Eastoflex Amorphous Polyolefins

EASTMAN

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Introduction

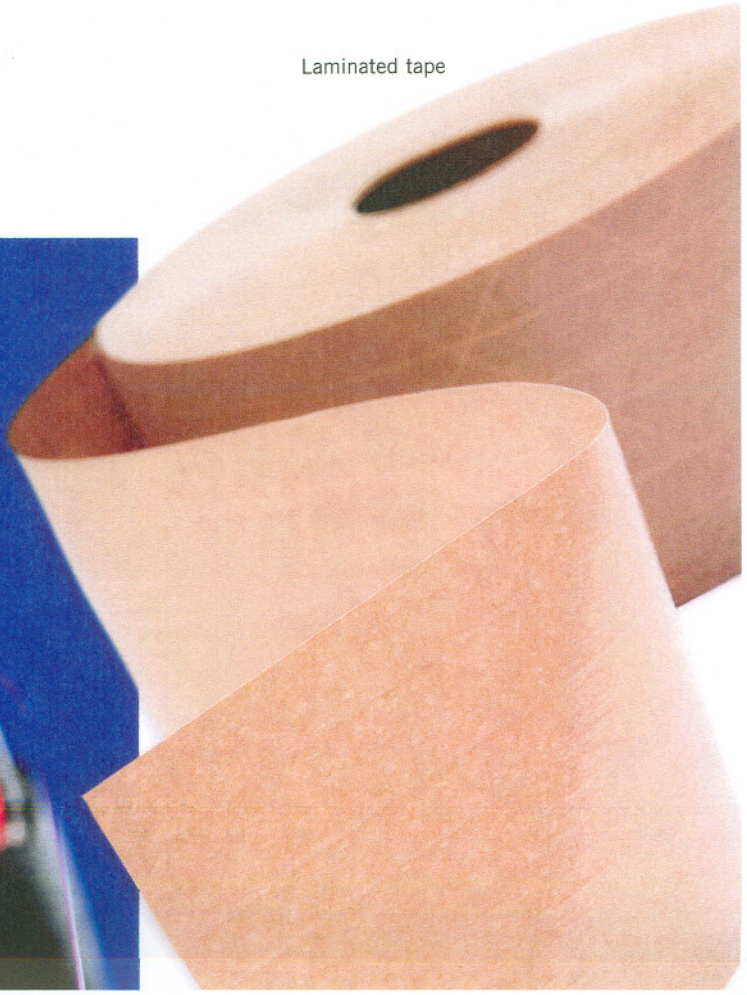
Eastoflex Amorphous Polyolefins (APOs) are characterized by consistent quality, low odor, good heat stability, low color, and broad compatibility with numerous elastomers, polymers, and tackifying resins.

These amorphous polyolefins are used as base polymers in hot-melt adhesives, paper laminating, sealants, and pressure-sensitive adhesives. They are especially useful as elastomer extenders in sealants. They can also be used as waterproofing compounds for wire and cable-flooding applications and as asphalt modifiers for modified bitumen roofing membranes. *Eastoflex* APOs can be processed with standard extrusion or roll-coating equipment, drum-melting units, and virtually all hot-melt adhesive application equipment.

