Product Data Sheet

Ecdel™ Elastomer 9966

Application/Uses

- Bags
- Flexible medical
- Flexible packaging
- IV Containers
- Pharmaceutical packaging
- Tubing

Key Attributes

- Chemical resistant with low extractables
- Excellent clarity
- Excellent toughness & flexibility without plasticizers
- Heat & sterilization stability

Product Description

Ecdel™ elastomers are medical grade copolyester ethers (COPE). They offer the clarity, toughness, and chemical resistance needed in a variety of flexible packaging including medical applications. Ecdel™ Elastomer 9966 may be injection molded or extruded. Ecdel™ elastomers may be extrusion blow molded directly into bags or extruded into film for later fabrication into bags.

This product has been CRADLE TO CRADLE CERTIFIED^{cm} Silver.
The CRADLE TO CRADLE CERTIFIED^{cm} Mark is a registered certification mark used under license through McDonough Braungart Design Chemistry (MBDC). MBDC is a global sustainability consulting and product certification firm. The CRADLE TO CRADLE® framework moves beyond the traditional goal of reducing the negative impacts of commerce ('eco-efficiency'), to a new paradigm of increasing its positive impacts ('eco-effectiveness'). At its core, Cradle to Cradle design perceives the safe and productive processes of nature's 'biological metabolism' as a model for developing a 'technical metabolism' flow of industrial materials. Product components can be designed for continuous recovery and reutilization as biological and technical nutrients within these metabolisms. For more information about MBDC and to obtain printable certificates for Eastman Copolyesters, visit www.mbdc.com. Choose Eastman Chemical Company under Company Name in C2C Certified products to display a list of our products.

Typical Properties

Property[a]	Test[b] Method	Typical Value, Units[c]
Thermal Properties		
Inherent Viscosity	EMN-A-AC-G-V-1	1.16
Flow Rate (Condition 230°C/2.16 kg)	D 1238	10 g/10 min
Crystalline Peak Melting Point (T_m)	D 3418	205°C (400°F)
Crystallization Temperature on Cooling (T_cc)	DSC	140°C (284°F)
Glass Transition Temperature (T_g)	DSC	-3°C (27°F)

Specific Heat [d]		
@ 25°C (77°F) - solid	DSC	1.6 kJ/kg·K (0.38 Btu/lb·°F)
@ 100°C (212°F) - solid	DSC	1.8 kJ/kg·K (0.43 Btu/lb·°F)
@ 150°C (302°F) - solid	DSC	2.0 kJ/kg·K (0.48 Btu/lb·°F)
@ 175°C (347°F) - solid	DSC	2.3 kJ/kg·K (0.55 Btu/lb·°F)
@ 200°C (392°F) - transition	DSC	3.1 kJ/kg·K (0.74 Btu/lb·°F)
@ 225°C (437°F) - melt	DSC	2.3 kJ/kg·K (0.55 Btu/lb·°F)
Heat of Fusion	E 793	27 kJ/kg (11.6 Btu/lb)
Thermal Conductivity	C 177	0.19 W/m·K (1.3 Btu·in./h·ft^2·°F)
Coefficient of Linear Thermal Expansion	D 696	15 x 10-5 /°C (mm/mm·°C) (8 x 10-5 /°F (in./in.·°F))
Brittleness Temperature	D 746	<-75°C (<-103°F)
Vicat Softening Temperature @ 1 kg load	D 1525	170°C (338°F)
Mechanical Properties		
Specific Gravity	D 792	1.13
Durometer Hardness		
Shore D Scale	D 2240	55
Shore A Scale	D 2240	95
Tensile Stress @ Break [e]	D 638	22 MPa (3200 psi)
Tensile Stress @ Yield [f]	D 638	14 MPa (2030 psi)
Elongation @ Yield	D 638	38%
Elongation @ Break	D 638	400%
Tensile Modulus	D 638	170 MPa (24650 psi)
Flexural Modulus	D 790	150 MPa (21750 psi)
Tear Strength	D 1004	350 N (79 lbf)
Izod Impact Strength, Notched @ -40°C (-40°F)	D 256	40 J/m (0.75 ft·lbf/in.)
Torsional Modulus Temperature		
@ 240 MPa (35,000 psi)	D 1043	-28°C (-18°F)
@ 930 MPa (135,000 psi)	D 1043	<-70°C (<-94°F)
Water Absorption, 24 h immersion	D 570	0.4%
Electrical Properties		
Arc Resistance (tungsten electrodes)	D 495	Fails by melting
Comparative Tracking Index (CTI)	IEC 112	Fails by melting
Volume Resistivity In Air	D 257	10^{14} ohm·cm
Surface Resistivity	D 257	10^{15} ohms/square
Dielectric Strength, Short Time, 500 V/sec rate-of-rise		
In Oil	D 149	14 kV/mm (356 V/mil)
In Air	D 149	6 kV/mm (152 V/mil)

