LION COPOLYMER

Application Bulletin– Trilene

Trilene® as Reactive Plasticizer in High Durometer Rubber Compounds

- *Trilene® polymers can significantly reduce compound viscosity*
- *Trilene® can reduced scrap and improve physical properties*
- *Trilene® liquid polymers are non-extractable and nonvolatile (Zero VOC)*
- *Trilene® can reduce mixing capital cost.*
- *Trilene® in high durometer formulation, maximizes hardness, improves physical properties includes compression.*

Introduction

Trilene® liquid polymers are a family of viscous, low molecular weight ethylene-propylene copolymers and ethylene-propylene non-conjugated diene terpolymers. They are polymerized randomly to produce liquid elastomers with stable, saturated hydrocarbon backbones. The terpolymers, which derive their reactivity from pendant unsaturation, are useful in applications requiring crosslinking. Trilene® may be used alone or in combination with solid elastomers to allow curing of conventional rubber along with the processing versatility of a liquid. Trilene® liquid polymers can be used in a wide variety of applications.

Low Viscosity

The lower viscosity of Trilene®, compared with traditional EPDM polymers provides advantages in the areas of processing and product preparation. Capital costs are reduced because lower intensity mixing and less expensive tooling techniques can be used.

Reactive Plasticizer

Substituting a modest level of Trilene® polymers for the high molecular weight elastomers in a rubber formulation can significantly reduce compound viscosity. Processing can be improved and scrap reduced without significant reductions in cured physical properties. Because Trilene® liquid polymers are curable, they are non-extractable and nonvolatile after cure. The addition of 10 phr Trilene® polymer usually lowers compound Mooney viscosity by 15 points.

Applications

Trilene® liquid copolymers and terpolymers are used to modify the flow characteristics and improve the processing of high molecular weight elastomers, thermoplastics, and plastics. In high durometer formulations replacing conventional plasticizers with Trilene® terpolymers will enhance the processing to maximize hardness without compromising physical properties or compression set.

Detailed technical reports are available on a number of specific end uses. We also encourage you to contact us with any questions that you may have on Trilene or to discuss specific applications. Our technical business support personnel are committed to serving your needs and can be reached at 225 267-3660 or check out our website at www.lioncopolymer.com.

High Durometer Dense Extrusion Compound with Trilene					
		A	B	C	D
Plasticizer (full recipe below)					
Paraffinic oil		**25**	**45**	**25**	**25**
Trilene® 65		**---**	**---**	**20**	**30**
Processing					
Mooney ML 1+4 @ 100°C		**>200**	**86**	**92**	**75**
Unaged Properties					
Shore A Hardness		**86**	**78**	**81**	**81**
Compression set (22hrs@70C) %		**9**	**9**	**9**	**9**
Die C Tear kN/m		**21.40**	**20.70**	**20.80**	**24.00**
Ultimate Tensile Mpa		**12.60**	**12.40**	**12.70**	**12.90**
Ultimate Elongation %		**100**	**140**	**120**	**130**
Recipe: 100phr High MW EPDM polymer, 140phr N-785 black, Plasticizer variable, Stearic acid - 1phr, Zinc oxide - 5phr, PE wax - 10phr, TAC (72%) 2.8phr, CaO (80) - 5phr, Di-(t-butylperoxy-i-propyl) benzene(60%) - 3.3phr					

Effect of Plasticizer on Hardness					
		None	Oil	T-65	T-77
Plasticizer (full recipe below)					
Paraffinic oil		**---**	**10**	**---**	**---**
Trilene® 65		**---**	**---**	**10**	**---**
Trilene® 77		**---**	**---**	**---**	**10**
Processing					
Mooney ML 1+4 @ 100°C		**83**	**63**	**64**	**69**
Unaged Properties					
Shore A Hardness		**73**	**66**	**69**	**70**
100% Modulus Mpa		**4.60**	**1.65**	**3.34**	**4.00**
Ultimate Tensile Mpa		**19.40**	**17.60**	**19.20**	**19.20**
Ultimate Elongation %		**270**	**460**	**310**	**280**
Recipe: 100phr High MW EPDM polymer, 60phr N-774 black, Plasticizer variable, Zinc oxide - 5phr, TMQ - 1phr, TMTM - 2phr, Dicumyl Peroxide (40%) - 7phr					