Viton™ GFLT-600S

Fluoroelastomers

Technical Information

Introduction

Viton™ GFLT-600S* fluoroelastomer is a 67% fluorine, peroxide-cured, low temperature fluoroelastomer (FKM). Viton™ GFLT-600S utilizes the latest technology from Chemours, 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
- Improved mold release/mold fouling properties
- Improved mold flow and less shear sensitivity for a 65 Mooney peroxy-cured FKM
- Excellent 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 post-cure

Processing

A load factor of 72%+ for internal mixing of Viton™ GFLT-600S is preferred. The suggested process aids for Viton™ GFLT-600S 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 Viton™ GFLT-600S 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-600S, read and follow the recommendations as described in the Chemours technical bulletin, "Handling Precautions for Viton™ and Related Chemicals."

Product Description

Chemical Composition	Copolymer of perfluoromethylvinyl ether, vinylidene fluoride, and tetrafluoroethylene with a cure monomer
Physical Form	Sheet
Color	White to tan
Odor	None
Specific Gravity	1.86
Fluorine Percent	~67%
Storage Stability	Excellent
Mooney Viscosity, ML 1+10 at 121 °C (250 °F)	65

*Viton™ GFLT-600S was formerly named VTR-8550.

Chemours™

Table 1. General Properties of Viton™ GFLT-600S

	Viton™ GFLT-600S
Mooney (ML 1 + 10) at 121 °C (250 °F) on Gum Polymers	
Reading (MU)	64
Viton™ GFLT-600S	100
Zinc Oxide	3
N990 (MT Black)	30
Diak™ 7 (TAIC)	3
Luperox® 101XL45	2
Total phr lab	138
Mooney Scorch at 121 °C (250 °F)	
Minimum, MU	34
2 pt Rise, min	>30
5 pt Rise, min	—
ODR at 162 °C (324 °F), 3° Arc, 100 Range, 30 Min Clock	
ML, dNm	15
ts2, min	2.4
t'50, min	5.4
t'90, min	7.2
MH, dNm	133
MDR 2000 at 177 °C (350 °F), 0.5° Arc, 100 Range, 6 Min Clock	
ML, dNm	1.6
ts2, min	0.7
t'50, min	1.1
t'90, min	2.0
t'95, min	2.6
MH, dNm	34.9
Rosand Capillary Rheometer at 100 °C (212 °F), 1.5 mm Die - L/D = 0/1 and 10/1	
Shear Rate, sec^{-1}	*Pressure, MPa (L/D = 0/1 die)*
44	4.3
113	5.4
452	7.1
1129	8.4
2222	10.0
Physical Properties at RT—Original (Cured 5 min at 177 °C [350 °F]—No Post-Cure)	
M-10, MPa	0.7
M-100, MPa	4.4
Tensile, MPa (T-B, psi)	12.2 (1,770)
Elongation, %	222
Hardness, A, pts	68
"Hot" Tear Die B at 150 °C (302 °F)—(Cured 5 min at 177°C [350 °F]—No Post-Cure)	
Tear Die B, (N/mm)	5.2

Table 1. General Properties of Viton™ GFLT-600S (continued)