Dielectric Constant		
1 kHz	D 150	3.9
10 kHz	D 150	3.8
1 MHz	D 150	3.7
Dissipation Factor		
1 kHz	D 150	0.02
10 kHz	D 150	0.02
1 MHz	D 150	0.02

Film Properties		
Thickness of Film Tested		0.11-0.14 mm (4.5-5.5 mils)
Haze	D 1003	1%
Gloss @ 45°	D 2457	85
Regular Transmittance	D 1003	94%
Total Transmittance	D 1003	93%
Refractive Index, n_D	D 542	1.51
Tensile Stress @ Yield [g]		
M.D.	D 882	14 MPa (2030 psi)
T.D.	D 882	12 MPa (1740 psi)
Elongation @ Break		
M.D.	D 882	>400%
T.D.	D 882	>500%
Tensile Modulus [h]	D 882	180 MPa (26000 psi)
Coefficient of Friction	D 1894	>1.0
Water Vapor Transmission Rate [i]	F 372	190 g/m^2·24h (12 g/100in.^{2}·24h)
Gas Permeability, CO_2 [j] @ 23°C (73°F)	D 1434	>1000 cm^3·mm/m^2·24h·atm (>2540 cm^3·mil/100in.^{2}·24h·atm)
Gas Permeability, O_2 [j] @ 30°C (86°F)	D 1434	130 cm^3·mm/m^2·24h·atm (330 cm^3·mil/100in.^{2}·24h·atm)

[a] *Unless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity.*

[b] *Unless noted otherwise, the test method is ASTM.*

[c] *Units are in SI or US customary units.*

[d] *For 200°C (392°F) - transition, apparent specific heat, including the effects of the heat of fusion.*

[e] *D 412, Die C specimens, which are equivalent to ASTM D 638, Type IV specimens. Specimens were 2.0 mm (0.075 in.) thick and were tested using a crosshead speed of 500 mm (20 in.) per min.*

[f] *Injection molded ASTM D 638 Type I specimens, about 3 mm (1/8 in.) thick, were tested using a crosshead speed of 500 mm (20 in.) per min.*

[g] *Crosshead speed, 500 mm/min (20 in./min)*

[h] *Crosshead speed, 25 mm/min (1 in./min)*

[i] *Data are based on limited testing. Test conducted at 38°C (100°F) and 100% relative humidity. Mocon values; confirmed by ASTM E 96E.*

[j] *Data are based on limited testing.*

Comments

Unless noted otherwise, properties reported here are typical of average lots. Eastman makes no representation that the material in any particular shipment will conform exactly to the values given.

Eastman Medical Disclaimer

It is the responsibility of the medical device manufacturer ("Manufacturer") to determine the suitability of all component parts and raw materials, including any Eastman product, used in its final product in order to ensure safety and compliance with requirements of the United States Food and Drug Administration (FDA) or other international regulatory agencies.

Eastman Chemical Company products have not been designed for nor are they promoted for end uses that would be categorized by either the United States FDA or by the International Standards Organization (ISO) as implant devices. Eastman products are not intended for use in the following applications: (1) in any bodily implant applications for greater than 30 days, based on FDA-Modified ISO-10993, Part 1 "Biological Evaluation of Medical Devices" tests (including any cosmetic, reconstructive or reproductive implant applications); (2) in any cardiac prosthetic device application, regardless of the length of time involved, including, without limitation, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems, and ventricular bypass assisted devices, or (3) as any critical component in any medical device that supports or sustains human life.

Eastman Chemical Company products offered for the medical market have met selected FDA-Modified ISO-10993, Part 1 "Biological Evaluation of Medical Devices" tests with human tissue contact time of 30 days or less. The tests include: cytotoxicity, sensitization, irritation or intracutaneous reactivity, systemic toxicity (acute), subchronic toxicity (sub-acute), implantation, hemocompatibility. The Manufacturer is responsible for the biological evaluation of the finished medical device.

The suitability of an Eastman Product in a given end-use environment is dependent upon various conditions including, without limitation, chemical compatibility, temperature, part design, sterilization method, residual stresses, and external loads. It is the responsibility of the Manufacturer to evaluate its final product under actual end-use requirements and to adequately advise and warn purchasers and users thereof.

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