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Eastotac™ and Regalite™ hydrogenated hydrocarbon resins in metallocene packaging adhesives

Packaging adhesives formulated using metallocene-catalyzed ethylene-octene copolymers (m-PE) generally require the use of low molecular weight aliphatic, preferably hydrogenated, tackifier resins in order to achieve the necessary level of compatibility to form a stable, useful adhesive. Regalite™ resins and Eastotac™ hydrogenated hydrocarbon resins can both be used to produce effective adhesives. Since these two families of resins have different availability in different geographic regions, it is of interest to compare their performance in m-PE packaging adhesives.

Typical properties of resins used in this study

Resin	RBSP (°C)	Mz (Daltons)	Mw (Daltons)	Mn (Daltons)
Eastotac™ H-100R	100	2550	1050	450
Eastotac™ H-130W	130	2400	1050	500
Regalite™ R1100	100	1500	900	600
Regalite™ R1125	123	2100	1300	800

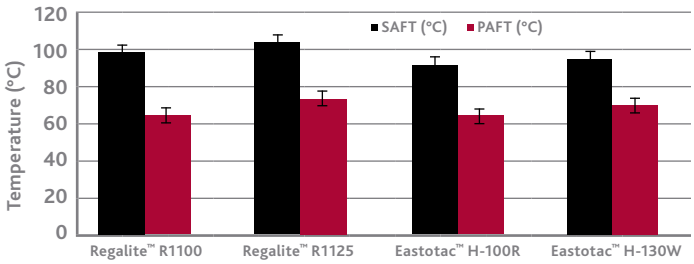
Values given are average values of typical samples and should not be interpreted as product specifications. RBSP=Ring and Ball Softening Point

The performance of the resins was tested in a standard packaging adhesive formulation: 35 phr AFFINITY™ GA 1950 polyolefin plastomer from Dow Chemical, 35 phr resin, 30 phr Sasolwax™ H1 wax from Sasol, and 0.5 phr Irganox™ 1010 antioxidant from Ciba Specialty Chemicals.

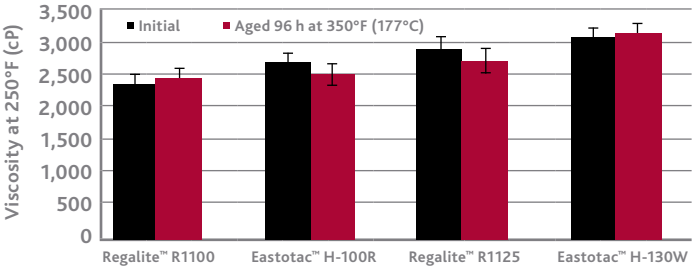
All adhesives had equivalent RBSP of 110°C-112°C. Adhesive peel adhesion failure temperature (PAFT) increased with resin RBSP, but resin RBSP did not significantly affect adhesive shear adhesion failure temperature (SAFT) due to the dominance of the Fischer-Tropsch wax. All adhesives gave 100% fiber tear on corrugated cardboard at room temperature and at 140°C (60°F).

Eastotac™ H-100R and Regalite™ R1100 hydrocarbon resins, both with 100°C RBSP, had equivalent viscosities, which were lower than the viscosities obtained using the Eastotac™ H-130W and Regalite™ R1125 hydrocarbon resins with 125°C-130°C RBSP. All adhesives showed less than 6% change in viscosity after aging in air at 350°F (177°C) for 96 hours.

Comparison of SAFT and PAFT performance of m-PE packaging adhesives



Adhesive viscosity before and after aging in air



Conclusion

Regalite™ and Eastotac™ hydrogenated hydrocarbon resins of similar softening point gave similar adhesive performance in AFFINITY™ GA 1950 m-PE packaging adhesives with a 35/35/30 polymer/resin/FT-wax formulation. Adhesive PAFT performance and viscosity were shown to be dependent on resin softening point.

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