Viton™ GF-200S

Fluoroelastomers

Technical Information

Introduction

Viton™ GF-200S fluoroelastomer is a 70% fluorine, peroxide-cured fluoroelastomer similar to Viton™ GF-600S, but with a significantly lower gum polymer viscosity of ~25 (ML at 121 °C [250 °F]). Viton™ GF-200S utilizes advanced polymer architecture (APA), which includes a novel peroxide cure site along with an optimized molecular weight distribution.

Features

- Excellent fluid resistance to aromatic hydrocarbons and alcohols, including methanol, oils, steam, and acids
- Is ideal for blending with Viton™ GF-600S to reach intermediate viscosity ranges for injection molding
- Improved mold release/mold fouling properties
- Improved mold flow and less shear sensitivity than 65 Mooney Viton™ GF-600S
- Excellent physical properties with high elongation, both original and aged
- Heat, fluids, and low temperature properties comparable to Viton™ GF and GF-600S
- Improved water resistance/lower volume swell in water
- Excellent compression set resistance with either low or no post-cure

Processing

A load factor of >72% for internal mixing of Viton™ GF-200S is suggested. The suggested process aids for Viton™ GF-200S are 0.75 phr of Struktol® HT-290, either alone or in combination with 0.5 phr of PAT-777, or combinations of 0.5 phr Armeen® 18D with carnauba wax or Struktol® WS-280. The use of DIAK™ 8 is NOT suggested, as it causes poor mold release and high compression set. DIAK™ 7 (TAIC) is the suggested coagent for all Viton™ GF-200S compounds and is usually used at a 2.5 phr level or lower, unless high modulus is needed. High levels of TAIC can bleed out and cause molding flaws.

Safety and Handling

Before handling or processing Viton™ GF-200S, be sure to read and be guided by the suggestions in the Chemours technical bulletin, "Handling Precautions for Viton™ and Related Chemicals."

Product Description

Chemical Composition	Copolymer of hexafluoropropylene, vinylidene fluoride, and tetrafluoroethylene with a cure site monomer
Physical Form	Sheet
Appearance	White to tan
Odor	None
Mooney Viscosity, ML 1 + 10 at 121 °C (250 °F)	25
Specific Gravity	1.90
Storage Stability	Excellent
Fluorine, %	~70

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Table 1. General Properties of Viton™ GF-200S

	Viton™ GF-200S	50/50 Blend	Viton™ GF-600S
Mooney Viscosity (ML 1 + 10 at 121 °C [250 °F]) on Gum Polymers			
1 + 10 Reading	23	38	58
Compound DD-1964 No.	A48-03	A48-04	A48-05
Viton™ GF-200S	100	50	—
Viton™ GF-600S	—	50	100
Zinc Oxide	3	3	3
N990 (MT Black)	30	30	30
DIAK™ 7 (TAIC)	3	3	3
Varox® DBPH-50	2	2	2
Total phr Lab	138	138	138
Mooney Scorch at 121 °C (250 °F)			
Minimum, MU	13	22	31
2 Pt. Rise, min	24.8	23.0	18.4
5 Pt. Rise, min	26.2	24.2	19.8
10 Pt. Rise, min	27.7	25.7	20.9
ODR at 162 °C (324 °F), 3 Degree Arc, 100 Range, 30 Min Clock			
M-L, dNm	6	10	16
ts-2, min	1.4	1.3	1.4
t'50, min	3.1	3.0	3.1
t'90, min	5.8	5.3	6.2
M-H, dNm	173	168	166
MDR 2000 at 177 °C (351 °F), 0.5 Degree Arc, 100 Range, 12 Min Clock			
M-L, dNm	0.6	1.1	1.7
ts-2, min	0.4	0.4	0.4
t'50, min	0.7	0.7	0.6
t'90, min	1.1	1.1	1.0
t'95, min	1.4	1.3	1.3
M-H, dNm	33.6	33.2	32.7
Physical Properties at RT—Original (Cured 7 min at 177 °C [351 °F]—No Post-Cure)			
M-100, MPa	4.5	4.8	4.7
Tensile, MPa	13.3	13.3	14.3
T-B , psi	1,930	1,931	2,069
Elongation, %	278	264	291
Hardness A, pts	71	70	71
"Hot" Tear Strength at 150 °C (302 °F)—Original (Cured 7 min at 177 °C [351 °F]—No Post-Cure)			
Tear Die B, N/mm	11.4	10.5	10.9
Physical Properties at RT—Original (Cured 7 min at 177 °C [351 °F]—Post-Cured 2 hr at 232 °C [450 °F])			
M-100, MPa	6.3	6.6	6.2
Tensile, MPa	18.0	18.7	20.0
T-B , psi	2,614	2,714	2,904
Elongation, %	246	237	285
Hardness A, pts	76	74	74