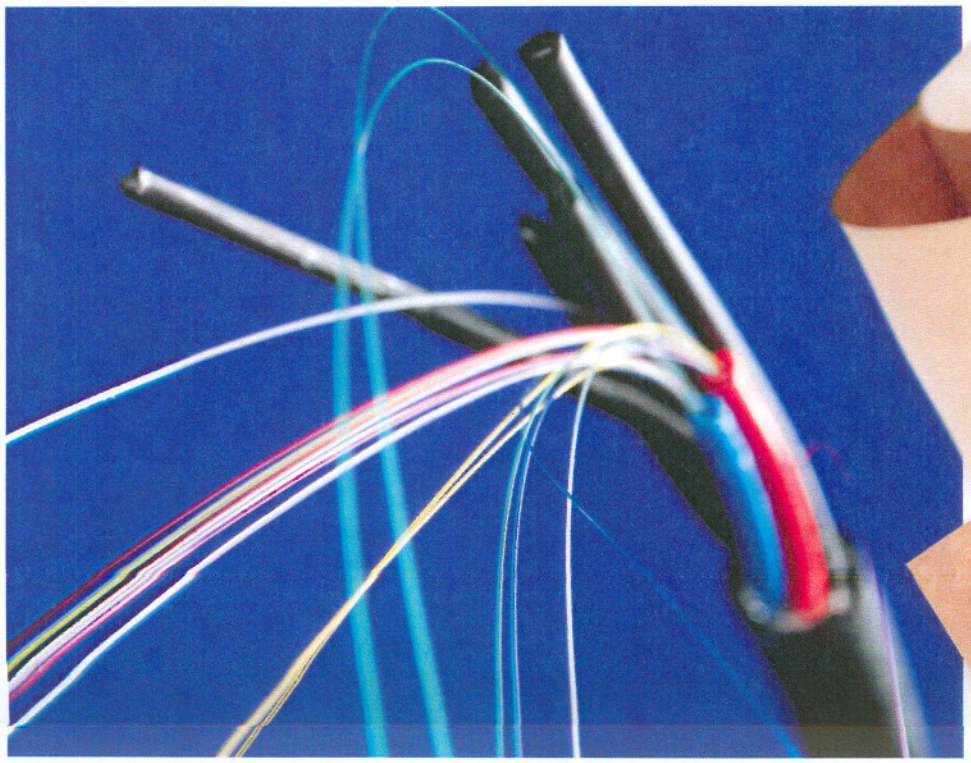
In sealants, *Eastoflex* APOs can be used as elastomer extenders and as viscosity and flow modifiers. This allows the formulator to reduce raw material costs, shorten mixing time and save energy, while improving water resistance and peel adhesion.

In hot-melt adhesives, *Eastoflex* APOs offer excellent adhesion to polyolefin and metallic substrates. The wide viscosity range and low application temperatures of *Eastoflex* APOs make them ideally suited for disposable goods assembly involving thin thermoplastic films and nonwovens.

Laminated tape



Cable filling and flooding



In addition to current commercial products, Eastman can make custom APO blends for specific property requirements. The minimum production run for a new product is 40,000 lb (approximately 18 metric tons) for a molten tank truck and 20,000 lb (approximately 9,000 kg) for packaged material. An order commitment of at least this size is necessary to support a production run of a new *Eastoflex* product.

Insulating glass sealant

Modified bitumen roofing

Eastoflex APO Product Forms and Packaging

Molten Bulk

All grades of *Eastoflex* APOs can be delivered in North America in molten bulk form in railcars or tank trucks. For related information, please refer to Eastman Publication WA-35, "Bulk Handling and Storage of *Eastoflex* Amorphous Polyolefins."

