

## SR709

### 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: SR709

#### Description

SR709 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. SR709 may act as a more efficient activator, increasing the quantity of crosslinks while lowering the average sulfur rank of each linkage. By using SR709 in the cure package, the compounder can lower reversion and compression set, increase resilience, lower hysteresis and improve the thermal stability of the compound. SR709 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 Table 1 below.

Table 1

SR709 Features and Typical Properties

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

# TECHNICAL UPDATE

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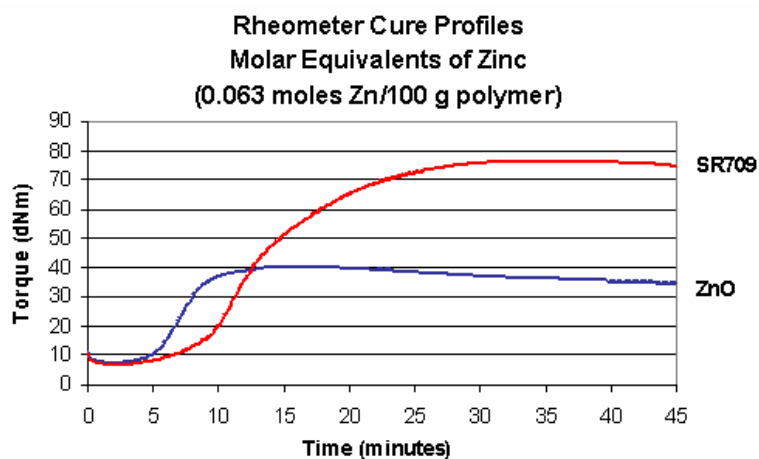
In the model sulfur-cure formulation in Table 2 below, zinc oxide can be replaced with various levels of SR709 (zinc monomethacrylate or ZMMA).

**Table 2**  
**Model Sulfur-Cure Formulation**

	<b>Ingredient</b>	<b>phr</b>
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 SR709 and zinc oxide (ZnO) at equivalent molar concentration of zinc. Scorch safety is noticeably improved at similar states of cure.

**Figure 1**



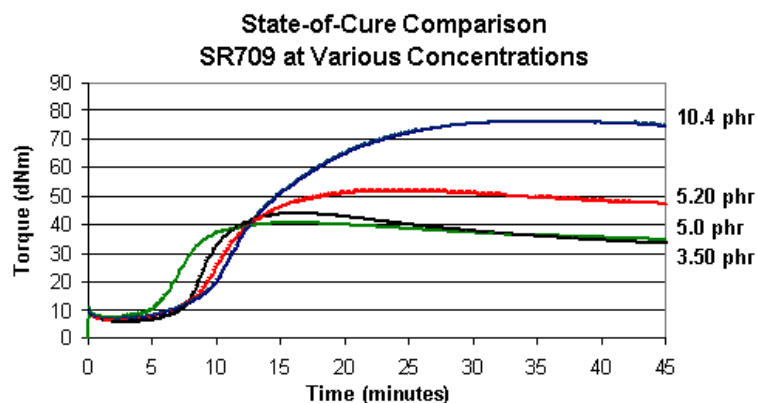
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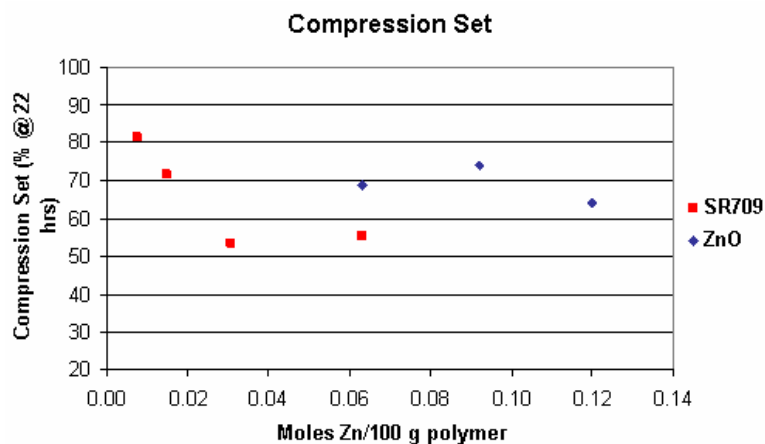
The chart below shows a comparison of elevated levels of SR709 and 5 phr ZnO. State-of-cure continues to improve, while scorch protection is evident at even low levels of SR709.

Figure 2



As illustrated in Figure 3 below, at equivalent concentrations of zinc activator, SR709 provides lower compression set.

Figure 3



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The benefits of SR709 are summarized below.

## Benefits Summary

At Equivalent...	Crosslink Density	Zn Concentration
<b>SR709 Provides...</b>	<ul style="list-style-type: none"><li>• Improved scorch protection</li><li>• Reduced Zn activator requirement</li></ul>	<ul style="list-style-type: none"><li>• Higher crosslink density</li><li>• Improved scorch protection</li><li>• Reduced reversion</li></ul>

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