Table 1. General Properties of Viton™ GF-200S (continued)

	Viton™ GF-200S	50/50 Blend	Viton™ GF-600S
Compression Set , Method B, O-Rings			
22 hr at 200 °C (392 °F)			
– No Post-Cure	20	20	19
– Post-Cure at 232 °C (450 °F)	16	14	16
70 hr at 200 °C (392 °F)			
– No Post-Cure	26	24	24
– Post-Cure at 232 °C (450 °F)	20	19	20
Physical Properties at RT—Heat-Aged 70 hr at 250 °C (482 °F) in Oven			
M-100, MPa	5.2	5.6	5.4
% Change, M-100	–17	–15	–13
Tensile, MPa	18.6	18.2	18.2
% Change, T-B	3	–3	–9
Elongation, %	296	275	293
% Change, E-B	20	16	3
Hardness, A, pts	78	77	77
Pts Change	2	3	3
Physical Properties at RT—Heat-Aged 70 hr at 275 °C (527 °F) in Oven			
M-100, MPa	3.8	4.1	4.2
% Change, M100	–40	–39	–33
Tensile, MPa	11.8	12.9	13.2
% Change, T-B	–34	–31	–34
Elongation, %	355	347	340
% Change, E-B	44	47	19
Hardness, A, pts	78	77	77
Pts Change	2	3	3
Physical Properties at RT—Aged 168 hr at 100 °C (212 °F) in ASTM # 105 Oil (5W/30 Motor Oil)			
M-100, MPa	7.0	6.4	6.7
% Change, M100	12	–3	8
Tensile, MPa	10.8	10.4	10.5
% Change, T-B	–40	–45	–47
Elongation, %	141	145	140
% Change, E-B	–43	–39	–51
Hardness, A, pts	79	77	77
Pts Change	3	3	3
Volume Swell, %	1.6	1.6	1.6
Low Temperature Testing (Post-Cured)			
Tg by DSC, °C (Inflection)	–5.0	–5.4	–6.0
Fluid Immersions - Volume Swell—168 hr at 23 °C (73 °F), Unless Noted			
Fuel C, %VS	2.9	3.4	3.3
M15 Fuel, %VS	7.0	7.2	7.7
Methanol, %VS	3.4	3.3	3.3
Distilled Water at 100 °C (212 °F)	3.7	3.7	3.8

Test Procedures

Property Measured	Test Procedure
Compression Set	ASTM D395, Method B (25% deflection)
Hardness	ASTM D1414, durometer A
MDR (moving die rheometer)	ASTM D5289
Mooney Scorch	ASTM D1646, small rotor at 121 °C (250 °F)
Mooney Viscosity	ASTM D1646, ten pass at 121 °C (250 °F)
ODR (oscillating disk rheometer)	ASTM D2084
Property Change After Heat Aging	ASTM D573
Stress/Strain Properties 100% Modulus Tensile Strength (T-B) Elongation (E-B)	ASTM D412, pulled at 8.5 mm/sec (20 in/min)
Tear Die B	ASTM D624
Tg by DSC	DDE Custom (Akron MDSC – Tg)
Volume Change in Fluids	ASTM D471

Test temperature is 23 °C (73 °F), except where specified otherwise.