3M™ Dynamar™
High Performance Rubber Additive RA 5300

Features and Benefits

- High performance rubber additive for fluoroelastomer compounds
- Provides improved smoothness for FKM extrusions and improved mold release and less mold fouling for molders of FKM compounds compared to typical processing aids
- Delivers exceptional processing performance with limited property loss
- Excellent thermal stability
- Ideal for many FKM tube, profile, and pre-form extrusions, as well as injection and transfer molding processes

Note: Data in this document are not for specification purposes.

Introduction

3M™ Dynamar™ RA 5300 High Performance Rubber Additive is designed for use at low loadings to improve the processing in extrusion and molding operations. It utilizes unique chemistry which makes it particularly effective as a processing aid in fluoroelastomer compounds. Loadings between 0.5 and 1 PHR (parts per hundred rubber) can achieve excellent performance with minimal effect on rheological and physical properties of the overall compound.

As a rubber processing additive, Dynamar RA 5300 can help improve the surface finish of FKM extrusions, deliver a higher yield and improve downstream processing. RA 5300 may also aid molding processes with improved flow, release, and tool fouling, especially at higher molding temperatures (approximately 400°F).

Compared to conventional FKM processing additives, RA 5300 exhibits exceptional stability for compression set and heat age resistance, and at loadings less than 1 PHR has little to no effect on rheological properties.

Recommended Processing Procedures

Traditional techniques for mixing FKM compounds can be used to incorporate RA 5300. The same properties that allow this product to perform in extrusion and molding processes can also be seen in the mixing process. Sticking to two roll mills and internal mixers can be lessened with the use of RA 5300.

RA 5300 should be added at the same time in the mix sequence as the fillers and other dry ingredients. Premixing the fillers with RA 5300 is highly recommended for ease of incorporation. If added early in the mix, prior to filler incorporation, the RA 5300 could form a film on the polymer and mill rolls and reduce the polymer's ability to band on the mill. Late addition, after filler incorporation, could reduce its ability to incorporate into the mix.

Safety and Toxicology

Read and follow all applicable precautions and directions for use contained in the product label and the Material Safety Data Sheet (MSDS) before using this product. General handling procedures include: **1**) Use of general dilution and/or local exhaust ventilation to control airborne exposures. **2**) Store away from heat and out of direct sunlight. **3**) Store away from acids and strong bases.

Use of Dynamar RA 5300 in an FKM O-Ring Compound

The following tables show the effect of scorch safety, cure rate, and ultimate physical properties of RA 5300 in comparison to conventional processing aids used in 3M fluoroelastomer O-ring compounds. RA 5300 has little effect on the scorch safety or cure rate in comparison to the control with no process aid added. The conventional materials generate faster cure rate and shorter scorch than both the control and the compound with RA 5300. Addition of RA 5300 produces a slightly lower hardness and tensile strength in comparison to the control and the conventional materials, but has little to no effect on compression set in comparison to higher compression set values using the conventional materials.

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Compound				
3M™ Dyneon™ FE 5640	100	100	100	100
N-990	30	30	30	30
Calcium Hydroxide HP XL	6	6	6	6
Elastomag® 170	3	3	3	3
3M™ Dynamar™ RA 5300		1		
Carnauba Wax			1	
Struktol® WS-280				1
	139	**140**	**140**	**140**
MDR, 177°C (350°F) for 12 Minutes				
MH (in-lb)	23.52	22.91	24.15	26.29
ML (in-lb)	1.35	1.35	1.36	1.39
t^s2 (min)	2.42	2.48	1.99	2.07
T' 50 (min)	3.01	3.04	2.48	2.6
T' 90 (min)	4.21	4.24	3.82	4.03
Mooney Viscosity, MS 1+60 @ 121°C (250°F)				
Initial Viscosity, MU	76.9	77.2	65.1	75.8
Minimum Viscosity, MU	38.1	36.5	37.6	39.2
t^s3, Minutes	>60	>60	37.02	>60
t^310, Minutes	>60	>60	>60	>60
t^318, Minutes	>60	>60	>60	>60
Press Cure, 10' @ 177°F (350°F)				
Tensile (psi)	1554	1372	1315	1297
Elongation (%)	257	266	247	233
100% Modulus (psi)	712	638	716	681
Hardness (Shore A)	71	71	74	73
Post Cure, 232°C (450°F) for 16 Hours				
Tensile (psi)	2331	2090	2614	2170
Elongation (%)	200	206	177	185
100% Modulus (psi)	978	901	1152	1022
Hardness (Shore A)	76	74	77	76
Compression Set, 70 Hours @ 200°C (392°F), -214 O-ring, 25% Deflection				
% Set	14.1	13.6	19.1	17.3
Heat Age Resistance, 70 Hours @ 270°C (518°F)				
Tensile (psi)	2038	1761	2001	1900
Elongation (%)	210	193	201	191
100% Modulus (psi)	770	787	934	901
Hardness (Shore A)	76	73	78	78
Tensile Change (%)	-13.1	-15.5	-27.0	-20.1
Elongation Change (%)	0.5	-7.7	12.9	-3.5
100% Modulus Change (%)	-23.0	-14.6	-20.9	-13.6
Hardness Change (pts)	-1	-1	2	2

3M

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