EASTMAN

Product Data Sheet

Eastapak™ Polymer 9921

Application/Uses

- Automotive parts containers
- Food packaging
- Food-contact applications
- Health and nutrition containers
- Household products containers
- Refillable carbonated soft drink containers
- Wine and liquor containers

Product Description

Eastapak™ Polymer 9921 is an 0.80 ltV (dL/g) copolymer PET that has proven itself as an exceptional, cost-effective option that continues to surpass expectations for quality, efficiency and convenience in a wide array applications.

Typical Properties

Property[a]	Test[b] Method	Typical Value, Units[c]
Pellet Properties		
Crystalline Density	D 1505	1.4 g/cm^3
Bulk Density		
Poured	D 1895	850 kg/m^3 (53 lb/ft^3)
Vibrated		911 kg/m^3 (57 lb/ft^3)
Melt Density @ 285°C (545°F)	D 1238 (Note A- Table 2)	1.1 g/cm^3
Crystalline Peak Melting Point (T_m) [d]	D 3418	238°C (461°F)
Heat of Fusion [e]	E 793	60 kJ/kg (14 cal/g)
Specific Heat [e]		
@ 23°C (73°F)	E 1269	1.1 kJ/kg·K (0.27 Btu/lb·°F)
@ 80°C (176°F)	E 1269	1.4 kJ/kg·K (0.33 Btu/lb·°F)
@ 100°C (212°F)	E 1269	1.5 kJ/kg·K (0.35 Btu/lb·°F)
@ 200°C (392°F)	E 1269	1.8 kJ/kg·K (0.43 Btu/lb·°F)
@ 280°C (536°F)	E 1269	2.0 kJ/kg·K (0.48 Btu/lb·°F)
Pellet Size		3.27 mm (0.1 in.)
Pellet Shape		Cubical

Film Properties		
Thickness of Film Tested	D 374	264 microns (10.4 mils)
Intrinsic Viscosity (film)	EMN-A-AC-G-V-1	0.788
Haze	D 1003	0.71%
Gloss @ 60°	D 2457	149
Transparency	D 1746	100%
Regular Transmittance	D 1003	89%
Total Transmittance	D 1003	92%
Water Vapor Transmission Rate [f]	F 372	6.8 g/m^2·24h (0.4 g/100$in.^2$·24h)
Gas Permeability, CO_2	D 1434	25.6 cm^3·mm/m^2·24h·atm (64 cm^3·mil/100$in.^2$·24h·atm)
Gas Permeability, O_2 [g]	D 3985	5.2 cm^3·mm/m^2·24h·atm (12 cm^3·mil/100$in.^2$·24h·atm)
Elmendorf Tear Resistance		
M.D.	D 1922	3538 g/mm (957 gf)
T.D.	D 1922	5063 g/mm (1395 gf)
PPT Tear Resistance		
M.D.	D 2582	95.4 N (21.4 lbf)
T.D.	D 2582	116.5 N (26.2 lbf)
Tear Propagation Resistance, Split Tear Method		
@ 254 mm/min (10 in./min) M.D.	D 1938	60.5 N/mm (345 lbf/in.)
@ 254 mm/min (10 in./min) T.D.	D 1938	83.3 N/mm (476 lbf/in.)
Tear Resistance, Trouser @ 200 mm/min		
M.D.	ISO 6383-1	73.3 N/mm
T.D.	ISO 6383-1	94.1 N/mm
Tensile Strength @ Yield		
M.D.	D 882	53.7 MPa (7789 psi)
T.D.	D 882	47.9 MPa (6947 psi)
Tensile Strength @ Break		
M.D.	D 882	51.5 MPa (7469 psi)
T.D.	D 882	46.7 MPa (6773 psi)
Elongation @ Yield		
M.D.	D 882	5.8%
T.D.	D 882	4.7%
Elongation @ Break		
M.D.	D 882	444%
T.D.	D 882	557%
Tensile Modulus		
M.D.	D 882	2140 MPa (3.10 x 10^5 psi)
T.D.	D 882	2153 MPa (3.12 x 10^5 psi)