Pellets

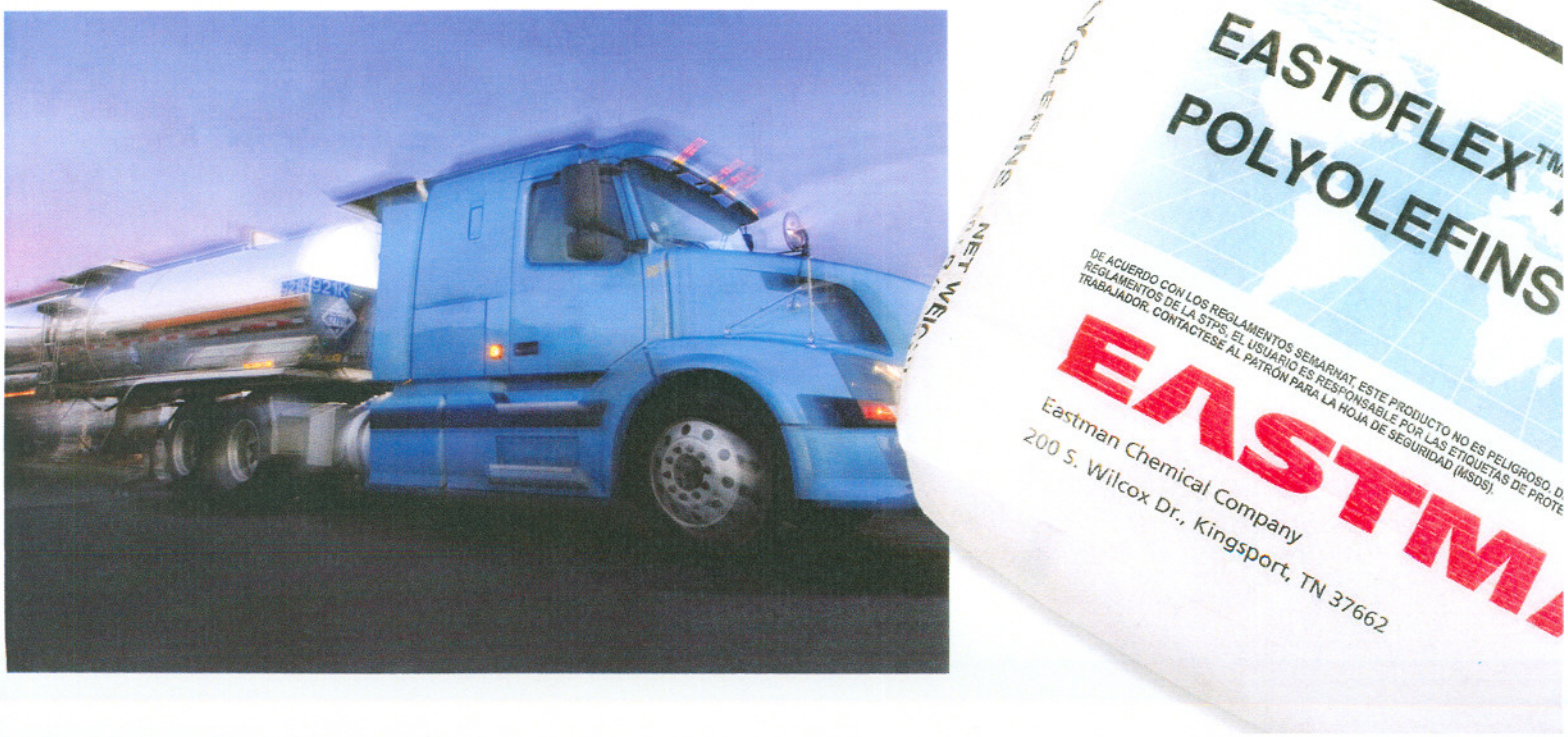
Most *Eastoflex* products are available in pellet form. Formulas ending in PL are pellets coated with a polypropylene powder, while formulas ending in PL-1 are pellets coated with a low-density polyethylene powder. *Eastoflex* APO pellet formulas are packaged in bags (50-lb net weight), 2,250-lb net weight per pallet and boxes (50-lb net weight), 900-lb net weight per pallet. The bags used to package *Eastoflex* APO pellets are made of polypropylene. Pellet boxes are lined with a low-density polyethylene liner. Due to their softness, *Eastoflex* E1003 and *Eastoflex* E1005 are not available as pellets.

Solid Cylinders

The following *Eastoflex* APO grades can be supplied on a made-to-order basis as 45–55 lb (approximately 20–25 kg) cylinders: P1010, P1023, M1020, M1030, E1060, and E1200. These cylinders are strippable fiberboard containers 13 in. (33 cm) in diameter by 14 in. (36 cm) tall.

Slats

The following *Eastoflex* APO grades can be supplied on a made-to-order basis as slats in 50-lb (22.7-kg) boxes: P1010S, P1023S, M1018S, M1030S, M1058S, E1005S, E1060S, and E1200S. Slats are chips weighing approximately 5 g each. They are coated with a thin film of low-density polyethylene to prevent blocking. *Eastoflex* APO slats are packaged in boxes (50-lb net weight), 900-lb net weight per pallet. Slat boxes are lined with a low-density polyethylene liner.

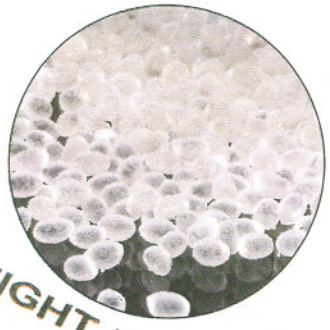


Molten bulk can be delivered by tank truck or rail car.

Eastoflex E1003 Packaging and Blend Options

Because of its softness, *Eastoflex* E1003 cannot be packaged in cylinder, slat or pellet form. The only available solid-form package for *Eastoflex* E1003 is a 270–330 lb (approximately 120–150 kg) fiber drum. Handling *Eastoflex* E1003 is likely to require drum-melting and unloading equipment.

