EASTMAN

Technical tip

Eastman non-phthalate plasticizers for waterborne adhesives

Introduction

Creating much-needed elasticity, plasticizers improve the performance of adhesives. In waterborne adhesives, DIBP has been an industry standard, however DIBP has been classified as an SVHC (substance of very high concern) under REACH. Changing regulations and consumer preferences now demand that more non-phthalate plasticizers be used in consumer products. Eastman Chemical Company has a broad portfolio of non-phthalate plasticizers.

Presented here are Benzoflex™ 2088 plasticizer, Benzoflex™ 50 plasticizer, Eastman TXIB™ formulation additive, and Eastman Effusion™ plasticizer, which meet all the concerns around non-phthalate demand and have the following advantages:

- Suitable for most adhesive systems, providing improved wet tack, set times, and open times
- Compatible with PVAc and VAE emulsions
- Reliability of supply
- Eastman TXIB is highly compatible with Benzoflex™ plasticizers and Eastman Effusion.

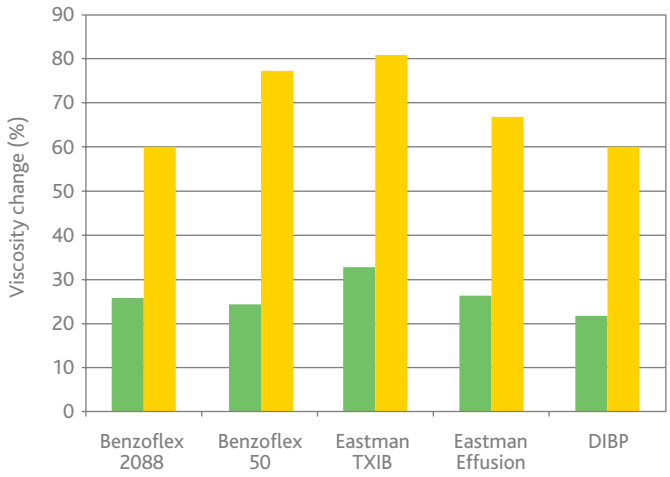
In vinyl acetate homopolymer formulations (PVAc)

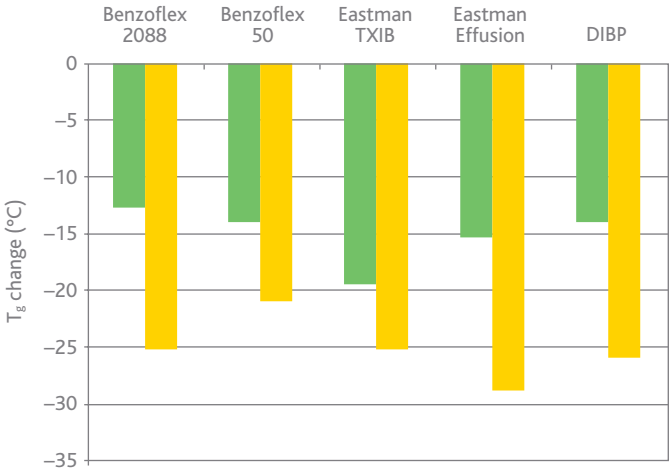
The following graphs demonstrate that our non-phthalate plasticizers have a comparable or better performance than DIBP.

- Benzoflex 2088 provides efficient T_g suppression, particularly at higher addition levels, for better low-temperature properties.
- Benzoflex 50 provides significant viscosity increase, particularly at higher addition levels.
- Eastman TXIB provides efficient T_g suppression at lower (<10% on dry polymer content) addition levels for better low-temperature properties combined with a large viscosity increase. We generally only recommend using Eastman TXIB at these lower addition levels, as in some vinyl acetate homopolymers, incompatibility is evident at levels above 10% on dry polymer.
- Eastman Effusion provides efficient T_g suppression for better low-temperature properties at both high and low addition levels.

It is possible to use the plasticizers alone or in combination to optimize the desired T_g suppression and viscosity increase. You should determine the correct Eastman plasticizer level for your specific formulation.

Effect of plasticizer on PVAc





■ 5% plasticizer content in plasticized PVAc emulsion mixture

■ 10% plasticizer content in plasticized PVAc emulsion mixture

In vinyl acetate ethylene copolymer formulations (VAE)

The following graphs demonstrate that our non-phthalate plasticizers have a comparable or better performance than DIBP.

