone and resistance against UV and weathering, very good electrical insulation properties, no physiological effect, bad gas tightness, normal mechanical properties, low abrasion resistance.</p>		
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Ceramics

Abbreviation (DIN ISO 1629)	Familiar denominations and names	Typical technical values
Al2O3	Aluminiumoxide	Operating Temperature: max. 1200°C, Density: 3.7 g/cm³, Compression Strength: 1450~2450 N/mm², Resistance to Bending 250~350 N/mm², Hardness: 2300 HV, Thermal Conductivity: 30 W/m•K, 1014 Ohm•cm
<p>High strength and hardness, high wear resistance, very good chemical resistance and corrosion resistance, high thermal conductivity, high thermal shock resistance, high electric insulation values.</p>		
ZrO2	Zirkonoxide	Operating Temperature: max. 800°C, Density: 6.0 g/cm³, Compression Strength: 2100 N/mm², Resistance to Bending 900~1000 N/mm², Hardness: 1300 HV, Thermal Conductivity: 2.5 W/m•K, 1010 Ohm•cm
<p>High strength and hardness, high wear resistance, very good chemical resistance and corrosion resistance, high thermal conductivity, high thermal shock resistance, high electric insulation values.</p>		