Eastoflex E1005S was developed to help alleviate handling problems associated with *Eastoflex* E1003. *Eastoflex* E1005S, a blend containing a significant portion of *Eastoflex* E1003, is available in slat form. In addition to *Eastoflex* E1005S, *Eastoflex* E1016PL, and *Eastoflex* E1016PL-1 are pelletized formulas containing a significant portion of *Eastoflex* E1003.



Eastoflex pellets are available in bags or boxes.

Made-to-order solid cylinders are shipped in strippable fiberboard containers.

Made-to-order slats are shipped in boxes.

Eastoflex APO Blends

Eastman can make custom-blended APO mixtures from nearly any combination of *Eastoflex* P1010, P1023, E1003, E1060, and E1200. The mixtures listed in Table 1 are examples of standard commercial blends. Other blended products can be made if the composite properties of the mixture fall within the blending range (Figures 1 and 2).

Parameters for the five *Eastoflex* APOs available for blending are illustrated in Figures 1 and 2, showing ranges for *Thermosel* viscosity at 190°C, ring and ball softening point, glass transition temperature, and needle penetration hardness.

There are minimum order requirements for the development of a custom APO blend. Note that only *Eastoflex* P1010, P1023, E1003, E1060, and E1200 are available for blending. If you have any questions about Eastman's capabilities for APO blending, contact your Eastman sales representative.

Figure 1

Eastoflex APO Blending Capabilities
Ring & Ball Softening Point vs. _Thermosel_ Viscosity @ 190°C

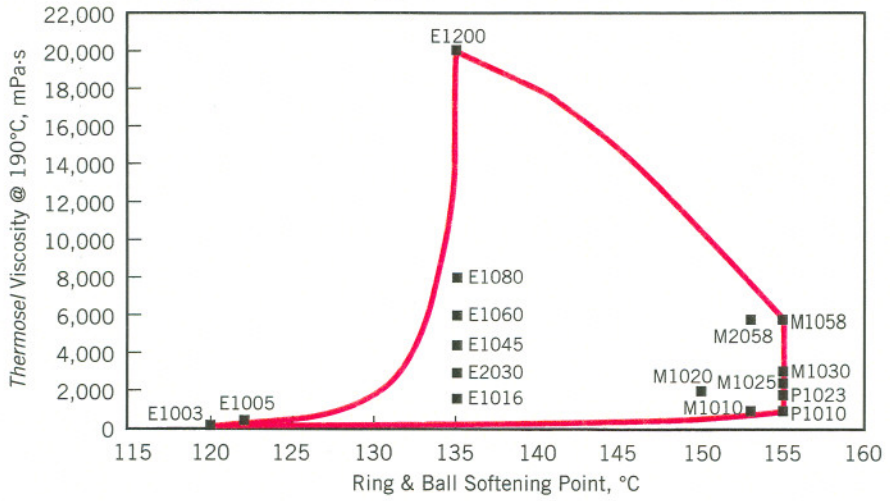


Figure 2

Eastoflex APO Blending Capabilities
Glass Transition Temperature vs. Needle Penetration

