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POLYPROPYLENE (PP)

Polypropylene is a semi-crystalline thermoplastic with high rigidity and very good chemical resistance. Characteristic for polypropylene is a CH3 side-group in the monomer structural unit, which can be aligned in various spatial positions during polymerisation. The various spatial alignments are significant for the physical properties and differ according to the following:

- Isotactic (regular, one-sided alignment in the macromolecule),
- Syndiotactic (regular, double-sided alignment in the macromolecule),
- Atactic (irregular, random alignment in the macromolecule).

Standard Colours: Grey / White

Mechanical Properties		
Density	g/cm³	0.91
Yield Stress	MPa	32
Elongation at break	%	70
E-Module (Tensile)	MPa	1,400
E-Module (Bending)	MPa	1,400
Flexural strength	MPa	45
Impact strength	KJ/m²	o. B.
Notched-bar impact strength	KJ/m²	7
Ball indentation Hardness H 358/30	MPa	70
Creep rate stress at 1% elongation	MPa	4
Sliding friction coefficient against steel (dry running) [3]	-	0.35
Sliding wear against steel (dry running) [3]	µm/km	11.0
Thermal Properties		
Melting temperature	°C	+162
Thermal conductivity	W//(k m)	0.22
Specific thermal capacity	J/(g K)	1.7
Coefficient of linear expansion	10^{-5} - K^{-1}	16
Operating temperature range (long-term)	°C	0 to +80
Operating temperature range (short-term)	°C	+100
Fire behaviour after UL 94 IEC 60695	-	HB
Electrical Properties		
Dielectric constant [6] IEC 60250	-	2.25
Dielectric loss facto [6]	-	0.00033
Specific volume resistance	Ω-cm	$>10^{16}$
Surface resistance	Ω	10^{14}
Dielectric strength	KV/mm	52
Creep resistance	-	CM 600
Moisture absorption in NK	W(H_2O)%	<0.01
Water absorption until saturated	W_5%	<0.01

Alignment
A distinction is also made between homopolymers and copolymers; copolymers are tougher but have less mechanical and chemical stability. As the physical properties improve considerably with the increase in the isotactic concentration in the polymer, isotactic polypropylene homopolymers should be the first choice for use in the technical area. The polypropylene finished products that we offer consist of high density polypropylene types produced
by extrusion or moulding processes.

Main properties

- Low density compared to other materials (0.91 g/cm3)
- Minimum water absorption (< 0.01%)
- Excellent chemical resistance, also to solvents
- High corrosion resistance
- Relatively high surface hardness
- Very good electrical insulator
- Physiologically safe

Applications

- Pump parts
- Component parts in chemical apparatus construction
- Fittings
- Valve bodies
- Product holders for electroplating processes
- Punching plates

Areas of use

- Electroplating industry
- Chemical industry
- Machine engineering
- Stamping/punching plants

Sliding properties - PP-H is subject to strong sliding abrasion and is thus not suitable for use in sliding applications.

Chemical resistance - PP-H is resistant to acids, alkaline solutions, salts and salt solutions, alcohols, oils, fats, waxes and many solvents. Aromatics and halogenated hydrocarbons cause swelling. PP-H is not resistant to strong oxidising materials (e.g. nitric acid, chromic acid or halogens) and there is a danger of stress corrosion cracking.

Behaviour in fire - PP-H is rated as normal flammable. When the source of ignition is removed PP-H continues to burn, forming droplets. However, apart from carbon dioxide, carbon monoxide and water, only small quantities of carbon black and molecular constituents of the plastic develop as conflagration gases. The oxygen index (the oxygen concentration required for combustion) at 18% is low compared to other plastics.

Weathering effects - PP-H is not resistant to UV rays. UV rays, in combination with atmospheric oxygen, oxidise the surface and discolouration occurs. If the material is exposed to the effects of UV rays for a longer period, this will cause irreparable damage and decomposition of the surface.

Machining - In addition to its good welding properties, PP-H can also be machined on machine tools. The semi-finished products can be drilled, milled, sawed, planed and turned on a lathe. It is also possible to cut a thread into the material or insert a threaded element. Generally, no cooling or lubricating emulsion is necessary. During cutting, it is very important to ensure that the tools that are used are always adequately sharp. Blunt tools cause the surface to heat, which can cause “smearing” and consequently unacceptable surface finishes.