Technical Information

Made with Advanced Polymer Architecture

Viton® fluoroelastomer

From DuPont Performance Elastomers

Viton® GF-200S

Product Description

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 @ 121°C). GF-200S utilizes the latest technology from DuPont Performance Elastomers, 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, 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 postcure

Product Description: Viton® GF-200S

Chemical Composition: Copolymer of hexafluoro-propylene , vinylidene fluoride, and tetra-fluoroethylene with a cure site monomer	
Physical form	sheet
Appearance	white to tan
Odor	none
Mooney Viscosity, ML 1 + 10 @ 121°C	25
Specific Gravity	1.90
Storage Stability	Excellent
Fluorine percent	~ 70%

Note: These are typical physical properties and not intended to serve as specifications

Processing

A load factor of 72%+ for internal mixing of GF-200S is suggested. The suggested process aids for 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 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 & Handling

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

Contents

* Viton® GF-200S was formerly known as VTR-8605

Table I - General Properties of Viton® GF-200S compared to GF-300

	GF-300	GF-200S	50 / 50 Blend	GF-600S
Mooney Viscosity (ML 1 + 10 @ 121°C) on gum polymers				
1 + 10 Reading =	30	23	38	58
Compound DD-1964 #	**A48-01**	**A48-03**	**A48-04**	**A48-05**
Viton® GF300	100	-	-	-
Viton® GF-200S	-	100	50	-
Viton® GF-600S	-	-	50	100
Zinc Oxide	3	3	3	3
N990 (MT Black)	30	30	30	30
DIAK™ 7 (TAIC)	3	3	3	3
Varox® DBPH-50	2	2	2	2
Total phr lab =	138	138	138	138
Mooney Scorch @ 121°C				
Minimum, MU	18	13	22	31
2 Pt. Rise (min)	26.5	24.8	23.0	18.4
5 Pt. Rise (min)	29.1	26.2	24.2	19.8
10 Pt. Rise (min)	>30	27.7	25.7	20.9
ODR @ 162°C, 3 Degree Arc, 100 Range, 30 Minute Clock				
M-L (dNm)	7	6	10	16
ts-2 (min)	1.4	1.4	1.3	1.4
t'50 (min)	3.2	3.1	3.0	3.1
t'90 (min)	6.6	5.8	5.3	6.2
M-H (dNm)	136	173	168	166
MDR 2000 @ 177°C, 0.5 Degree Arc, 100 Range, 12 Minute Clock				
M-L (dNm)	0.7	0.6	1.1	1.7
ts-2 (min)	0.5	0.4	0.4	0.4
t'50 (min)	0.7	0.7	0.7	0.6
t'90 (min)	1.6	1.1	1.1	1.0
t'95 (min)	2.2	1.4	1.3	1.3
M-H (dNm)	23.6	33.6	33.2	32.7
Physical Properties @ R.T. - Original (Cure 7' @ 177°C - no postcure)				
M-100, MPa	3.6	4.5	4.8	4.7
Tensile, MPa	12.3	13.3	13.3	14.3
(T-B , psi)	(1781)	(1930)	(1931)	(2069)
Elongation, %	336	278	264	291
Hardness, A, pts	69	71	70	71

continued

Table I - General Properties of Viton® GF-200S compared to GF-300 (cont)