	Viton™ GFLT-600S
Physical Properties at RT—Original (Cured 5 min at 177 °C [350 °F]—No Post-Cure)	*Post-cured 2 hr*
M-10, MPa	0.7
M-100, MPa	5.4
Tensile, MPa (T-B, psi)	15.9 (2,298)
Elongation, %	220
Hardness, A, pts	70
Physical Properties at RT—Heat-Aged 70 hr at 250 °C (482 °F) in Oven (Slabs Post-Cured)	
M-10, MPa (% change, M10)	0.7 (–3)
M-100, MPa (% change, M100)	4.3 (–20)
Tensile, MPa (T-B, % change)	17.6 (11)
Elongation, % (E-B, % change)	260 (18)
Hardness, A, pts (pts change)	70 (0)
Physical Properties at RT—Heat-Aged 70 hr at 275 °C (527 °F) in Oven (Slabs Post-Cured)	
M-10, MPa (% change, M10)	0.7 (–1)
M-100, MPa (% change, M100)	3.4 (–38)
Tensile, MPa (T-B, % change)	15.0 (–5)
Elongation, % (E-B, % change)	295 (34)
Hardness, A, pts (pts change)	69 (–1)
Compression Set, Method B, O-Rings	
22 hr at 200 °C (392 °F)	
– No Post-cure	13
– Post-cured 2 hr at 232 °C (450 °F)	12
70 hr at 200 °C (392 °F)	
– No Post-cure	21
– Post-cured 2 hr at 232 °C (450 °F)	18
Physical Properties at RT—Aged 168 hr at 150 °C (302 °F) In ASTM #105 Oil (5W/30) (Slabs Post-Cured)	
M-100, MPa (% change, M100)	5.2 (–4)
Tensile, MPa (T-B, % change)	8.0 (–50)
Elongation, % (E-B, % change)	133 (–40)
Hardness, A, pts (pts change)	71 (70.26)
Volume Swell, %	1.5
Volume Swell After Immersion—Time and Temperature as Noted	
Fuel C, 168 hr at 23 °C (73 °F)	5.9
CM15 Fuel, 168 hr at 23 °C (73 °F)	14.5
Methanol, 168 hr at 23 °C (73 °F)	8.5
Water, 168 hr at 23 °C (73 °F)	3.2
Low Temperature Testing	
TR-10, °C	–24.5
Tg by DSC, °C	–26.0

Table 2. Viton™ GFLT-600S Filler Study

Table 2 shows the reinforcing effect of various levels of MT Black (N990) and some common mineral fillers in GFLT-600S. The mineral-filled stocks all have a blue pigment present plus TiO_2 to stabilize the color. All the compounds contain 0.5 phr of process aid Armeen® 18D. Post-cures were done both for 2 hours and 4 hours at 232 °C (450 °F). The data indicates that when a process aid like Armeen® 18D is present more than 2 hours at 232 °C (450 °F), post-cure is needed for optimal tensile strength, depending on the amount of the process aid. For these types of compounds, 4–8 hours at 232 °C (450 °F) post-cure would normally be suggested.

	5-MT	30-MT	60-MT	Wollast	Albaglos	$BaSO_4$	Albaglos/R972
Viton™ GFLT-600S	100	100	100	100	100	100	100
Zinc Oxide	3	3	3	3	3	3	3
N990 (MT Black)	5	30	60	—	—	—	—
10 Wollastocoat® 10222	—	—	—	40	—	—	—
Albaglos® ($CaCO_3$)	—	—	—	—	40	—	35
Blanc Fixe ($BaSO_4$)	—	—	—	—	—	40	—
Aerosil® R972	—	—	—	—	—	—	5
Ti-Pure™ R-960 (TiO_2)	—	—	—	1	1	1	1
Stan-Tone® D4005 Blue	—	—	—	1	1	1	1
Armeen® 18D	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Diak™ 7 (TAIC)	3	3	3	3	3	3	3
Varox® DBPH-50	2	2	2	2	2	2	2
Total phr	113.5	138.5	168.5	150.5	150.5	150.5	150.5
Mooney Scorch at 121 °C (250 °F)							
Minimum, MU	23	31	43	34	38	28	41
2 pt rise, min	24.3	13.2	9.4	21.4	16.5	23.6	16.8
5 pt rise, min	25.5	14.7	11.2	22.2	17.2	24.6	17.8
10 pt rise, min	27.0	16.0	12.8	22.9	17.9	26.1	18.8
ODR at 162 °C (324 °F), 3° Arc, 100 Range, 30 Min Clock							
ML, dNm	14	17	20	19	19	16	21
ts2, min	1.4	1.3	1.1	1.3	1.0	1.5	1.1
t'50, min	2.7	3.0	3.0	2.8	2.5	3.0	2.5
t'90, min	4.5	6.3	6.5	4.3	5.0	6.5	3.9
MH, dNm	94	134	176	146	143	129	161
MDR 2000 at 177 °C (350 °F), 0.5° Arc, 100 Range, 6 Min Clock							
ML, dNm	1.3	1.8	3.1	2.0	2.4	1.7	2.5
ts2, min	0.5	0.4	0.3	0.4	0.4	0.4	0.4
t'50, min	0.7	0.6	0.6	0.6	0.6	0.7	0.6
t'90, min	1.1	1.1	1.4	1.0	0.9	1.0	0.9
t'95, min	1.3	1.5	1.9	1.2	1.1	1.3	1.1
MH, dNm	18.5	30.0	49.6	30.8	34.5	25.8	40.4
Physical Properties at RT—Original (Cured 5 min at 177 °C [350 °F]—No Post-Cure)							
M-10, MPa	0.4	0.8	1.3	1.0	0.7	0.7	0.8
M-100, MPa	1.4	3.7	7.5	4.5	2.6	1.8	3.0
Tensile, MPa (T-B, psi)	7.6 (1,108)	9.1 (1,314)	10.3 (1,488)	8.0 (1,166)	5.7 (819)	7.7 (1,109)	10.4 (1,511)
Elongation, %	286	248	199	259	280	297	298
Hardness, A, pts	55	69	81	68	68	61	71