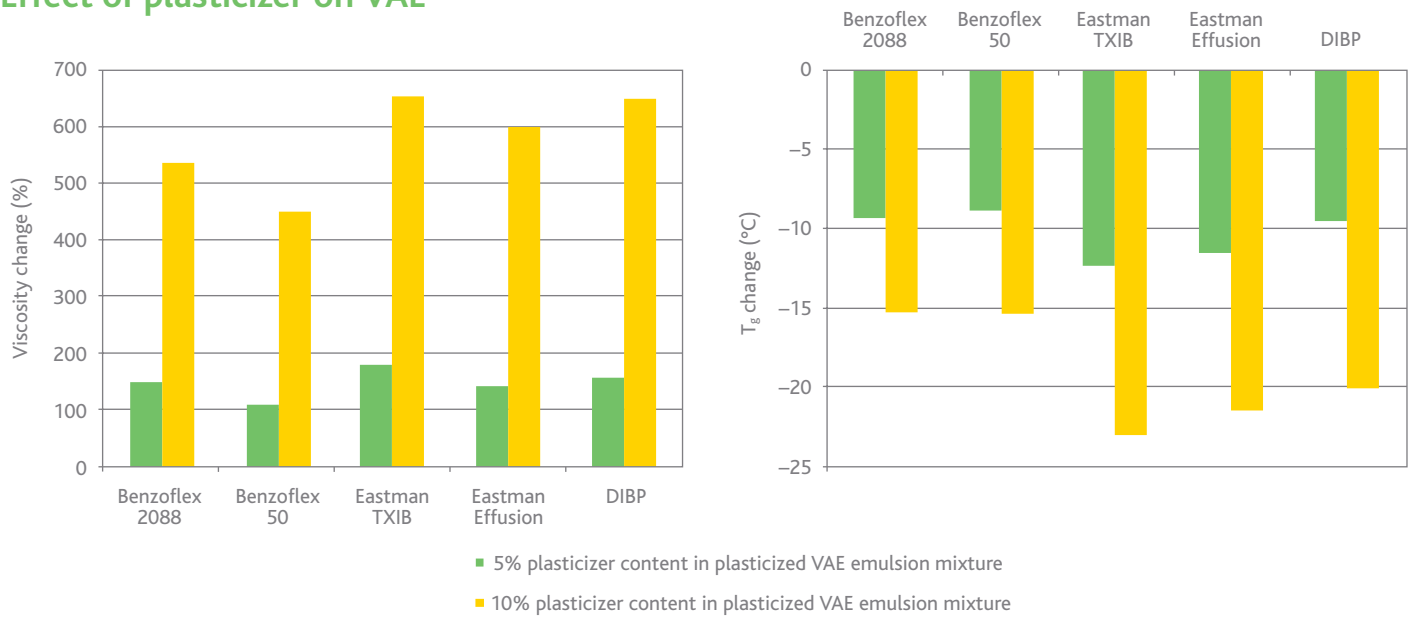
- Benzoflex™ 2088 plasticizer and Benzoflex™ 50 plasticizer provide efficient T_g suppression, particularly at lower addition levels, for better low-temperature properties. The viscosity increase for both products is sufficient for most water-based applications.
- Eastman TXIB™ formulation additive and Eastman Effusion™ plasticizer provide efficient T_g suppression for better low-temperature properties combined with a large viscosity increase.

As in PVAc adhesives, it is possible to optimize your formulation. By creating blends of Benzoflex 2088 and Benzoflex 50 with Eastman TXIB and Eastman Effusion, the desired balance of viscosity and T_g suppression can be achieved.

Other applications

Benzoflex 2088 improves adhesion in acrylic latex caulks and may also be used in pressure sensitive acrylics and the A side of 2K polysulfide sealants and polyurethane sealants. In PVC, it serves as a fast fuser, delivering low processing temperatures and low volatility, which makes it a good plasticizer for interior applications, such as flooring. Eastman TXIB is completely compatible with PVC in all proportions and is usually blended with general-purpose plasticizers such as Eastman 168™ non-phthalate plasticizer. Eastman TXIB also serves as a plasticizer in nail polish and industrial coatings. Eastman Effusion is also a high-solvating plasticizer, which imparts lower plastisol viscosity for PVC plastisols. Eastman TXIB, Eastman Effusion, and Benzoflex 50 are all efficient plasticizers in acrylic caulk formulations.

Effect of plasticizer on VAE



To find out more about the secure supply and efficiency for Benzoflex 2088, Benzoflex 50, Eastman TXIB, and Eastman Effusion, contact your Eastman representative today.

Regulatory status in food contact application

Product regulatory information sheets for Benzoflex 2088, Benzoflex 50, Eastman TXIB, and Eastman Effusion are available on request. Contact Eastman at 800-EASTMAN or visit www.EastmanPlasticizers.com for more information.

	North America Region	European Union – (EU) No. 10/2011*
Benzoflex™ 2088 plasticizer	Lawful for use in certain food contact applications	Not listed
Benzoflex™ 50 plasticizer	Lawful for use in certain food contact applications	Not listed
Eastman Effusion™ plasticizer	Lawful as a plasticizer in polymers for use: (1) in adhesives, (2) in pressure sensitive adhesives, and (3) as a coating or component of paper or paperboard intended for use in contact with dry foods with no free surface fat or oil	Not listed
Eastman TXIB™ formulation additive	Lawful for use in certain food contact applications	Lawful for use in certain food contact applications

**Regulation 10/2011 refers to food contact applications in plastics.*

Typical properties

	Benzoflex 2088	Benzoflex 50	Eastman Effusion	Eastman TXIB	DIBP
Specific gravity @ 20°C	1.16	1.15	1.045	0.945	1.038
Surface tension @ 25°C, dynes/cm	44	43	34	27.5	33
Boiling point @ 760 mm Hg, °C	356	370	337	281	320
Freezing point, °C	<16*	<16*	16	–70	–37
Viscosity, Brookfield @ 25°C, mPa•s	71	78	16	5	36

** The plasticizer has the possibility to solidify at 16°C, however, they supercool. The melting point is 16°C. The pour point is <–21°C. Experience indicates that Benzoflex 50 remains liquid down to 0°C.*

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