	GF-300	GF-200S	50 / 50 Blend	GF-600S
"Hot" Tear Strength @ 150°C - Original (Cured 7' @ 177°C - No Postcure)				
Tear Die B, N/mm	11.2	11.4	10.5	10.9
Physical Properties @ R.T. - Original (Cured 7' @ 177C - Postcured 2 hrs @ 232°C)				
M-100, MPa	5.0	6.3	6.6	6.2
Tensile, MPa	20.0	18.0	18.7	20.0
(T-B , psi)	(2904)	(2614)	(2714)	(2904)
Elongation, %	300	246	237	285
Hardness, A, pts	72	76	74	74
Compression Set , Method B, O-Rings				
22 Hrs @ 200°C				
- no postcure	34	20	20	19
- Postcure @ 232°C	26	16	14	16
70 Hrs @ 200°C				
- no postcure	43	26	24	24
- Postcure @ 232°C	36	20	19	20
Physical Properties @ R.T. - Heat Aged 70 Hrs @ 250°C In Oven				
M-100, MPa	4.9	5.2	5.6	5.4
(% Change, M-100)	-1%	-17%	-15%	-13%
Tensile, MPa	17.0	18.6	18.2	18.2
(% Change, T-B)	-15%	3%	-3%	-9%
Elongation, %	325	296	275	293
(% Change, E-B)	8%	20%	16%	3%
Hardness, A, pts	75	78	77	77
(Pts Change)	3	2	3	3
Physical Properties @ R.T. - Heat Aged 70 Hrs @ 275°C In Oven				
M-100, MPa	3.0	3.8	4.1	4.2
(% Change,M100)	-40%	-40%	-39%	-33%
Tensile, MPa	7.3	11.8	12.9	13.2
(% Change, T-B)	-64%	-34%	-31%	-34%
Elongation, %	391	355	347	340
(% Change, E-B)	30%	44%	47%	19%
Hardness, A, pts	75	78	77	77
(Pts Change)	3	2	3	3

continued

Table I - General Properties of Viton® GF-200S compared to GF-300 (cont)

	GF-300	GF-200S	50 / 50 Blend	GF-600S
Physical Properties @ R.T. - Aged 168 Hrs @ 100°C In ASTM # 105 Oil (5W/30 motor oil)				
M-100, MPa	6.2	7.0	6.4	6.7
(% Change, M100)	23%	12%	-3%	8%
Tensile, MPa	10.6	10.8	10.4	10.5
(% Change, T-B)	-47%	-40%	-45%	-47%
Elongation, %	154	141	145	140
(% Change, E-B)	-49%	-43%	-39%	-51%
Hardness, A, pts	75	79	77	77
(Pts Change)	3	3	3	3
Volume Swell, %	1.4	1.6	1.6	1.6
Low Temperature Testing (postcured)				
Tg by DSC, °C (Inflection)	-6.1	-5.0	-5.4	-6.0
Fluid Immersions - Volume Swell - 168 Hrs @ 23°C unless noted				
Fuel C, %VS	2.5	2.9	3.4	3.3
M15 Fuel, %VS	6.3	7.0	7.2	7.7
Methanol, %VS	3.7	3.4	3.3	3.3
Distilled Water @ 100°C	4.9	3.7	3.7	3.8

Appendix

List of Proprietary Chemicals and Ingredients

Sources of compounding ingredients referenced or used in this bulletin are listed here. This is not to imply that comparable ingredients from other sources might not be equally usable.

Material	Composition	Supplier
Armeen® 18D	1-Octadecanamine,N-Octadecyl	Akzo Nobel Polymer Chemicals LLC Chicago, IL 60606
Carnauba wax	carnauba wax	Frank B. Ross Co. Inc. Jersey City, NJ 07304
DIAK™ 7	TAIC – triallyl isocyanurate	DuPont Performance Elastomers Wilmington, DE 19809
DIAK™ 8	TMAIC – trimethallyl isocyanurate	DuPont Performance Elastomers Wilmington, DE 19809
PAT-777	Fatty acid derivatives	IDE Processes International Sales LLC (E und P Wurtz GmbH) Kew Gardens, NY 11415
Struktol® HT-290	Blend of fatty acid derivatives	Struktol Co. of America Stow, OH 44224
Struktol® WS-280	silicone-organic compounds	Struktol Co. of America Stow, OH 44224
Varox® DBPH-50	45% active dispersion of 2,5 Dimethyl-2-5-Di-(t-butyl-peroxy) hexane	R.T. Vanderbilt Co. Norwalk, CT 06855
Viton® fluoroelastomer	Fluorinated synthetic rubber (FKM)	DuPont Performance Elastomers Wilmington, DE 19809

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 @ 121°C
Mooney Viscosity	ASTM D1646, ten pass @ 121°C
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/s (20” in/min)
Tear Die B	ASTM D624
Tg by DSC	DDE Custom (Akron MDSC – Tg)
Volume Change In Fluids	ASTM D471

Note: Test temperature is 23°C except where specified otherwise

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