Table 2. Viton™ GFLT-600S Filler Study (continued)

	5-MT	30-MT	60-MT	Wollast	Albaglos	$BaSO_4$	Albaglos/R972
Physical Properties at RT—Original (Cured 5 min at 177 °C [350 °F]—Post-Cured 2 hr at 232 °C [450 °F])							
M-10, MPa	0.4	0.9	1.6	1.0	0.7	0.6	0.9
M-100, MPa	1.4	4.7	10.5	6.3	3.3	2.1	4.0
Tensile, MPa (T-B, psi)	9.5 (1,382)	13.2 (1,910)	15.4 (2,230)	9.1 (1,318)	9.2 (1,335)	9.3 (1,346)	12.4 (1,804)
Elongation, %	288	223	186	210	301	309	289
Hardness, A, pts	56	72	84	70	70	64	72
Physical Properties at RT—Original (Cured 5 min at 177 °C [350 °F]—Post-Cured 4 hr at 232 °C [450 °F])							
M-10, MPa	0.4	1.0	1.9	1.1	0.7	0.7	0.9
M-100, MPa	1.5	5.4	12.6	7.3	4.2	2.5	4.5
Tensile, MPa (T-B, psi)	9.6 (1,392)	16.3 (2,361)	18.7 (2,706)	11.1 (1,602)	9.7 (1,408)	10.8 (1,570)	12.5 (1,807)
Elongation, %	265	215	176	223	279	316	284
Hardness, A, pts	57	73	87	71	71	65	74
Physical Properties at RT—Heat Aged 70 hr at 250 °C (482 °F) in Oven (4 hr Post-Cure)							
M-100, MPa (% change, M100)	1.4 (–9)	4.6 (–15)	10.8 (–14)	6.6 (–10)	4.2 (1)	3.7 (49)	5.5 (6)
Tensile, MPa (% change, T-B)	16.4 (99)	17.2 (6)	18.7 (0)	12.9 (17)	11.4 (17)	13.0 (20)	12.9 (23)
Elongation, % (% change, E-B)	412 (63)	319 (22)	215 (0)	397 (78)	377 (35)	392 (24)	330 (41)
Hardness, A, pts (pts change)	57 (0)	74 (1)	86 (–1)	70 (–1)	71 (0)	66 (1)	76 (2)
Physical Properties at RT—ASTM #105 Oil (5W/30) Aged 168 hr at 150 °C (302 °F) (4 hr Post-Cure)							
M-100, MPa (% change, M100)	1.5 (0)	6.0 (11)	11.7 (–7)	7.5 (4)	4.4 (4)	2.6 (6)	5.9 (13)
Tensile, MPa (% change, T-B)	3.7 (–55)	9.4 (–42)	11.9 (–36)	7.8 (–30)	5.9 (–39)	3.3 (–70)	6.8 (–36)
Elongation, % (% change, E-B)	183 (–28)	136 (–37)	101 (–43)	102 (–54)	149 (–47)	155 (–51)	122 (–48)
Hardness, A, pts (pts change)	57 (0)	73 (0)	86 (–1)	71 (0)	71 (0)	65 (0)	75 (1)
Volume Change, %	1.5	1.4	1.3	1.2	0.9	1.2	1.0
Compression Set, Method B, O-Rings							
22 hr at 200 °C (392 °F)							
– No Post-cure	20	24	30	21	36	41	31
– Post-cured 2 hr at 232 °C (450 °F)	12	14	16	14	19	26	19
– Post-cured 4 hr at 232 °C (450 °F)	10	14	14	14	17	17	19
70 hr at 200 °C (392 °F)							
– No Post-cure	21	37	43	31	54	53	49
– Post-cured 2 hr at 232 °C (450 °F)	22	30	34	26	33	40	37
– Post-cured 4 hr at 232 °C (450 °F)	24	26	31	31	37	33	34
Compression Set, Method B, Plied Discs							
22 hr at 200 °C (392 °F) (2 hr post-cured)	8	11	13	12	15	17	16
70 hr at 200 °C (392 °F) (2 hr post-cured)	14	15	18	16	22	21	25
Volume Swell After Immersion—Time and Temperature as Noted (4 hr Post-Cure)							
Fuel C, 168 hr at 23 °C (73 °F)	7.0	6.4	5.8	5.9	5.5	6.3	5.9
M-15 Fuel. 168 hr at 23 °C (73 °F)	19.2	16.1	13.4	16.1	16.1	17.3	15.5
Methanol, 168 hr at 23 °C (73 °F)	11.2	10.8	8.9	8.5	8.8	9.6	8.8
Water, 168 hr at 100 °C (212 °F)	4.3	3.4	2.5	6.9	9.8	10.2	8.8
Low Temperature Properties (4 hr Post-Cure)							
Tg by DSC	–25.6	–26.4	–26.2	–26.3	–26.5	–26.3	–26.1
TR-10	–24.2	–24.1	–25.0	–24.0	–24.0	–24.1	–24.0

