

DuPont™ Viton® GFLT-200S

Technical Information — Rev. 2, July 2010

Product Description

DuPont™ Viton® GFLT-200S* fluoroelastomer is a low viscosity 67% fluorine, peroxide-cured, low temperature fluoroelastomer. GFLT-200S utilizes the latest technology from DuPont, **Advanced Polymer Architecture** (APA), which includes a novel peroxide cure site along with an optimized molecular weight distribution.

Features

- Is ideal for blending with Viton® GFLT-600S to reach intermediate viscosity ranges for injection and transfer molding
- Heat, fluids, and low temperature resistance comparable to Viton® GFLT-300 and GFLT-301
- Cures exceptionally fast to a high state of cure
- Improved mold release/mold fouling properties
- Improved mold flow and less shear sensitivity for a 25 Mooney peroxy cured FKM
- Good physical properties with high elongation, both original and aged
- Improved water resistance/lower volume swell in water
- Excellent compression set resistance with either low or no postcure

Product Description: Viton® GFLT-200S

Chemical Composition: Copolymer of perfluoro-Methylvinyl ether, vinylidene fluoride, and tetra-fluoroethylene with a cure site monomer

Physical form	Sheet
Appearance	White to tan
Odor	None
Mooney Viscosity, ML 1 + 10 at 121 °C	25
Specific Gravity	1.86
Storage Stability	Excellent
Fluorine, %	~67

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

Processing

A load factor of 72%+ for internal mixing of GFLT-200S is preferred. The suggested process aids for GFLT-200S are 0.75 phr of Struktol® HT290 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® WS280. 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 GFLT-200S compounds, and is usually used at a 3 phr level or lower unless high modulus is needed. High levels of TAIC can bleed out and cause molding flaws. A peroxide level of 1.5 to 2 phr is suggested for this fast curing FKM polymer.

Safety and Handling

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

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*Viton® GFLT-200S was formerly known as VTR-8555

Table I

The fundamental properties of DuPont™ Viton® GFLT-200S

Compound:¹	GFLT-300 A50-01	GFLT-200S A50-05
ML-10 at 121 °C (gum):	34	27
Compound:	<u>A50-01</u>	<u>A50-05</u>
Viton® GFLT-300	100	—
Viton® GFLT-200S	—	100
Zinc Oxide	3	3
N990 (MT Black)	30	30
Diak™ 7	3	3
Varox® DBPH-50	<u>3</u>	<u>2</u>
total =	139	138
Mooney Scorch at 121 °C		
Minimum	23	16
2 Pt. Rise (min)	24.9	28.0
5 Pt. Rise (min)	26.4	>30
10 Pt. Rise (min)	27.9	—
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock		
M-L (dNm)	11	6
ts-2 (min)	1.1	1.3
t'50 (min)	2.9	2.7
t'90 (min)	12.9	4.2
M-H (dNm)	116	163
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock		
M-L (dNm)	1.1	0.8
ts-2 (min)	0.4	0.4
t'50 (min)	0.7	0.6
t'90 (min)	2.4	1.1
t'95 (min)	3.4	1.3
M-H (dNm)	18.3	32.2
Rosand Capillary Rheometer at 100 °C, 1.5 mm die - L/D = 0/1 & 10/1		
<u>Shear Rate (s⁻¹)</u>	<u>Pressure (short die L/D = 0/1), MPa</u>	
113	4.7	3.0
452	6.5	4.6
1129	7.8	6.0
2221	9.4	7.4
Spider Mold Flow Test — Sprue 0.8 mm (0.031") — transfer pressure 103 bar — (cure 7' at 177 °C)		
Total shot weight (gms)	39.9	39.9
Weight of spider (gms)	9.8	27.5
Fill factor (%)	25%	69%
Physical Properties at R.T. — Original (Cured 7' at 177 °C — No Postcure)		
M-10, MPa	0.7	0.7
M-100, MPa	4.1	4.2
Tensile, MPa	12.1	9.7
(T-B, psi)	(1749)	(1404)
Elongation, %	236	226
Hardness, A, pts	66	68
"Hot" tear strength at 150 °C — Original (Cured 7' at 177 °C — No Postcure)		
Tear Die B (nicked), N/mm	4.5	5.5

(Continued)

Table I — The fundamental properties of DuPont™ Viton® GFLT-200S (cont.)

Compound: ¹	GFLT-300 A50-01	GFLT-200S A04-03
Physical Properties at R.T. — Original (Cured 7' at 177 °C — Postcured at 232 °C as noted)		
	<u>16 hr</u>	<u>2 hr</u>
M-10, MPa	0.9	0.9
M-100, MPa	6.1	5.3
Tensile, MPa	16.2	15.3
(T-B, psi)	(2346)	(2213)
Elongation, %	183	214
Hardness, A, pts	71	72
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven		
M-100, MPa	4.9	4.0
(% Change, M100)	-21	-24
Tensile, MPa	15.5	15.6
(% Change, T-B)	-4	4
Elongation, %	231	264
(% Change, E-B)	26	27
Hardness, A, pts	72	74
(Pts Change)	1	2
Physical Properties at R.T. — Heat Aged 70 hr at 275 °C In Oven		
M-100, MPa	2.7	2.6
(% Change, M100)	-56	-51
Tensile, MPa	8.3	9.4
(% Change, T-B)	-49	-37
Elongation, %	358	380
(% Change, E-B)	96	83
Hardness, A, pts	69	71
(Pts Change)	-2	-1
Physical Properties at R.T. — Aged 168 hr at 150 °C In ASTM #105 Oil (5W/30)		
M-100, MPa	6.8	5.3
(% Change, M100)	12	1
Tensile, MPa	11.6	9.5
(% Change, T-B)	-28	-37
Elongation, %	146	157
(% Change, E-B)	-20	-25
Hardness, A, pts	75	74
(Pts Change)	4	2
Volume Swell, %	0.3	0.4
Compression Set, Method B, O-Rings		
22 hr at 200 °C		
- No PC	49	19
- PC at 232 °C	30	13
70 hr at 200 °C		
- No PC	55	22
- PC at 232 °C	44	21
Low Temperature Testing		
TR-10, °C	-23.1	-24.4
Tg by DSC, °C	-24.0	-25.5
Volume Swell After Immersion — 168 hr at temperature as noted		
Fuel C, at 23 °C	5.0	6.3
CM15 (85/15 Fuel C/Methanol), at 23 °C	11.9	12.4
Methanol, 23 °C	6.6	8.8
Water, at 100 °C	7.6	3.3

