Polyethylene (HD-PE & UHMW-PE)

Technical Datasheet

精欣达 JING XIN DA

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Typical Applications

High density PE – (HDPE)
For - transport containers, pump and valve parts, tank construction, components with medical applications, gaskets, slide profiles, components for the food industry.

Ultra-high-molecular-weight PE –(UHMW-PE)
For - pump & valve parts, gaskets, glide profiles, parts for the food industry.

Product Description

High-quality general purpose engineering plastic materials; the chemical name is polyethylene. It's available in a range of grades and forms to suit many applications.

Technical Description

Smiths' range of extruded polyethylene includes the following grade options –

Grade	Modification	Purpose
High density PE (HD-PE or 300 grade)	None. Colours, natural black. Some sizes available in red or yellow.	Component identification. Black will have better UV resistance.
Ultra-high-molecular-weight PE. (UHMW-PE or 1000 grade)`	None. Colours natural black, green.	Component identification. Black will have better UV resistance.

Machinability

The machining of polyethylene is uncomplicated provided the component tolerances allow for polyethylene's relatively high co-efficient of thermal expansion and tensile elongation values. Full machining instructions can be supplied on request.

Chemical Resistance

HD-PE has extremely good resistance to aqueous solutions of acids, alkalis and salts. Also alcohol and many solvents. Slight swelling may be caused by permanent contact with grease, oil and wax, but generally not enough to limit the use of the material. Aromatics and halogenated hydrocarbons will cause a reduction in useful working life. The material has no resistance to strong oxidising agents such as nitric or chromic acids, and halogens.
The UHMWPE grade has even better chemical resistance; strong oxidising agents only cause surface swelling.

Physiological Safety

The FDA (US Food & Drug Administration) has approved the raw materials used for both the HD-PE and UHMWPE grades to allow their use in contact with food – check for any specific limitations required by the FDA.

Product Attributes	Customer Benefits
Range of grades available.	Correct grade selection for each application is optimised
Able to resist very high impact loads	
Excellent chemical resistance	Very good all-round product for diverse engineering applications
Natural product may be used in contact with foodstuffs (subject to appropriate limits)	
HDPE may be hot air welded.	Low cost assembly.
UHMWPE is resistant to extreme abrasion	Long wear life.
Low density - compared with other engineering plastics	Easy handling, low inertia, saving energy
Minimal absorption of moisture	Aids dimensional stability
Diameter (HD-PE)	Huge components are possible.
Product sourced from longstanding manufacturer with ISO accreditation	Consistent quality ensures uniform machining & performance

Product Availability *

Extruded round bar	
HD-PE	10mm to 700mm dia in black (to 500mm dia in natural) ≤ 2m lengths.
UHMW-PE	20mm to 200mm in natural, black and green. ≤ 2m lengths.
Hollow round bar in HD-PE (black colour)	From 30mm o/d x 15mm i/d to 200mm o/d x 120mm i/d in 2m lengths.
	Square & rectangular hollow tubes, angles, channels and welding rod. Also hinges and handles for tank fabrication. All in black colour.

* Sizes not stocked are available on relatively short delivery time. 1, 2 or 3m lengths supplied or cut to customer requirements.

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	High Density PE	Ultra-high molecular weight PE	
Mechanical Properties			
Density at 20°C	0.95	0.93	g/cm^3
Tensile strength @ yield	27	17	MPa
@ break	35	40	MPa
Elongation @ yield	9	≥ 20	%
@ break	≥ 700	≥ 50	%
Tensile modulus of elasticity	1150	600	MPa
Flexural strength	22	27	MPa
Impact strength	No break	No break	kJ/m^2
Notched impact strength	29	No break	kJ/m^2
Ball indentation hardness / Rockwell	-	35	N/mm^2
Hardness (Shore D)	64	51	-
Electrical Properties			
Volume resistivity	≥ 10^{15}	≤ 10^{14}	Ohm cm
Surface resistivity	≥ 10^{16}	≤ 10^{12}	Ohm
Dielectric constant @ 1 MHz	2.35	3.0	-
Dielectric loss factor @ 1 MHz	0.0003	0.0001	-
Dielectric strength	17	45	Kv/mm
Tracking resistance – IEC 60112	-	KB ≥ 600	V
Thermal Properties			
Vicat softening point -VST/B/50	80	80	°C
-VST/A/50	129	-	°C
Heat deflection temperature -HDT/B	69	65	°C
-HDT/A	-	42	°C
Coefficient thermal expansion	1.50	2.0	10^{-4} .K^{-1}
Thermal conductivity at 20°C	0.42	0.42	W/(m - K)
Service temperatures - upper limit	90	90	°C
without high mech. load - lower limit	-50	-150	°C
Other Physical Properties			
Moisture absorption - ISO 62	0.01	0.001	%
Suitability for bonding	+	-	-
Physiological indifference according to FDA or EEC 90/128 - natural colour	+	-	
Friction coefficient	0.30	0.25	DIN 53375
Flammability according to UL94	HB	HB	UL94
UV stability without additives	0	-	

Technical Assistance

Our knowledgeable staff backed up by our resident team of qualified metallurgists and engineers, will be pleased to assist further on any technical topic.

info@jxd-machining.com | www.jxd-machining.com

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