



Technical Information



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General Description

Plaztuff™ Hyspec Polymer sheet is a modified High Molecular Weight Polyethylene (HMWPE) made to our exact specification for the purposes of manufacturing a wide range of engineering products using extrusion welding and sheet fabrication techniques

Polyethylene's are semi-crystalline materials with excellent chemical resistance[#], good fatigue and wear resistance, and a wide range of properties. Polyethylenes provide good resistance to organic solvents, degreasing agents and electrolytic attack. They have higher impact strength, but lower working temperatures than Polypropylene. They are light in weight, resistant to staining and have very low moisture absorption rates. Polyethylenes are easy to distinguish from other plastics as they float in water.

Plaztuff™ HMWPE is lightweight (1/8 the weight of mild steel), high in tensile strength and is as simple to machine as wood and with extrusion welding equipment is fully weldable. Plaztuff™ is self-lubricating, offers excellent impact resistant, long wearing, has moderate abrasion resistant and is corrosion resistant. Plaztuff™ sheet is built to a high specification with a very high UV factor and performs well in all environments with good weathering properties and a 20+ UV life. Plaztuff™ is also non-toxic and non-staining and meets FDA and USDA certification acceptance for food and pharmaceutical equipment and is a good performer in applications up to 82°C

Material Properties

Property <u>PHYSICAL</u>	SI	Method (ASTM or UL)
Molecular Weight	< 500,000	-
Density	0.96 g/cm ³	ASTM D1505
Water Absorption, 24hrs %	0	ASTM D570
<u>MECHANICAL</u>		
Tensile Strength at Yield, 2 in/min, Type IV bar	28 MPa	ASTM D638
Tensile Impact, Type S bar	190 kJ/m ²	ASTM D1822
Elongation at Break, 2 in/min, Type IV bar	500%	ASTM D638
Flexural Modulus, Tangent - 16:1 span:depth, 0.5 in/min	1,400 MPa	ASTM D790
ESCR, Condition A (100% Igepal), F50	>600 h	ASTM D1693
ESCR, Condition B (100% Igepal), F50	>600 h	ASTM D1693

Durometer Hardness, Type D (Shore D)	77	ASTM D2240
Dynamic Coefficient of friction	0.07	ASTM D1894

Wear resistance

Each material listed below was rotated 24 hours @ 1750 r.p.m. in a 50/50 sand/water slurry. The weight loss for each of the materials is relative to 100 and 50...

The lower the number... the better the abrasion resistance.

Material	Abrasion Rating
Carbon Steel	100
High MW Polyethylene	44
Nylon	31

THERMAL

Vicat Softening Temperature, Loading 1, Rate A	126°C	ASTM D1525
Heat Deflection Temperature, 66 psi, Method A	78°C	ASTM D648
Brittleness Temperature, Type A, Type I specimen	<-75°C	ASTM D746
Average Coefficient of linear Thermal Expansion between 23 & 100°C 10^{-6} m/(m-K)	150	ASTM D696
Max operating Temperature	82°C	-
Flammability Rating	n.r	UL94

ELECTRICAL

Dielectric Strength (V/mil) short time, 5mm thick	700	ASTM D149
Dielectric Constant at 1 kHz	2.30-2.35	ASTM D150
Dissipation Factor at 1 kHz	0.0002	ASTM D150
Volume Resistivity (ohm-cm) at 50% RH	10^{15}	ASTM D257
Arc Resistance (sec)	250-300	ASTM D495

The nominal properties reported herein are typical of the product, but do not reflect normal testing variance and therefore should not be used for specification purposes. Values are rounded. The physical properties determined on test pieces cannot be used for concluding the behaviour of finished articles, since the range of variables in both the processing and shaping play a part.

see attached chemical resistance chart for polyethylene

Chemical Resistance Chart for HDPE (High Density Polyethylene)

The chemical resistance chart that follows is a general guide only. Please contact Orange Peel about specific applications.

Chemical Resistance Classification:

- E – 30 days of constant exposure to reagent causes no damage
- G – Little or no damage after 30 days of constant exposure to the reagent
- F – Some effect after 7 days exposure to the reagent. Solvents may cause swelling and permeation losses
- N – Not recommended for continuous use

First letter of each pair applies to conditions at 20°C (68°F); the second to those at 50°C (122°F).