¹Compound reference number: DD-1985A50

(Continued)

Table II**Blend of DuPont™ Viton® GFLT-200S and GFLT-600S**

Compound: ²	GFLT-200S A04-03	Blend A04-04	GFLT-600S A04-05
ML-10 at 121 °C (gum):	24	41	61
<u>Compound</u>	<u>A04-03</u>	<u>A04-04</u>	<u>A04-05</u>
Viton® GFLT-200S	100	50	—
Viton® GFLT-600S	—	50	100
Zinc Oxide	3	3	3
N990 (MT Black)	30	30	30
DIAK™ 7	3	3	3
Varox® DBPH-50	2	2	2
total =	138	138	138
Mooney Scorch at 121 °C			
Minimum	16	25	36
2 Pt. Rise (min)	26.7	22.2	20.0
5 Pt. Rise (min)	27.6	23.7	21.2
10 Pt. Rise (min)	>30	24.9	22.3
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock			
M-L (dNm)	6	11	18
ts-2 (min)	1.5	1.2	1.2
t'50 (min)	2.9	2.6	2.5
t'90 (min)	4.2	4.1	4.2
M-H (dNm)	169	167	161
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock			
M-L (dNm)	0.6	1.2	2.0
ts-2 (min)	0.4	0.4	0.4
t'50 (min)	0.6	0.6	0.6
t'90 (min)	1.0	1.0	1.0
t'95 (min)	1.3	1.2	1.2
M-H (dNm)	35.2	33.6	32.4
Rosand Capillary Rheometer at 100 °C, 1.5 mm die - L/D = 0/1 and 10/1			
<u>Shear Rate (s⁻¹)</u>	<u>Pressure (short die L/D = 0/1), MPa</u>		
113	3.5	4.0	5.2
452	5.5	5.5	6.3
1129	6.6	6.7	7.3
2221	7.8	7.9	8.4
Physical Properties at R.T. — Original (Cured 7' at 177 °C — No Postcure)			
M-100, MPa	5.0	5.1	4.7
Tensile, MPa (T-B, psi)	12.1 (1759)	13.3 (1929)	12.8 (1862)
Elongation, %	188	203	214
Hardness, A, pts	67	67	65
"Hot" tear strength at 150 °C — Original (Cured 7' at 177 °C — No Postcure)			
Tear Die B (nicked), N/mm	8.1	7.5	8.5
Physical Properties at R.T. - Original (Cured 7' at 177 °C — Postcured 2 hr at 232 °C)			
M-100, MPa	6.0	6.1	5.6
Tensile, MPa (T-B, psi)	16.8 (2437)	16.9 (2451)	16.6 (2408)
Elongation, %	198	199	206
Hardness, A, pts	70	68	67

(Continued)

Table II — Blend of DuPont™ Viton® GFLT-200S and GFLT-600S (cont.)

Compound: ²	GFLT-200S A04-03	Blend A04-04	GFLT-600S A04-05
Compression Set, Method B, O-Rings (2 hr postcure)			
22 hr at 200 °C			
- No PC	13	11	14
- PC at 232 °C	9	9	11
70 hr at 200 °C			
- No PC	20	20	20
- PC at 232 °C	17	14	17
Low Temperature Testing			
TR-10, °C	-24.0	-24.8	-24.8
Tg by DSC, °C	-26.0	-26.1	-25.3

²Compound reference number: DD-1977A04

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.

<u>Material</u>	<u>Composition</u>	<u>Supplier</u>
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 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-butylperoxy) hexane	R.T. Vanderbilt Co. Norwalk, CT 06855
Viton® fluoroelastomer	Fluorinated synthetic rubber (FKM)	DuPont Wilmington, DE 19809

Test Procedures

Property Measured	Test Procedure
Compression Set	ASTM D395, Method B (25% deflection)
Compression Set, O-Rings	ASTM D395, Method B (25% deflection)
Hardness	ASTM D1414, durometer A
Mooney Scorch	ASTM D1646, small rotor at 121 °C
Mooney Viscosity	ASTM D1646, ten pass at 121 °C
ODR (oscillating disk rheometer)	ASTM D2084
Property Change After Heat Aging	ASTM D573
Stress/Strain Properties	ASTM D412, pulled at 8.5 mm/s (20" in/min)
100% Modulus	
Tensile Strength (T-B)	
Elongation (E-B)	
Temperature Retraction (TR-10)	ASTM D1329
Volume Change In Fluids	ASTM D471

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

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