Polyethylene (PE)

Polyethylene is a semi-crystalline thermoplastic with high toughness and chemical resistance, but rather low mechanical strength in comparison to other plastics and cannot be used at high temperatures. The different polyethylenes differ in regard to their molar mass (molecular weight), which is important for the respective physical properties. This means that in addition to the common properties that all types have, certain ones have type-specific properties.

The polyethylene finished products that we offer consist of high density polyethylene types produced by extrusion or moulding processes.

Main properties

- Low density compared to other materials (0.94 g/cm^3)
- High impact resistance, also at low temperatures
- Minimum water absorption (< 0.01%)
- Excellent chemical resistance
- High corrosion resistance
- Anti-adhesive
- Very good electrical insulator
- High vibration absorption
- Physiologically safe (does not apply to regenerate semi-finished products)

Colours

PE-HD: natural, black
PE-HMW: natural, green
PE-UHMW: natural, green, black.
Other colours on request.

Sliding properties

PE-HD (PE 300; molar mass approx. 200,000 g/mol) is very suitable for welding due to its relatively low molar mass; however, it is not abrasion resistant and has low strength values. This leads to a high level of sliding abrasion, which excludes its use in sliding applications.

PE-HMW (PE 500; molar mass approx. 500,000 g/mol) has better sliding properties because of its higher molar mass and is also more abrasion resistant than PE-HD. In combination with its good level of toughness, it is suitable for use in low load components that are not subject to any high degree of sliding abrasion.

PE-UHMW (PE 1,000; molar mass approx. 4,500,000 g/mol). Because of its high molar mass it has very good wear resistance, bending strength and impact resistance and good noise absorption. Due to its excellent sliding properties and low sliding abrasion, it is the ideal material for lightly loaded components.

Both PE-HMW and PE-UHMW are also available as regenerated material, although it must be noted that the respective physical properties are slightly reduced.

Chemical resistance

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

Weathering effects

As a general rule, no PE types are resistant to UV rays. This does not apply to the black coloured types, which are resistant to UV rays also in combination with atmospheric oxygen.

Behaviour in fire

All PE types are rated as normal flammable. When the source of ignition is removed they continue to burn and form 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.

Areas of use

PE-HD
- Electroplating industry
- Chemical industry
- Chemical apparatus construction

PE-HMW
- Food industry
- Meat processing industry
- Sporting venue construction

PE-UHMW
- Electroplating industry
- General machine engineering
- Coal processing
- Packaging industry
- Conveying technology
- Paper industry
- Electrical industry

Applications

PE-HD
- Component parts in chemical equipment design
- Fittings
- Inserts
- Stacking boxes

PE-HMW
- Cutting table surfaces
- Agitator blades
- Wall linings in refrigeration rooms
- Impact bands
- Knife blocks

PE-UHMW
- Sheaves, guide rollers
- Sprocket wheels and pinions
- Gears
- Chain guides
- Slides
- Suction plates
- Roller knife and scrapers
- Chute linings for silos
- Conveyor trough linings
- Abrasion protection strips

Machining

In addition to the good welding properties of PE-HD and PE-HMW, all PE types 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. As a rule, no cooling or lubricating emulsion is necessary.