

Technical Datasheet: Engineering plastic type CF

General notes

- **PA66/CF30** polyamide 66 reinforced with 30 wt% carbon fibre
- heat stabilized
- very high rigidity, excellent tensile and flexural strength, fatigue and creep resistance
- low friction, self lubricating properties, excellent wear and abrasion resistance
- good heat capability
- good chemical resistance (oils, grease, fuels, non polar solvents); not resistant to strong acids, alkalis and hot water or steam
- ESD safe material, (avoid powder attraction, sparks generation, ignition sources).
- very low coefficient of linear thermal expansion
- typical applications include handling of sensitive components and devices (glass and ceramic substrates, capillary, etc.)

Mechanical properties

Flexural modulus +23°C:	17000 MPa	ASTM D 790
Flexural modulus +60°C:	12000 MPa	ASTM D 790
Flexural modulus +90°C:	9800 MPa	ASTM D 790
Flexural modulus +120°C:	8000 MPa	ASTM D 790
Tensile strength +23°C:	210 MPa	ISO 527
Tensile strength +60°C:	159 MPa	ISO 527
Tensile strength +90°C:	134 MPa	ISO 527
Tensile strength +120°C:	117 MPa	ISO 527
Rockwell hardness M:	>100	ASTM D 785
Izod-Impact strength (notched) +23°C:	70 J/m	ASTM D 256
Charpy-Impact strength (unnotched) +23°C:	30 kJ/m ²	DIN 53453

Thermal properties

Temp. of defl. under load (1.80 MPa):	256 °C	ASTM D648
Temp. of defl. under load (0.45 MPa):	260 °C	ASTM D648
Vicat softening temperature (50°C/h 50N):	254 °C	ISO 306
Coef. of lin. therm expansion, normal:	2,80 E-5/°C	ASTM D 696
Continuous Use Temperature	130°C	20'000 h
Short Time Temperature	190°C	

Electrical properties

Surface resistivity	10 ² Ohm	
Comparative tracking index:	<100 Volts	IEC 112
Electric strength (2mm):	2.0 kV/mm	IEC 243-1

Other properties

Density	1.28 g/ccm	ISO 1183
Water absorption in water 23°C (24h)	0.60%	ISO 62

Technical Datasheet: High-performance plastic type CP

General notes

- **PEEK** polyetheretherketone reinforced with carbon fibre
- very hard, rigid, high tensile and flexural strength, very high wear resistance
- high heat capability (260-300°C), good dimension stability, low thermal linear expansion coefficient
- excellent resistance to chemicals and aggressive agents, excellent resistance to thermal ageing.
- ESD-safe material
- typical applications include handling of components in cleaning/chemical/assembly processes also at high temperature (soldering).

Mechanical properties

Flexural modulus +23°C:	21400 MPa	ISO 178 ASTM D 790
Flexural strength +23°C	350 MPa	ISO 178 ASTM D 790
Tensile modulus +23°C	24000 MPa	ISO 527 ASTM D 638
Tensile strength +23°C:	190 MPa	ISO 527 ASTM D 638
Izod - Impact strength (notched) +23°C:	65 J/m	ISO 180/4A ASTM D 256

Thermal properties

Temp. of defl. under load (1.80 MPa):	300 °C	ISO 75 ASTM D648
Continuous Use Temperature	260°C	20'000 h
Short Time Temperature	300°C	