Acetaldehyde – GF	Diethyl Ketone – GG	Nitric Acid, 1-10% – EE
Acetamide, Sat. – EE	Diethyl Malonate – EE	Nitric Acid, 50% – GN
Acetic Acid, 5% – EE	Diethylamine – FN	Nitric Acid, 70% – GN
Acetic Acid, 50% – EE	Diethylene Glycol – EE	Nitrobenzene – FN
Acetic Anhydride – FF	Diethylene Glycol Ethyl Ether – EE	Nitromethane – FN
Acetone – EE	Dimethyl Acetamide – EE	n-Octane – EE
Acetonitrile – EE	Dimethyl Formamide – EE	Orange Oil – GF
Acrylonitrile – EE	Dimethylsulfoxide – EE	Ozone – EE
Adipic Acid – EE	1,4-Dioxane – GG	Perchloric Acid – GN
Alanine – EE	Dipropylene Glycol – EE	Perchloroethylene – NN
Allyl Alcohol – EE	Ether – FN	Phenol, Crystals – GF
Aluminum Hydroxide – EE	Ethyl Acetate – EE	Phenol, Liquid – NN
Aluminum Salts – EE	Ethyl Alcohol (Absolute) – EE	Phosphoric Acid, 1-5% – EE
Amino Acids – EE	Ethyl Alcohol (40%) – EE	Phosphoric Acid, 85% – EE
Ammonia – EE	Ethyle Benzene – GF	Picric Acid – NN
Ammonium Acetate, Sat. – EE	Ethyl Benzoate – GG	Pine Oil – EG
Ammonium Glycolate – EE	Ethyl Butyrate – GF	Potassium Hydroxide, 1% – EE
Ammonium Hydroxide, 5% – EE	Ethyl Chloride, Liquid – FF	Potassium Hydroxide, Conc. – EE
Ammonium Hydroxide, 30% – EE	Ethyl Cyanoacetate – EE	Propane Gas – FN
Ammonium Oxalate – EE	Ethyl Lactate – EE	Propionic Acid – EF
Ammonium Salts – EE	Ethylene Chloride – GF	Propylene Glycol – EE
n-Amyl Acetate – EG	Ethylene Glycol – EE	Propylene Oxide – EE
Amyl Chloride – FN	Ethylene Glycol Methyl Ether – EE	Resorcinol, Saturated – EE
Aniline – EG	Ethylene Oxide – GF	Resorcinol, 5% – EE
Aqua Regis – NN	Fatty Acids – EE	Salicylaldehyde – EE
Benzaldehyde – EE	Fluorides – EE	Salicylic Acid, Powder – EE
Benzene – GG	Flourine – GN	Salicylic Acid, Saturated – EE
Benzoic Acid, Sat. – EE	Formaldehyde, 10% – EE	Salt Solutions, Metallic – EE
Benzyl Acetate – EE	Formaldehyde, 40% – EE	Silicone Oil – EE
Benzyl Alcohol – FN	Formic Acid, 3% – EE	Silver Acetate – EE
Bromine – FN	Formic Acid, 50% – EE	Silver Nitrate – EE
Bromobenzene – FN	Formic Acid, 100% – EE	Skydrol LD4 – EG
Bromoform – NN	Freon TF – EG	Sodium Acetate, Saturated – EE
Butadiene – FN	Fuel Oil – GF	Sodium Hydroxide, 1% – EE
Butyl Chloride – NN	Gasoline – GG	Sodium Hydroxide, 100% – EE
n-Butyl Acetate – EG	Glacial Acetic Acid – EE	Sodium Hypochlorite, 15% – EE
n-Butyl Alcohol – EE	Glutaraldehyde – EE	Stearic Acid, Crystals – EE
sec-Butyl Alcohol – EE	Glycerine – EE	Sulphuric Acid, 1-6% – EE
tert-Butyl Alcohol – EE	n-Heptane – GF	Sulphuric Acid, 20% – EE
Butyric Acid – FN	Hexane – GF	Sulphuric Acid, 60% – EE
Calcium Hydroxide, Conc. – EE	Hydrazine – NN	Sulphuric Acid, 98% – GG
Calcium Hydroxide, Sat. – EE	Hydrochloric Acid, 5% – EE	Sulphur Dioxide, Liquid – FN

Carbazole – EE	Hydrochloric Acid, 20% – EE	Sulphur Dioxide, Wet or Dry – EE
Carbon Disulfide – NN	Hydrochloric Acid, 35% – EE	Sulphur Salts – GF
Carbon Tetrachloride – GF	Hydrofluoric Acid, 4% – EE	Tararic Acid – EE
Cedarwood Oil – FN	Hydrofluoric Acid, 48% – EE	Tetrahydrofuran – GF
Cellosolve Acetate – EE	Hydrogen Peroxide, 3% – EE	Thionyl Chloride – NN
Chlorobenzene – FN	Hydrogen Peroxide, 30% – EE	Toluene – GG
Chlorine, 10% in Air – EF	Hydrogen Peroxide, 90% – EE	Tributyl Citrate – EG
Chlorine, 10% (Moist) – GF	Iodine Crystals – NN	Trichloroacetic Acid – FF
Chloroacetic Acid – EE	Isobutyl Alcohol – EE	1,2,4-Trichlorobenzene – NN
p-Chloroacetophenone – EE	Isopropyl Acetate – EG	Trichloroethylene – FN
Chloroform – GF	Isopropyl Alcohol – EE	Triethylene Glycol – EE
Chromic Acid, 10% – EE	Isopropyl Benzene – GE	2,2,4-Trimethylpentane – FN
Chromic Acid, 50% – EE	Isopropyl Ether – NN	Tripropylene Glycol – EE
Cinnamon Oil – FN	Jet Fuel – FN	Tris Buffer, Solution – EG
Citric Acid, 10% – EE	Kerosene – GG	Turpentine – GG
Cresol – FN	Lacquer Thinner – FN	Undecyl Alcohol – EG
Cyclohexane – FN	Lactic Acid, 3% – EE	Urea – EE
Cyclohexanone – FN	Lactic Acid, 85% l – EE	Vinylidene Chloride – GF
Cyclopentane – FN	Mercury – EE	Xylene – GF
DeCalin – EG	2-Methoxyrthanol – EE	Zinc Stearate – EE
n-Decane – FN	Methoxyethyl Oleate – EE	
Diacetone Alcohol – EE	Methyl Acetate – FF	
o-Dichlorobenzine – FF	Methyl Alcohol – EE	
p-Dichlorobenzine – GF	Methyl Ethyl Ketone – EE	
1,2-Dichloroethane – NN	Methyl-y-butyl Ether – FN	
2,4-Dichlorophenol – NN	Methylene Chloride – GF	
Diethyl Benzene – FN	Mineral Oil – EE	
Diethyl Ether – FN	Mineral Spirits – FN	