

# Adhesives and Sealants Raw Materials

Cable Filling/Flooding  
Hot-Melt Adhesives  
Laminating  
Liquid Adhesives  
Pressure-Sensitive Adhesives  
Roofing  
Sealants and Caulks  
Urethane Adhesives and Sealants  
Wax Blending

## ***Eastoflex* E1003 Amorphous Polyolefin Copolymer as a Substitute for Polyisobutylene in a Low-Temperature, Pressure-Sensitive Adhesive**

*Eastoflex* E1003 amorphous polyolefin copolymer has been evaluated in Eastman laboratories as a substitute for polyisobutylene (PIB) in a styrene-isoprene-styrene (SIS) based, low-temperature, pressure-sensitive adhesive (PSA) formulation. PIB is added to formulations to improve low-temperature performance properties of PSAs. Formulas evaluated and blending procedure used are shown in Table 1.

Pressure-sensitive adhesive properties were evaluated by applying each PSA formulation to polyester film at a dry thickness of 1 mil. The coated polyester film was adhered to stainless steel strips and tested at room temperature and at 0°C (32°F) using standard test procedures developed by the Pressure-Sensitive Tape Council (PSTC).

Results (see Table 2) indicate that PSA containing *Eastoflex* E1003 gave quick-tack and peel strength values at both temperatures similar to PSA containing PIB. Additional benefits of using E1003 were lower viscosity for easier processing and coating plus a significantly higher softening point that improves the cold flow resistance of the formulation.

Results indicate that *Eastoflex* E1003 amorphous polyolefin copolymer can be a lower-cost replacement for polyisobutylene in low-temperature PSA formulations, depending on end-use performance requirements. *Eastoflex* E1003 has a *Brookfield* Thermosel viscosity of 250 cP at 190°C (374°F), a ring and ball softening point of 120°C (248°F), and a  $T_g$  of -33°C (-27°F).

Table 1

Formulations Evaluated and Blending Procedure

Ingredients	Weight %		Description/Supplier
	Formula A	Formula B	
<i>Kraton</i> 1107 elastomer	15	15	Styrene-isoprene-styrene elastomer (Shell Chemical Company)
<i>Vistanex</i> LM-MS polyisobutylene	27	—	Polyisobutylene (Exxon Chemical Company)
<i>Eastoflex</i> E1003 copolymer	—	27	Amorphous propylene-ethylene copolymer (Eastman Chemical Company)
<i>Eastotac</i> H-100E resin	39	39	Hydrocarbon resin (Eastman Chemical Company)
<i>Shellflex</i> 371 oil	18	18	Extender oil (Shell Chemical Company)
<i>Irganox</i> 1010 antioxidant	1	1	Antioxidant (Ciba-Geigy Corp.)

### Blending Procedure

Formulations A and B were compounded in a sigma-blade mixer at 177°C (350°F) for 2 hours.

Test Procedure	Formula A (With PIB)	Formula B (With E1003)
Quick tack @ RT, psi, PSTC-5	2.2	2.1
180° Peel adhesion @ RT, pli, PSTC-1	2.3	2.0
Quick tack @ 0°C (32°F), psi	1.3	0.9
180° Peel adhesion @ 0°C (32°F), pli	4.2	3.7
Brookfield Thermosel viscosity @ 177°C, cP, ASTM D 3236	3,295	515
Ring and ball softening point, °C, ASTM E 28	66	96

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