Table 3. Viton™ GFLT-600S Metal Oxide Study

While zinc oxide is normally recommended with GFLT-600S and all APA peroxide cured types, due to its good balance of hot tear and heat resistance, it is possible to use either no metal oxide or different metal oxides with this FKM (if some tradeoffs can be accommodated). For example, magnesium oxide may help in bonding GFLT-600S to metal, and calcium hydroxide can be used in biodiesel applications that cannot tolerate zinc. The 100% modulus can be increased by using MgO in place of ZnO. The mixed MgO/ZnO metal oxide system is of interest, as it has higher 100% modulus with good heat resistance.

	No MO	ZnO	MgO	$Ca(OH)_2$	CaO	MgO/ZnO
Viton™ GFLT-600S	100	100	100	100	100	100
N990 (MT Black)	30	30	30	30	30	30
Zinc Oxide (ZnO)	—	3	—	—	—	1.5
Elastomag® 170 (MgO)	—	—	3	—	—	1.5
Calcium Hydroxide	—	—	—	3	—	—
Calcium Oxide		—	—	—	—	3
Diak™ 7 (TAIC)	3	3	3	3	3	3
Varox® DBPH-50	2	2	2	2	2	2
Total phr	135	138	138	138	138	138
Mooney Scorch at 121 °C (250 °F)						
Minimum, MU	32	33	35	36	34	35
2 pt Rise, min	22.6	19.0	18.2	17.1	16.8	17.6
5 pt Rise, min	24.3	20.3	19.1	18.2	17.8	18.7
10 pt Rise, min	25.6	21.3	19.9	19.2	18.8	19.5
ODR at 162 °C (324 °F), 3° Arc, 100 Range, 30 Min Clock						
ML, dNm	18	18	20	19	19	20
ts2, min	1.1	1.1	1.1	1.1	1.2	1.2
t'50, min	2.6	2.6	2.7	2.8	2.8	2.7
t'90, min	5.5	4.4	9.9	8.4	6.2	7.1
MH, dNm	160	156	190	192	185	179
MDR 2000 at 177 °C (350 °F), 0.5° Arc, 100 Range, 6 Min Clock						
ML, dNm	2.0	2.0	2.3	2.2	2.1	2.2
ts2, min	0.4	0.4	0.4	0.4	0.4	0.4
t'50, min	0.6	0.6	0.6	0.6	0.6	0.6
t'90, min	1.1	1.0	1.0	1.1	1.1	1.0
t'95, min	1.3	1.2	1.2	1.4	1.5	1.2
MH, dNm	31.9	33.5	35.7	34.5	35.2	34.5
Spider Mold Flow Test—Sprue 0.031 in (~0.8 mm) (Cured 7 min at 177 °C [350 °F])						
Total Shot Weight, g	32.0	31.8	31.9	31.9	32.0	31.8
Weight of Spider, g	12.5	15.6	15.2	14.0	13.5	12.6
Fill Factor, %	39	49	47	44	42	40
Physical Properties at RT—Original (Cured 7 min at 177 °C [350 °F]—No Post-Cure)						
M-10, MPa	0.7	0.8	0.8	0.8	0.7	0.8
M-100, MPa	4.2	4.7	5.8	5.5	5.0	5.4
Tensile, MPa (T-B, psi)	12.2 (1,775)	12.1 (1,775)	14.5 (2,104)	13.8 (2,000)	13.3 (1,926)	13.6 (1,976)
Elongation, %	228	200	201	210	215	196
Hardness, A, pts	66	68	69	68	69	68