Electrical properties

Surface resistivity:	10 ⁵ -10 ⁶ Ohm	
Decay time:	< 0.2 sec	1000-10 V

Other properties

Density	1.39 g/ccm	ISO 1183
Water absorption in water 23°C (24h)	0.01%	ISO 62

Chemical Resistance Guide of CP

Acids

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Acetic Acid, 10% Conc.	A	A	-
Acetic Acid, Conc.	A	A	A
Acetic Acid, Glacial	A	A	-
Acrylic Acid	A	A	-
Aqua Regia	C	C	C
Benzene Sulphonic Acid	C	-	-
Benzoic Acid	A	A	-
Boric Acid	A	A	-
Carbolic Acid	A	-	-
Carbonic Acid	A	A	-
Chloracetic Acid	A	A	-
Chlorosulfonic Acid	C	C	C
Chromic Acid, 40% Conc.	A	-	-
Chromic Acid, Conc.	C	C	C
Citric Acid	A	A	-
Formic Acid	B	B	-
Hydrobromic Acid (100%)	C	C	C
Hydrochloric Acid, 10% Conc.	A	A	-
Hydrochloric Acid, Conc.	A	B	-
Hydrocyanic Acid	A	A	-
Hydrofluoric Acid (40%)	C	C	-
Hydrofluoric Acid (70%)	C	C	-
Lactic Acid	A	A	-
Maleic Acid	A	A	-
Nitric Acid, 10% Conc.	A	A	-
Nitric Acid, 30% Conc.	B	-	-
Nitric Acid, 50% Conc.	C	C	C
Nitric Acid, Conc.	C	C	C
Nitrous Acid, 10%	A	-	-
Oleic Acid	A	-	-
Oleum	C	C	C
Oxalic Acid	A	A	-
Perchloric Acid	A	A	-
Phosphoric Acid, 10% Conc.	A	A	A
Phosphoric Acid, 50% Conc.	A	A	A
Phosphoric Acid, 80% Conc.	A	A	-
Phthalic Acid	A	A	-
Picric Acid	A	A	-
Silicic Acid	A	A	-
Sulphuric Acid, <40% Conc.	B	B	B
Sulphuric Acid, >40% Conc.	C	C	C
Sulphurous Acid	A	A	-
Tannic Acid, 10% Conc.	A	A	-
Tartaric Acid	A	A	-

Bases

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Ammonia, 880	A	-	-
Ammonia, Anhydrous	A	A	A
Ammonia, Aqueous	A	A	A
Ammonium Hydroxide, 10% Conc.	A	-	-
Ammonium Hydroxide, Conc.	A	-	-
Calcium Hydroxide	A	-	-
Hydrazine	A	A	-
Magnesium Hydroxide	A	-	-
Potassium Hydroxide, 10% Conc.	A	-	-
Potassium Hydroxide, 70% Conc.	A	-	-
Sodium Hydroxide, 10% Conc.	A	A	A
Sodium Hydroxide, 50% Conc.	A	A	A
Sodium Hydroxide, Conc.			

Inorganic Reagents

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Aluminum Chloride	A	A	-
Aluminum Sulphate	A	A	-
Alum, Saturated	A	A	-
Ammonium Chloride (10% Conc.)	A	A	-
Ammonium Nitrate	A	A	-
Antimony Trichloride	A	A	-
Barium Salts (Chloride, Sulfide)	A	-	-
Bleach	A	A	-
Brine	A	A	-
Bromine	C	C	C
Bromine (Dry)	C	C	C
Bromine (Wet)	C	C	C
Bromine Water, Saturated	A	A	-
Calcium Bisulphide	A	A	-
Calcium Carbonate	A	-	-
Calcium Chloride	A	A	-
Calcium Hypochlorite	A	A	-
Calcium Nitrate	A	-	-
Calcium Sulphate	A	A	-
Carbon Dioxide (Dry)	A	-	-
Carbon Monoxide (Gas)	A	A	A
Chlorine (Gas-Dry)	A	A	C
Chlorine (Gas-Wet)	C	C	-
Chlorine (Liquid)	C	C	C
Chlorine (Wet)	C	C	C
Copper Acetate	A	A	-
Copper Carbonate	A	A	-
Copper Chloride	A	A	-
Copper Cyanide	A	A	-
Copper Fluoride	A	A	-
Copper Nitrate	A	A	-
Copper Sulphate	A	A	-

