DuPont™ Viton® GLT-200S

Technical Information — Rev. 2, July 2010

Product Description

Viton® GLT-200S fluoroelastomer, formerly known as VTR-8505, is a 64% fluorine, peroxide-cured, low temperature fluoroelastomer similar to Viton® GLT-600S but with a significantly lower gum polymer viscosity of ~25 (ML at 121 °C). GLT-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

- Cures exceptionally fast to a high state of cure
- Is ideal for blending with Viton® GLT-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® GLT-600S
- Excellent physical properties with high elongation, both original and aged
- Heat, fluids, and low temperature resistance comparable to Viton® GLT and new GLT-600S
- Improved water resistance/lower volume swell in water
- Excellent compression set resistance with either low or no postcure

Product Description: Viton® GLT-200S

Chemical Composition: Copolymer of perfluoromethylvinyl ether, 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	25
Specific Gravity	1.80
Storage Stability	Excellent
Fluorine, %	~64

Processing

A load factor of 72%+ for internal mixing of GLT-200S is recommended. The suggested process aids for GLT-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 carna-uba wax or Struktol® WS280. The use of DIAKTM 8 is NOT suggested as it causes poor mold release and high compression set. DIAK™ 7 (TAIC) is the suggested coagent for all GLT-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® GLT-200S, be sure to read and be guided by the suggestions in DuPont technical bulletin “Handling Precautions for Viton® and Related Chemicals.”

Contents

Table I

General Properties of DuPont™ Viton® GLT-200S compared to DuPont™ GLT-600S and previous technology GLT-305

	GLT-305	GLT-200S	50 / 50 Blend	GLT-600S
ML-10 at 121 °C (gum polymer)	34	20	51	66
Compound[1]	A50-01	A50-03	A50-04	A50-05
Viton® GLT-305	100	—	—	—
Viton® GLT-200S	—	100	50	—
Viton® GLT-600S	—	—	50	100
Zinc Oxide	3	3	3	3
N990	30	30	30	30
DIAK™ 7	3	3	3	3
VAROX® DBPH-50	3	3	3	3
total =	139	139	139	139
Mooney Scorch at 121 °C				
Minimum	20	13	27	45
2 Pt. Rise (min)	21.7	28.9	26.3	21.7
5 Pt. Rise (min)	27.4	>30	28.8	23.8
10 Pt. Rise (min)	>30	—	>30	25.8
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock				
M-L (dNm)	10	5	13	25
ts-2 (min)	1.4	1.4	1.3	1.2
t'50 (min)	4.1	2.8	2.7	2.7
t'90 (min)	14.4	4.4	4.3	5.1
M-H (dNm)	122	136	138	127
MDR 2000 at 177 °C, 0.5 Degree Arc, 100 Range, 6 Minute Clock				
M-L (dNm)	1.0	0.5	1.4	2.6
ts-2 (min)	0.5	0.4	0.4	0.4
t'50 (min)	0.9	0.6	0.6	0.7
t'90 (min)	2.4	1.0	1.0	1.1
t'95 (min)	3.3	1.3	1.3	1.5
M-H (dNm)	20.0	29.1	28.0	26.4
Rosand Capillary Rheometer at 100 °C, 1.5 mm die - L/D = 0/1 & 10/1				
Shear Rate	Pressure (short die L/D = 0/1), MPa			
113 s^{-1}	4.7	3.1	4.7	5.3
452 s^{-1}	6.3	5.0	6.1	6.9
1129 s^{-1}	8.1	6.5	7.7	8.3
2221 s^{-1}	10.3	7.9	9.3	10.0
Spider Mold Flow Test — Sprue 0.031" (~0.8 mm) (Cured 7' at 177 °C)				
Total shot weight (gms)	31.9	31.7	32.0	31.8
Weight of spider (gms)	15.5	24.8	14.5	9.8
Fill factor (%)	48	78	45	31

continued

Table 1 (continued)