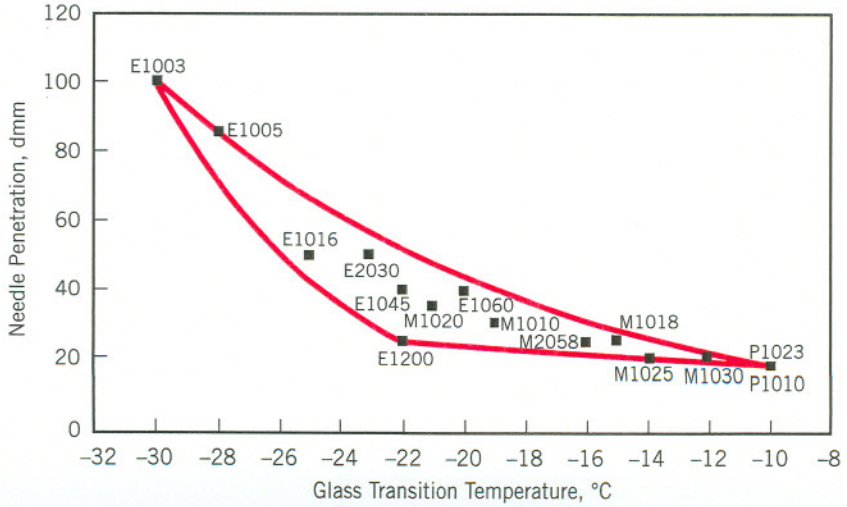


Table 1

Eastoflex Amorphous Polyolefins Typical Properties

		Viscosity, @ 190°C, mPa·s	R&B Softening Pt, °C (°F)	Glass Transition Temperature, °C (°F)	Penetration Hardness, dmm
		ASTM Method			
Product Name	Form	D 3236	E 28	D 3418	D 5
Propylene Homopolymers					
P1010	Molten/Solid[a]	1,000	155 (311)	–10 (14)	18
P1010S	Slats	1,000	153 (307)	–10 (14)	18
P1010PL	Pellets	1,000	155 (311)[b]	–10 (14)	18
P1023	Molten/Solid[a]	2,300	155 (311)	–10 (14)	18
P1023S	Slats	2,300	153 (307)	–10 (14)	18
P1023PL	Pellets	2,300	155 (311)[b]	–10 (14)	18
Propylene-Ethylene Copolymers					
E1003	Molten/Solid[a]	300	120 (248)	–30 (–22)	100
E1005	Molten/Solid[a]	500	125 (257)	–28 (–18)	85
E1005S	Slats	500	125 (257)	–29 (–20)	70
E1016	Molten/Solid[a]	1,600	135 (275)	–25 (–13)	50
E1016PL	Pellets	1,600	140 (284)[b]	–25 (–13)	50
E1016PL-1	Pellets	1,600	135 (275)	–25 (–13)	50
E2030	Molten/Solid[a]	3,000	135 (275)	–23 (–9)	50
E1045	Molten/Solid[a]	4,500	135 (275)	–22 (–8)	40
E1045PL	Pellets	4,500	140 (284)[b]	–22 (–8)	40
E1060	Molten/Solid[a]	6,000	135 (275)	–20 (–4)	40
E1060S	Slats	5,500	135 (275)	–20 (–4)	40
E1060PL	Pellets	5,700	140 (284)[b]	–20 (–4)	35
E1060PL-1	Pellets	6,000	135 (275)	–20 (–4)	35
E1080	Molten/Solid[a]	8,000	135 (275)	–20 (–4)	40
E1200	Molten/Solid[a]	20,000	135 (275)	–22 (–8)	25
E1200S	Slats	16,000	135 (275)	–22 (–8)	25
E1200PL	Pellets	17,000	143 (289)[b]	–22 (–8)	25
Polypropylene/Propylene-Ethylene Copolymer Mixtures					
M1010	Molten/Solid[a]	1,000	153 (307)	–15 (5)	30
M1010PL	Pellets	1,000	153 (307)[b]	–15 (5)	30
M1018	Molten/Solid[a]	1,800	155 (311)	–15 (5)	25
M1018S	Slats	1,800	150 (302)	–15 (5)	25
M1018PL	Pellets	1,800	155 (311)[b]	–15 (5)	25
M1020	Molten/Solid[a]	2,000	150 (302)	–21 (–6)	35
M1020PL	Pellets	2,000	153 (307)[b]	–21 (–6)	35
M1020PL-1	Pellets	2,000	150 (302)	–21 (–6)	35
M1025	Molten/Solid[a]	2,500	155 (311)	–14 (7)	20
M1030	Molten/Solid[a]	3,000	155 (311)	–12 (10)	20
M1030S	Slats	3,000	152 (306)	–12 (10)	20
M1030PL	Pellets	3,000	155 (311)[b]	–12 (10)	20
M1030PL-1	Pellets	3,000	155 (311)	–12 (10)	20
M1058	Molten/Solid[a]	5,800	155 (311)	–15 (5)	20
M1058S	Slats	5,600	152 (306)	–15 (5)	20
M1058PL	Pellets	5,800	155 (311)[b]	–15 (5)	20
M2058	Molten/Solid[a]	5,800	153 (307)	–16 (3)	25
M2058PL	Pellets	5,800	155 (311)[b]	–16 (3)	25

[a] *Molten available in tank trucks or railcars. Solid may be available in cylinders or drums.*

[b] *RBSP of pellet coating is 163°C. Pellet coating typically 1.5% to 2% by weight.*

Properties reported in this publication are typical of average lots. Eastman makes no representation that the material in any particular shipment will conform to the listed values.

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