Cupric Fluoride	A	A	-
Cupric Sulphate	A	A	-
Cuprous Chloride	A	A	-
Ethylene Nitrate	A	-	-
Ferric Chloride	B	B	-
Ferric Nitrate	A	-	-
Ferric Oxide	A	A	-
Ferric Sulphate	A	-	-
Ferrous Chloride	A	-	-
Ferrous Nitrate	A	-	-
Ferrous Sulphate	A	-	-
Fluorine	C	C	C
Hydrogen Peroxide	A	-	-
Hydrogen Sulphide (Gas)	A	A	A
Iodine	B	-	-
Lead Acetate	A	A	-
Lime	A	A	-
Magnesium Chloride	A	A	-
Magnesium Sulphate	A	A	-
Mercuric Chloride	A	A	-
Mercurous Chloride	A	-	-
Mercury	A	A	-
Nickel Acetate	A	A	-
Nickel Chloride	A	A	-
Nickel Nitrate	A	A	-
Nickel Salts	A	-	-
Nickel Sulphate	A	A	-
Nitrogen	A	-	-
Nitrous Oxide	A	-	-
Oxygen	A	-	-
Ozone	A	B	-
Phosphorous Chlorides	A	A	-
Phosphorous Pentoxide	A	A	-
Potassium Aluminium Sulphate	A	A	-
Potassium Bicarbonate	A	-	-
Potassium Bromide	A	A	-
Potassium Carbonate	A	-	-
Potassium Chlorate	A	A	-
Potassium Chloride	A	A	-
Potassium Dichromate	A	-	-
Potassium Ferricyanide	A	-	-
Potassium Ferrocyanide	A	-	-
Potassium Hydroxide	A	A	-
Potassium Nitrate	A	A	-
Potassium Permanganate	A	-	-
Potassium Sulphate	A	A	-
Potassium Sulphide	A	-	-
Silicone Fluids	A	A	-
Silver Nitrate	A	A	-
Sodium Acetate	A	-	-
Sodium Bicarbonate	A	-	-
Sodium Carbonate	A	A	-
Sodium Chlorate	A	A	-

Sodium Chloride	A	A	-
Sodium Hypochlorite	A	A	-
Sodium Nitrate	A	A	-
Sodium Nitrite	A	-	-
Sodium Peroxide	A	A	-
Sodium Salts	A	-	-
Sodium Silicate	A	A	-
Sodium Sulphate	A	A	-
Sodium Sulphide	A	A	-
Sodium Sulphite	A	A	-
Sodium (Hot)	C	C	C
Stannic Chloride	A	A	-
Stannous Chloride	A	A	-
Steam	A	A	A
Sulphur	A	A	-
Sulphur Chloride	A	A	-
Sulphur Dichloride	A	A	-
Sulphur Dioxide	A	A	A
Sulphur Hexafluoride (Gas)	A	-	-
Sulphur Trioxide	A	A	-
Tar	A	-	-
Tetraethyl Lead	A	-	-
Water, Distilled	A	A	-
Water	A	A	A
Water, Sea/Salt	A	A	-
Zinc Chloride	A	A	-
Zinc Sulphate	A	A	-

Alcohols

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Benzyl Alcohol	A	-	-
Butanol	A	-	-
Cyclohexanol	A	-	-
Ethanol	A	A	-
Ethylene Glycol	A	A	B
Ethylene Glycol, 50% Conc.	A	A	A
Glycerol	A	-	-
Glycols	A	A	-
Isopropanol	A	-	-
Methanol	A	A	-
Propanol	A	-	-

Aldehydes and Ketones

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Acetaldehyde	A	A	-
Acetone	A	A	-
Benzaldehyde	A	-	-
Cyclohexanone	A	-	-
Formaldehyde	A	A	-
Formalin	A	-	-
Methylethyl Ketone (MEK)	A	B	C
N-Methyl-2-Pyrrolidone (NMP)	A	-	-

Esters

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Aliphatic Esters	A	A	-
Amyl Acetate	A	A	-
Butyl Acetate	A	-	-
Dibutyl Phthalate	A	-	-
Dimethyl Phthalate	A	-	-
Dioctyl Phthalate	A	-	-
Ethyl Acetate	A	-	-
Oils (Di-Ester and Phosphate Ester Based)	A	A	-