Compound[1]	A50-01 GLT-305	A50-03 GLT-200S	A50-04 50 / 50 Blend	A50-05 GLT-600S
Physical Properties at R.T. — Original (Cured 7' at 177 °C - No Postcure**)**				
M-10, MPa	0.65	0.63	0.72	0.7
M-100, MPa	4.9	3.1	3.4	3.2
Tensile, MPa	12.8	11.4	12.4	13.8
(T-B, psi)	(1855)	(1656)	(1795)	(2001)
Elongation, %	200	256	292	310
Hardness, A, pts	66	66	66	64
"Hot" tear strength at 150 °C — Original (Cured 7' at 177 °C — No Postcure)				
Tear Die B (nicked), N/mm	7.7	9.4	10.1	10.6
Physical Properties at R.T. - Original (Cured 7' at 177 °C — Postcured at 232 °C as noted)				
	16 hrs	2 hrs	2 hrs	2 hrs
M-10, MPa	0.7	0.7	0.8	0.6
M-100, MPa	6.7	3.7	3.9	3.5
Tensile, MPa	18.2	16.2	18.2	18.4
(T-B, psi)	(2635)	(2350)	(2642)	(2671)
E-B, %	186	254	298	308
Hardness, A, pts	69	68	67	67
Compression Set, Method B — O-Rings				
22 hr at 200 °C				
- PC at 232 °C	16	13	11	13
70 hr at 200 °C				
- No PC	40	23	26	25
- PC at 232 °C	29	20	20	20
Low Temperature Testing				
Tg by DSC, °C	–30.8	–32.8	–32.9	–32.8
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven				
M-10, MPa	0.7	0.7	0.8	0.7
(% Change, M10)	3	0	–1	7
M-100, MPa	4.7	3.3	3.6	3.1
(% Change, M100)	–30	–9	–9	–11
Tensile, MPa	17.1	19.5	19.2	18.2
(% Change, T-B)	–6	20	6	–1
Elongation, %	226	328	325	346
(% Change, E-B)	22	29	9	12
Hardness, A, pts	67	67	67	67
(Pts Change)	–2	–1	0	0

(continued)

Table 1 (continued)

Compound[1]	A50-01 GLT-305	A50-03 GLT-200S	A50-04 50 / 50 Blend	A50-05 GLT-600S
Physical Properties at R.T. — Heat Aged 70 hr at 275 °C In Oven				
M-10, MPa	0.7	0.7	0.8	0.7
(% Change, M10)	3	3	5	5
M-100, MPa	4.9	3.8	3.7	3.2
(% Change, M100)	–27	4	–5	–10
Tensile, MPa	12.3	13.6	13.8	13.7
(% Change, T-B)	–32	–16	–24	–26
Elongation, %	193	250	273	307
(% Change, E-B)	4	-2	-8	0
Hardness, A, pts	67	67	67	67
(Pts Change)	–2	–1	0	0
Physical Properties at R.T. — Aged 168 hr at 150 °C In ASTM #105 Oil (5W/30)				
M-10, MPa	0.7	0.8	0.8	0.8
(% Change, M10)	0	15	8	34
M-100, MPa	6.1	3.9	4.1	4.3
(% Change, M100)	–10	7	5	22
Tensile, MPa	8.5	8.9	8.6	8.6
(% Change, T-B)	–53	–45	–53	–53
Elongation, %	121	165	156	158
(% Change, E-B)	–35	–35	–47	–49
Hardness, A, pts	71	70	69	69
(Pts Change)	2	2	2	2
Volume Swell, %	1.1	0.7	0.8	0.7
Fluid Immersions — Volume Swell				
Fuel C, 168 hr at 23 °C	7.8	8.6	8.3	8.6
CM15 Fuel, 168 hr at 23 °C	29.5	32.0	36.4	28.8
Distilled Water, 168 hr at 100 °C	6.5	3.9	3.8	3.2

[1]Compound number reference: DD1964A50

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]	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
Diak™ 8	TMAIC – trimethallyl 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[2]	Blend of fatty acid derivatives	Struktol Co. of America Stow, OH 44224
Struktol® WS-280[2]	silicone-organic compounds	Struktol Co. of America Stow, OH 44224
Varox® DBPH-50[3]	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 Wilmington, DE 19809

1Trademark of Akzo Nobel Polymer Chemicals LLC

2Trademark of Struktol Co. of America

3Trademark of R.T.Vanderbilt Co.

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 100% Modulus Tensile Strength (T-B) Elongation (E-B)	ASTM D412, pulled at 8.5 mm/s (20” in/min)
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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