

# TECHNICAL Bulletin

**Subject:** Epichlorohydrin  
Compounds

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## THERMAX® MEDIUM THERMAL BLACK N990 IN EPICHLOROHYDRIN

Thermax® medium thermal carbon black N990 is manufactured by the thermal decomposition of natural gas. The thermal process provides a unique carbon black characterized by a large particle size and low structure. Thermax® is widely used in applications which require excellent dynamic properties. The large particle size (low surface area) and low structure allow for low compression set, high rebound and low hysteresis, thereby maintaining the inherent elastomeric properties of the rubber compound. As a non-reinforcing black, thermal black is often blended with furnace carbon blacks and/or mineral fillers to achieve cost reduction and specific physical properties in the rubber compound.

Thermax® can be used in all polymers and is commonly used in new high cost polymers such as epichlorohydrin (CO, ECO, GECO). High loadings of Thermax® are possible, while maintaining low compression set and high resiliency. This allows manufacturers to reduce compound cost. The combination of Thermax® N990 and epichlorohydrin elastomer provides excellent solvent and oil resistance, low compression set, high resiliency, high ozone resistance and extreme temperature resistance. This allows for applications such as:

- Seals, gaskets, o-rings
- Tubing, hose, pump parts
- Oilfield and drilling applications, diaphragms
- Roll coverings

The following is a comparison of the effect of equal loadings of carbon black in hydrin copolymer compound (Hydrin 200, manufactured by Zeon Chemical).

### Formulation

Hydrin copolymer (Hydrin 200)	100.0
Carbon Black	60
Zinc stearate	1.0
Read lead	5.0
NBC (nickel dibutyldithiocarbamate)	1.0
ETU (2-mercaptoimidazoline)	1.5

<b>Carbon Black Type</b>	<b>HAF</b>	<b>FEF</b>	<b>APF</b>	<b>SRF</b>	<b>MT</b>
Loading, phr	60	60	60	60	60
<b>Mooney Scorch, 121°C</b>					
ML, minimum	128	173	176	122	79
ML, 5 minutes	5.3	5.0	4.8	122	6.3
100% Modulus, MPa	9.8	11.9	11.3	7.5	3.4
300% Modulus, MPa	-	-	-	-	9.5
Tensile Strength, MPa	19.5	18.4	17.2	14.9	9.5
Elongation (%)	200	190	200	220	300
Hardness, Shore A, pts	85	84	83	77	69
Graves Tear, Die C, kN/cm	49.0	40.3	47.3	35.0	26.3
Comp. Set, %, 22 hours @ 100°C	16	17	14	13	14
Lupke Rebound, % Return	35	40	43	57	60
<b>DeMattia Flex, Unpierced, Unaged, Flexures for 0.8" crack growth</b>					
	970	400	200	2400	12800

#### **Data Source: Zeon Chemical**

The results above demonstrate the typical effects of N990 in elastomers. High rebound resiliency, low compression set and high elongation are evident. Hence the use of N990 in applications that require low hardness and excellent dynamic properties. The low viscosity will allow for easy processing and good flow into intricate molds, particularly beneficial for injection molding.

As a non-reinforcing carbon black, Thermax® N990 is often blended with other carbon blacks or minerals fillers to achieve specific properties, such as higher tensile strength or higher tear strength.

Thermax® N990 is used in loadings of up to 200 phr in high performance polymers such as FKM, ECO, GECO and HNBR.