Ethers

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Diethylether	A	A	-
Dioxane	A	-	-
Ethylene Oxide (EtO)	A	-	-
Tetrahydrofuran (THF)	A	-	-

Organo-Nitrogen Compounds

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Acetonitrile	A	-	-
Aniline	A	B	-
Dimethyl Formamide (DMF)	A	-	-
Diethylamine	A	-	-
Nitrobenzene	A	-	-
Pyridine	A	A	-

Halogenated Organics

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
1,2 Dichloroethane	A	-	-
Carbon Tetrachloride	A	A	-
Chlorobenzene	A	A	-
Chloroform	A	A	-
Dibromoethane	A	-	-

Dichlorobenzene	A	-	-
Freon* 113 (Arklone®) Trichlorotrifluoroethane	A	-	-
Freon 114, 1, 1 Dichloro 1,2,2,2 Tetrafluoroethane	A	-	-
Freon 12, Dichlorodifluoromethane	A	-	-
Freon 22, Chlorodifluoromethane	A	A	-
Freon 134a	A	-	-
Freon 502	A	A	-
Genklene®* (1,1,1 Trichloroethane)	A	-	-
Methylene Chloride	A	-	-
Perchloroethylene	A	A	-
Trichloroethylene	A	A	-

Hydrocarbons

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Acetylene	A	A	-
Aromatic Solvents	A	A	-
Aviation Hydraulic Fluid	A	-	-
Benzene	A	A	-
Brake Fluid (Mineral)	A	A	A
Brake Fluid (Polyglycol)	A	A	A
Butane	A	-	-
Crude Oil	A	-	-
Cyclohexane	A	A	-
Diesel Oil	A	-	-
Dowtherm* G	B	-	-
Dowtherm* HT	B	-	-
Dowtherm* LF	B	-	-
Ethane	A	-	-
Fuel Oil	A	-	-
Gas (Manufactured)	A	-	-
Gas (Natural)	A	-	-
Gasoline	A	-	-
Heptane	A	-	-
Hexane	A	-	-
Hydraulic Fluid	A	-	-
Iso-Octane	A	-	-
Kerosene	A	-	-
Lubricating Oil	A	-	-
Methane (Gas)	A	A	A
Motor Oil	A	A	A
Naphtha	A	A	-
Naphthalene	A	A	-
Oils (Petroleum)	A	A	-
Oils (Vegetable)	A	A	-
Pentane	A	-	-
Petroleum Ether	A	A	-
Propane	A	-	-
Skydrol* Hydraulic Fluid	A	-	-
Styrene (Liquid)	A	-	-
Toluene	A	-	-
Transformer Oil	A	A	-
Vaseline*	A	-	-

Xylene	A	-	-
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Miscellaneous Reagents

CHEMICAL	23°C (73°F)	100°C (212°F)	200°C (392°F)
Adhesives (not cyanoacrylates)	A	-	-
Apple Juice	A	-	-
Aviation Spirit	A	-	-
Beer	A	A	-
Cooking Oil	A	-	-
Creosote	A	-	-
Detergent Solutions (non-phenolic)	A	A	-
Edible Fats and Oils	A	-	-
Fatty Acids	A	A	-
Fruit Juice	A	A	-
Gelatin	A	A	-
Ketchup	A	-	-
Linseed Oil	A	-	-
Milk	A	A	-
Mineral Oil	A	-	-
Molasses	A	A	-
Olive Oil	A	A	-
Peanut Oil	A	A	-
Paraffin	A	A	-
Sewage	A	A	-
Soap Solution	A	-	-
Starch	A	A	-
Tallow	A	A	-
Turpentine	A	-	-
Urea	A	A	-
Varnish	A	-	-
Vinegar	A	A	-
Wax	A	-	-
White Spirit	A	-	-
Wines and Spirits	A	-	-
Yeast	A	A	-

