

Dymalink® 709 Improves Scorch Safety and Promotes High Crosslink Density in Sulfur- Vulcanized Systems



Benefits

- Extends scorch safety and maintains cure rate
- Increases crosslink density (ultimate state of cure)
- Efficient cure activation
- Rationalizes reduced-zinc formulations

Markets/Applications

- Rubber roller compounds
- Automotive tires
- Conveyor belts

Additional Information

MSDS/TDS: Dymalink® 709

Description

Dymalink® 709 demonstrates utility as a functional additive for accelerated sulfur vulcanization. The zinc salt of methacrylic acid can be used in place of traditional zinc oxide/stearic acid activating systems. Benefits include increased scorch safety and elevated crosslink density while maintaining cure rates. Dymalink® 709 may act as a more efficient activator, increasing the quantity of crosslinks while lowering the average sulfur rank of each linkage. By using Dymalink® 709 in the cure package, the compounder can lower reversion and compression set, increase resilience, lower hysteresis and improve the thermal stability of the compound. Dymalink® 709 allows the compounder to achieve the cured properties of a sulfur-donor or efficient sulfur-cure system using a conventional accelerator. Features and typical properties are shown in Table 1 below.

Table 1

Dymalink® 709 Features and Typical Properties

Product Description	Zinc monomethacrylate
Product Features	<ul style="list-style-type: none">• Soluble metallic monomer• Potent activator for accelerated sulfur-cure
Physical Form	White powder
Molecular Weight	167
Specific Gravity @ 25C	1.88

TECHNICAL UPDATE

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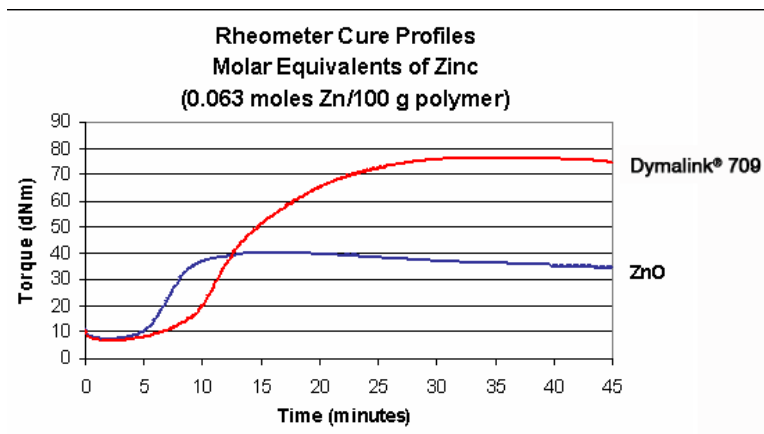
In the model sulfur-cure formulation in Table 2 below, zinc oxide can be replaced with various levels of Dymalink® 709 (zinc monomethacrylate or ZMMA).

Table 2
Model Sulfur-Cure Formulation

	Ingredient	phr
Stage 1	Synthetic PI	100
	N330 Carbon Black	50
	Processing Oil	10
	Zinc Oxide	Variable
	Stearic Acid	Variable
	ZDA, ZDMA, ZMMA	Variable
	Antioxidant	1
Stage 2	TBBS	0.7
	Sulfur	2.5

Figure 1 shows a comparison of rheometer cure profiles for Dymalink® 709 and zinc oxide (ZnO) at equivalent molar concentration of zinc. Scorch safety is noticeably improved at similar states of cure.

Figure 1



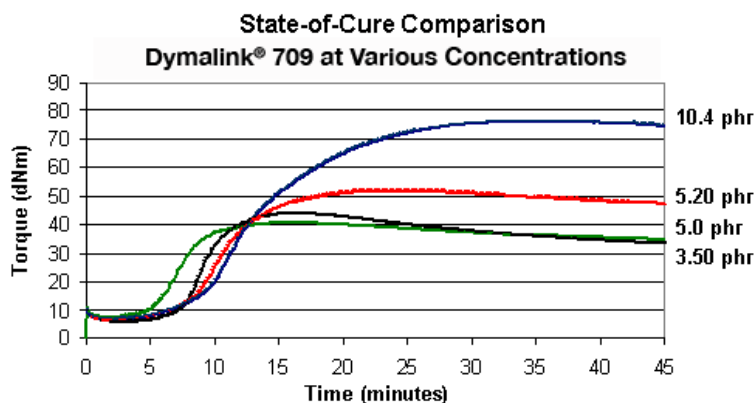
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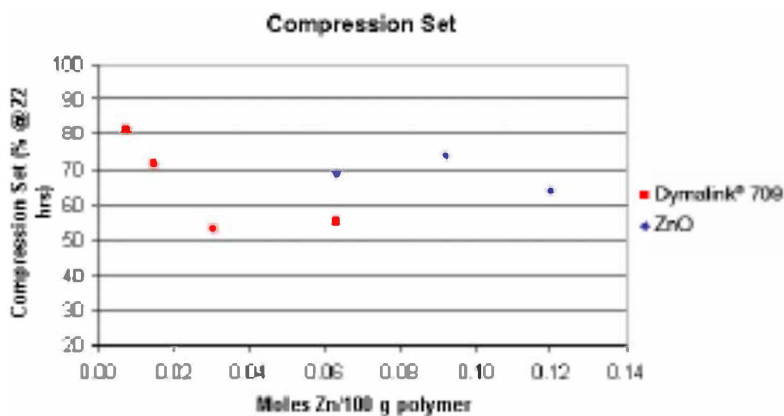
The chart below shows a comparison of elevated levels of Dymalink® 709 and 5 phr ZnO. State of cure continues to improve, while scorch protection is evident at even low levels of Dymalink® 709.

Figure 2



As illustrated in Figure 3 below, at equivalent concentrations of zinc activator, Dymalink® 709 provides lower compression set.

Figure 3



TECHNICAL UPDATE

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The benefits of Dymalink® 709 are summarized below.

Benefits Summary

At Equivalent...	Crosslink Density	Zn Concentration
Dymalink® 709 Provides...	<ul style="list-style-type: none">• Improved scorch protection• Reduced Zn activator requirement	<ul style="list-style-type: none">• Higher crosslink density• Improved scorch protection• Reduced reversion

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