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Vamac® GXF

Ethylene Methylacrylate Elastomer

Vamac® GXF is a terpolymer of ethylene, methyl acrylate, and a cure site monomer cured using an amine-based vulcanization system.

Compared with Vamac® G, Vamac® GXF has improved high temperature properties and better dynamic flex fatigue resistance. Vamac® GXF includes a small amount of processing aid and has a mild acrylic odor. Use adequate ventilation during storage, mixing, and processing to prevent accumulation of residual vapors. Storage stability is excellent.

Bale size is nominally: 560 x 370 x 165 mm

Major Performance Properties and Applications

Vamac® GXF is well suited for those applications which need improved high temperature properties or improved dynamic flex fatigue resistance over Vamac® G and can tolerate a slightly longer cure time. Typical applications that would benefit from the improved properties of Vamac® GXF are air ducts, hoses and torsional dampers.

Compounds of Vamac® GXF compared to Vamac® G have longer scorch time for improved processing and slightly higher compression sets. Elongation and properties at elevated temperature are improved resulting in significantly improved dynamic flex fatigue resistance. Heat and fluid aging is similar.

Vamac® GXF is well suited for injection, transfer and compression molding, and is easily extruded.

Compound and Vulcanizate 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® GXF 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® GXF

Ingredients	Parts
Vamac® GXF	100
Antioxidant: Naugard® 445	2
Release agent: Stearic acid	1.5
Release agent: Vanfre® VAM (alkylphosphate)	1
FEF black (N550)	50
Curative: Diak™ No. 1 (hexamethylene diamine carbamate)	1.5
Coaccelerator: DOTG (guanidine coagent)	4
Total Parts	160

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Elimination of Armeen® 18D from the Vamac® GXF compound to improve the compound cure time t(50).

Improved fatigue performance

DeMattia Dynamic Fatigue (ASTM D430) – Vamac® G vs. GXF (cycles to failure, avg. from 3 slabs (not pierced):
at 23°C : no failure, stopped after 600,000 cycles
at 100°C : Vamac® GXF lasts 1.7 times longer than Vamac® G
at 150°C : Vamac® GXF lasts 2.6 times longer than Vamac® G

DOTG Replacement

The reference compound shown in this datasheet includes DOTG as cure accelerator. Di-Ortho-Tolyl-Guanidine forms as decomposition product o-Toluidine (CAS 95-53-4) which is classified as carcinogen by IARC, NTP, OSHA and ACGIH.

DBU (1,8-Diazabicyclo[5.4.0] undec-7-ene, CAS 6674-22-2) based cure accelerators have been developed that can replace DOTG in Vamac® compounds. Typically, the exchange of DOTG by DBU causes slightly higher Modulus and Hardness, lower Elongation-at-Break, and higher Compression Set. Furthermore, DBU accelerated compounds usually have shorter Scorch and Cure times, which may lead to higher viscosity after mixing and thus reduced compound flow during injection molding processes.

Partial replacement of Vamac® G by Vamac® GXF helps to increase Elongation at Break values and provide longer Scorch times to allow for better compound flow. Higher Compression Set values with Vamac® GXF can be optimized by other compounding techniques use of plasticizers with lower volatility or use of Vamac® Ultra polymers.

Product information

Resin Identification	AEM		ISO 1043
Part Marking Code	>AEM<		ISO 11469
Colour	Clear[1]		
Viscosity, Mooney, ML 1'+4' at 100°C	17.5		ISO 289-1-2
Volatiles	≤0.4	%	EN 1400 / EN 14350-2
Maximum Service Temperature	175	°C	

[1]: clear to light yellow translucent

Rheological properties

Viscosity, Mooney, compound, ML 1'+4' at 100°C	50		ISO 289-1-2
Moving Die Rheometer at 180°C, torque	24 - 940	Nmm	ISO 6502
Moving Die Rheometer at 180°C, t(50)	3.2	min	ISO 6502
Moving Die Rheometer at 180°C, t(90)	8	min	ISO 6502

Cure conditions

Cure time	5	min
Cure temperature	190	°C
Post cure time	4	h
Post cure temperature	175	°C

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Typical mechanical properties

Tensile stress at 100% strain	5.1	MPa	ISO 527-1/-2
Tensile stress at break	17	MPa	ISO 527-1/-2
Tensile strain at break	>300	%	ISO 527-1/-2
Shore A hardness	71		ASTM D 2240
Compression set, 150°C, 70h	27	%	ISO 815
Tear strength, parallel	31	kN/m	ISO 34-1

Thermal properties

Glass transition temperature, 10°C/min	-27	°C	ASTM D 3418

Physical/Other properties

Density	1030	kg/m³	ISO 1183

Characteristics

Processing	Injection Moulding, Extrusion, Transfer Moulding, Compression moulding
Delivery form	Bale
Special characteristics	Heat stabilised or stable to heat

Additional information

Compression molding

Handling Precautions

Because Vamac® GXF 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® GXF product Safety Data Sheet (SDS), and our bulletin, *Safe Handling and Processing of Vamac®*.

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

Standard Fuels

- ✘ Diesel fuel (pref. ISO 1817 Liquid F), 23°C
- ✘ Diesel fuel (pref. ISO 1817 Liquid F), 90°C
- ✘ Diesel fuel (pref. ISO 1817 Liquid F), >90°C
- ✘ Diesel EN 590, 100°C

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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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