Technical Datasheet: Engineering plastic type DG/DL

General notes

- **POM/GF30** acetal resin reinforced with 30 wt% glass fibre
- good tensile and flexural strength, fatigue and creep resistance
- low friction, good wear and abrasion resistance
- low moisture absorption
- good chemical resistance (oils, grease, fuels, organic solvents); not resistant to strong acids, alkalis and oxidizing agents; good hydrolytic resistance (hot water)
- insulating
- typical applications include handling of very scratch sensitive components (ceramic and glass devices, wafers, capillary)

Mechanical properties

Flexural modulus +23°C:	8000 MPa	ASTM D 790
Flexural modulus +60°C:	5700 MPa	ASTM D 790
Flexural modulus +90°C:	4500 MPa	ASTM D 790
Flexural modulus +120°C:	3800 MPa	ASTM D 790
Tensile strength +23°C:	83 MPa	ISO 527
Tensile strength +60°C:	60 MPa	ISO 527
Tensile strength +90°C:	53 MPa	ISO 527
Tensile strength +120°C:	45MPa	ISO 527
Rockwell hardness M:	85	ASTM D 785
Izod-Impact strength (notched) +23°C:	55 J/m	ASTM D 256
Charpy-Impact strength (unnotched) +23°C:	20 kJ/m ²	DIN 53453

Thermal properties

Temp. of defl. under load (1.80 MPa):	162 °C	ASTM D648
Temp. of defl. under load (0.45 MPa):	165 °C	ASTM D648
Vicat softening temperature (50°C/h 50N):	156 °C	ISO 306
Coef. of lin. therm expansion, normal:	4.50 E-5/°C	ASTM D 696
Continuous Use Temperature	85°C	20'000 h
Short Time Temperature	120°C	

Electrical properties

Comparative tracking index:	>600 Volts	IEC 112
Electric strength (2mm):	23.0 kV/mm	IEC 243-1

Other properties

Density	1.59 g/ccm	ISO 1183
Colour	DG white DL black	
Water absorption in water 23°C (24h)	0.20%	ISO 62

Technical Datasheet: Engineering plastics type LR

General notes

- **PPS/GF30** polyphenylene sulfide reinforced with 30 wt% glass fiber
- very hard, rigid, high tensile and flexural strength, creep resistance
- high heat capability (230-260°C), good dimension stability, low thermal linear expansion coefficient
- UL94V-0 self-extinguishing, without halogens or phosphorus; low fume optical density and toxicity
- excellent chemical resistance (organic solvent, oils, grease, fuels, acids and alkalis); not resistant only to hydrochloric acid and oxidizing agents, excellent resistance to thermal ageing, very low moisture absorption
- insulating
- microwave transparent
- typical applications include soldering processes, handling of components in cleaning/chemical processes.

Mechanical properties

Flexural modulus +23°C:	11000 MPa	ASTM D 790
Flexural modulus +60°C:	10500 MPa	ASTM D 790
Flexural modulus +90°C:	8500 MPa	ASTM D 790
Flexural modulus +120°C:	6000 MPa	ASTM D 790
Tensile strength +23°C:	132 MPa	ISO 527
Tensile strength +60°C:	118 MPa	ISO 527
Tensile strength +90°C:	115 MPa	ISO 527
Tensile strength +120°C:	95 MPa	ISO 527
Rockwell hardness M:	99	ASTM D 785
Izod - Impact strength (notched) +23°C:	75 J/m	ASTM D 256
Charpy - Impact strength (unnotched) +23°C:	16 kJ/m ²	DIN 53453

Thermal properties

Temp. of defl. under load (1.80 MPa):	263 °C	ASTM D648
Temp. of defl. under load (0.45 MPa):	278 °C	ASTM D648
Vicat softening temperature (50°C/h 50N):	244 °C	ISO 306
Coef. of lin. therm expansion, normal:	2.80E-5/°C	ASTM D 696
Continuous Use Temperature	200°C	20'000 h
Short Time Temperature	230°C	