Dart Impact [h]		
@ 23°C (73°F)	D 1709A Modified	446 g
@ -18°C (0°F)	D 1709A Modified	373 g

Injection Molded Properties (ASTM Method)		
Specific Gravity	D 792	1.3286
Tensile Stress @ Break	D 638	24.7 MPa (3582 psi)
Tensile Stress @ Yield	D 638	56.3 MPa (8166 psi)
Tensile Modulus	D 638	2390 MPa (3.5 x 10^5 psi)
Flexural Modulus	D 790	2301 MPa (3.3 x 10^5 psi)
Flexural Yield Strength	D 790	74.7 MPa (10831 psi)
Deflection Temperature		
@ 0.455 MPa (66 psi)	D 648	67.7°C
@ 1.82 MPa (264 psi)	D 648	61.4°C
Rockwell Hardness, R Scale	D 785	111
Izod Impact Strength, Notched		
@ 23°C (73°F)	D 256	66.03 J/m
@ -40°C (-40°F)	D 256	39.59 J/m
Impact Strength, Unnotched [i]		
@ 23°C (73°F)	D 4812	NB
@ -20°C (-4°F)	D 4812	NB
@ -30°C (-22°F)	D 4812	NB
@ -40°C (-40°F)	D 4812	2911.33 J/m
Impact Resistance (Puncture), Energy @ Max. Load		
2.5-mm (0.100-in.) Thick Plaques, @ 23°C (73°F)	D 3763	33.4 J
2.5-mm (0.100-in.) Thick Plaques, @ -40°C (-40°F)	D 3763	4.23 J
3.2-mm (0.125-in.) Thick Plaques @ 23°C (73°F)	D 3763	34.27 J
3.2-mm (0.125-in.) Thick Plaques @ -40°C (-40°F)	D 3763	3.72 J

Injection Molded Properties (ISO Method)		
Tensile Stress @ Break	ISO 527	25.1 MPa
Tensile Stress @ Yield	ISO 527	56.2 MPa
Tensile Modulus	ISO 527	2401 MPa
Flexural Modulus	ISO 178	2334 MPa
Flexural Yield Strength	ISO 178	82.3 MPa
Deflection Temperature		
@ 0.45 MPa	ISO 75	66.2°C
@ 1.80 MPa	ISO 75	61.1°C

Izod Impact Strength, Notched, Type 1 Specimen, Type A Notch		
@ 23°C	ISO 180	6.24 kJ/m^2
@ -40°C	ISO 180	3.71 kJ/m^2
Impact Strength, Unnotched, Type 1 Specimen [j]		
@ 23°C	ISO 180	NB kJ/m^2
@ -20°C	ISO 180	NB kJ/m^2
@ -30°C	ISO 180	266.56 kJ/m^2
@ -40°C	ISO 180	248.41 kJ/m^2
Impact Resistance (Puncture), Energy @ Max. Load [k]		
2.5-mm Thick Plaques @ 23°C	ISO 6603-2	38.93 J
2.5-mm Thick Plaques @ -40°C	ISO 6603-2	3.44 J
3.2-mm Thick Plaques @ 23°C	ISO 6603-2	38.04 J
3.2-mm Thick Plaques @ -40°C	ISO 6603-2	2.36 J

[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] *Determined by DSC on the second heating cycle. Melting point rounded to the nearest 5°C because of variability of results.*

[e] *Determined by DSC on the first heating cycle.*

[f] *Test conducted at 38°C (100°F) and 100% relative humidity.*

[g] *Test conducted at 30°C (86°F) and 50% relative humidity.*

[h] *12.7 mm (0.5 in.) dia. head, 127 mm (5 in.) dia. clamp, 660 mm (26 in.) drop*

[i] *Nonbreak as defined by ASTM D 4812 with 3.2-mm (0.125-in.) specimens.*

[j] *Nonbreak as defined by ISO 180 with 4-mm specimens.*

[k] *Testing based on ISO 6603-2, using a striker diameter of 10 mm, a support and clamp diameter of 40 mm, and a velocity of 4.1 m/s.*

General

Eastapak polyesters are condensation polymers produced by a continuous melt-phase polymerization process followed by a solid-state polymerization process.

Comments

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.

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