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Vamac® Ultra DX for Pressureless Cure

Ethylene Methylacrylate Elastomer

Vamac® ethylene acrylic elastomer, introduced in 1975, has been successfully used for many years in demanding automotive applications, where excellent resistance to heat, engine and transmission fluids or Blow-By is required. our latest manufacturing technology allows production of enhanced AEM grades that have significantly improved compared to the existing standard Vamac® elastomers. These grades, designated and sold as Vamac® Ultra, provide a step-change improvement in processability, performance and customer value for targeted applications, including for peroxide cure E/MA dipolymer grade with Vamac® Ultra DX (formerly VMX2122).

Bale size is nominally: 560 x 370 x 165 mm

Major Performance Properties and Applications

Higher viscosity is the major difference between the standard AEM grades and the Vamac® Ultra family of polymers. Four Terpolymers of the Ultra grades, cured by Diamine curatives, are now commercial. Vamac® Ultra DX is a high viscosity version of Vamac® DP. It provides improved mold release, and is comparable to Vamac® Ultra Terpolymers.

Increased green strength of compounds helps to avoid collapse during extrusion processes, and may help in applying reinforcement layers without cutting the inner tube by filaments. The optimized polymer structure ensures gains in physical properties, resulting in improved performance of rubber parts such as cables, seals, gaskets or extruded hoses.

Best physical properties of Vamac® Ultra DX are obtained in rubber parts having a hardness range between 50 and 90 Shore A.

Compound and Vulcanisate Properties

Compounds of Vamac® are formulated and processed by customers to meet their own specific performance requirements. Many of the highest-performing compounds are vulcanizates of Vamac® are proprietary, and cannot be published. We have independently formulated a wide variety of Vamac® compounds for its own short- and long-term properties testing programs.

A typical compound of Vamac® Ultra DX for fluid resistance is reviewed below. Vulcanizate performance test data are given to help endusers evaluate the potential fitness of similar compounds for their own applications.

Sample Compound, Vamac® Ultra DX for fluid resistance

Ingredients	Parts
Vamac® Ultra DX	100
Antioxidant: Naugard® 445	1
Armeen® 18D PRILLS	0.5
Stearic Acid Reagent (95%)	1
Spheron® SOA (N 550)	65
Struktol® WS 180	0.5
Kezadol GR (CaO desiccant)	10
Luperox® DC 40 P	8

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Sartomer® SR350 (TRIM)	2
Total Parts	188

Vamac® Terpolymers are used as standard material for hoses, due to their good physical properties and excellent green strength of compounds for extrusion. Dipolymer compounds typically have had lower green strength. Vamac® Ultra DX offers higher green strength and better properties compared to Vamac® DP and can meet existing AEM specifications. Straight tubes can be cured in pressure less, continuous systems like UHF ovens or salt baths. Suitable compounds need Calcium Oxide (CaO) as absorbent for moisture which is always present in any rubber compounds. CaO would react with the acidic cure sites of Vamac® Terpolymers, for which reason these polymers cannot be used for such cost-effective continuous vulcanization processes. Vamac® Dipolymers can be used along with CaO, and some compounding possibilities have been developed in the past to produce compounds fit for use in pressure less cure processes.
Vamac® Ultra DX has shown improvements over Vamac® DP in lab trials. Optimization, including use of a combination of two peroxides with lower and higher decomposition temperatures may be employed, but was not used in this study. More information can be provided on request.

Product information

Colour	Clear		
Viscosity, Mooney, ML 1'+4' at 100 °C	28		ISO 289-1-2
Volatiles	≤0.4	%	EN 1400 / EN 14350-2
Maximum Service Temperature	175	°C	

Rheological properties

Viscosity, Mooney, compound, ML 1'+4' at 100 °C	69		ISO 289-1-2
Moving Die Rheometer at 180 °C, torque	100 - 1300[1]	Nmm	ISO 6502
Moving Die Rheometer at 180 °C, t(50)	0.8[1]	min	ISO 6502
Moving Die Rheometer at 180 °C, t(90)	1.6[1]	min	ISO 6502

[1]: tested at 190 °C

Cure conditions

Cure time	5	min
Cure temperature	190	°C

Typical mechanical properties

Tensile stress at 100% strain	5.4	MPa	ISO 527-1/-2
Tensile stress at break	14	MPa	ISO 527-1/-2
Tensile strain at break	>300	%	ISO 527-1/-2
Shore A hardness	75		ASTM D 2240
Compression set, 150 °C, 70h	52	%	ISO 815
Tear strength, parallel	8.5	kN/m	ISO 34-1

Characteristics

Processing	Extrusion
Delivery form	Bale
Special characteristics	Heat stabilised or stable to heat

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Additional information

Profile extrusion

Handling Precautions

Because Vamac® Ultra DX contains small amounts of residual methyl acrylate monomer, adequate ventilation should be provided during storage and processing to prevent worker exposure to methyl acrylate vapor. Additional information may be found in the Vamac® Ultra DX Safety Data Sheet (SDS), and our bulletin, Safe Handling and Processing of Vamac® (VME-A10628), available on our website.

Mixing

Vamac® Ultra DX has higher viscosity than Vamac® DP which permits better and faster dispersion of fillers and other compounding ingredients. Due to the general good scorch safety of peroxide cured compounds, changes in mixing cycle due to higher viscosity are not considered necessary.

Chemical Media Resistance

Mineral oils

- ✔ SAE 10W40 multigrade motor oil, 23 °C
- ✔ SAE 10W40 multigrade motor oil, 130 °C
- ✔ SAE 80/90 hypoid-gear oil, 130 °C
- ✔ Insulating Oil, 23 °C
- ✔ Motor oil OS206 304 Ref.Eng.Oil, ISP, 135 °C
- ✔ Automatic hypoid-gear oil Shell Donax TX, 135 °C
- ✔ Hydraulic oil Pentosin CHF 202, 125 °C

Symbols used:

✔ possibly resistant
Defined as: Supplier has sufficient indication that contact with chemical can be potentially accepted under the intended use conditions and expected service life. Criteria for assessment have to be indicated (e.g. surface aspect, volume change, property change).

✘ not recommended - see explanation
Defined as: Not recommended for general use. However, short-term exposure under certain restricted conditions could be acceptable (e.g. fast cleaning with thorough rinsing, spills, wiping, vapor exposure).

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