Electrical properties

Comparative tracking index:	150 Volts	IEC 112
Electric strength (2mm):	19.0 kV/mm	IEC 243-1
Resistivity	>10 ¹³ Ohm.m	
Surface resistivity	>10 ¹³ Ohm	

Other properties

Density	1.55 g/ccm	ISO 1183
Water absorption in water 23°C (24h)	0.01%	ISO 62

Chemical Resistance Guide of PPS

The chemical resistance of PPS is well known to be outstanding, even at elevated temperatures. However, being an organic polymer, it can be affected by some chemicals under certain conditions. Performance will vary depending on particular chemicals used (or combinations thereof), particular conditions of service, and particular PPS compounds used. Temperature and duration of exposure are critical factors that must be considered when determining the degree of chemical resistance required for a particular application. An insignificant effect that occurs over a short time, or at low temperature, may become significant in a few months or at elevated temperatures. It is important to consider which conditions and what properties are critical to an application, and then evaluate chemical resistance data relative not only to the performance requirements, but also relative to the performance of other materials used in the same application. If you require further information, our chemists can provide opinions about the suitability of PPS for particular chemical environments, based on our knowledge of the chemistry of PPS and our compounds. However, testing under conditions as similar as possible to actual service conditions is always recommended as the best way to determine chemical compatibility for a particular application.

Oxidizing Chemicals

Avoid exposure of PPS to these chemicals except at low concentrations or for very brief periods.

Acids, Bases, and Salt Solutions

Non-oxidizing, water-based acid, base, and salt solutions do not have a significantly different effect on PPS than water alone, except under very acidic conditions.

Organic Chemicals

Non-oxidizing organic chemicals generally have little effect on PPS.

Hot Water

PPS polymer is not hydrolyzed by hot water.

Automotive Fluids

PPS is very resistant to all common automotive fluids, even at elevated temperatures.

Technical Datasheet: High performance plastic type SV

General notes

- **PVDF** polyvinylidene fluoride carbon fibre reinforced
- excellent mechanical strength and toughness
- smooth surface
- heat stabilized, high heat capability, continuous use temperature up to 150°C
- high purity (clean room and medical devices approved, low extraction value)
- excellent chemical resistance to most aggressive substances (mineral and organic acid) and solvents (hydrocarbons, alcohols, halogenated), resistant to halogens
- outstanding resistance to hydrofluoric acid (40% conc., 90°C), nitric acid (50% conc., 90°C), hydrochloric acid (36% conc., 90°C)
- high abrasion resistant
- resistant to UV and nuclear radiation (sterilisation)
- ESD safe material, (avoid powder attraction, sparks generation, ignition sources) .
- typical applications include handling of very scratch- and contamination-sensitive components, cleaning and etching processes.

Mechanical properties

Flexural modulus +23°C:	7500 MPa	ASTM D 790
Tensile modulus +23°C:	8000 MPa	ASTM D638
Tensile strength +23°C:	120 MPa	ASTM D638
Flexural strength +23°C:	150 MPa	ASTM D790
Shore D hardness:	82	ASTM D 2240
Izod-Impact strength (notched) +23°C:	110 J/m	ASTM D 256

Thermal properties

Temp. of defl. under load (1.80 MPa):	158 °C	ASTM D648
Temp. of defl. under load (0.45 MPa):	170 °C	ASTM D648
Vicat softening temperature (50°C/h 50N):	172 °C	ISO 306
Coef. of lin. therm expansion, normal:	7.00 E-5/°C	ASTM D 696
Continuous Use Temperature	150°C	20'000 h
Short Time Temperature	200°C	

Electrical properties

Surface resistivity:	<1.0E5 Ohm	ASTM D257
Volume resistivity:	<1.0E3 Ohm.cm	ASTM D257

Other properties

Density	1.37 g/ccm	ISO 1183
Water absorption in water 23°C (24h)	0.65%	ISO 62