Table 3. Viton™ GFLT-600S Metal Oxide Study (continued)

	No MO	ZnO	MgO	$Ca(OH)_2$	CaO	MgO/ZnO
Physical Properties at RT—Original (Cured 7 min at 177 °C [350 °F]—Post-Cured 2 hr at 232 °C [450 °F])						
M-10, MPa	0.8	0.9	0.8	0.8	0.7	0.9
M-100, MPa	5.4	6.0	7.0	6.3	5.9	6.4
Tensile, MPa (T-B, psi)	16.9 (2,443)	16.3 (2,368)	18.3 (2,648)	16.6 (2,408)	16.8 (2,436)	17.0 (2,458)
Elongation, %	214	200	205	214	213	199
Hardness, A, pts	69	70	71	69	71	69
Physical Properties at RT—Original (Cured 7 min at 177 °C [350 °F]—Post-Cured 4 hr at 232 °C [450 °F])						
M-10, MPa	0.7	0.9	0.8	0.8	0.8	0.8
M-100, MPa	5.2	6.0	7.1	6.4	6.0	6.3
Tensile, MPa (T-B, psi)	16.8 (2,433)	16.9 (2,449)	18.0 (2,613)	16.6 (2,401)	16.6 (2,401)	16.8 (2,436)
Elongation, %	217	200	203	209	200	200
Hardness, A, pts	69	71	71	68	71	71
Physical Properties at RT—Heat-Aged 70 hr at 250 °C (482 °F) in Oven (2 hr Post-Cure)						
M-100, MPa (% change, M100)	2.6 (–52)	4.4 (–26)	4.2 (–41)	3.5 (–44)	3.6 (–39)	4.2 (–34)
Tensile, MPa (% change, T-B)	12.8 (–24)	17.2 (5)	16.5 (–10)	14.4 (–13)	13.9 (–17)	16.2 (–4)
Elongation, % (% change, E-B)	339 (58)	314 (57)	291 (42)	288 (35)	273 (28)	317 (59)
Hardness, A, pts (pts change)	70 (1)	72 (2)	73 (2)	71 (2)	71 (0)	72 (3)
Physical Properties at RT—Heat-Aged 70 hr at 275 °C (527 °F) in Oven (2 hr Post-Cure)						
M-100, MPa (% change, M100)	1.7 (–69)	2.8 (–53)	2.7 (–62)	2.2 (–64)	2.3 (–61)	2.9 (–54)
Tensile, MPa (% change, T-B)	6.9 (–59)	12.3 (–25)	9.7 (–47)	8.3 (–50)	7.9 (–53)	12.0 (–29)
Elongation, % (% change, E-B)	459 (115)	364 (82)	365 (78)	356 (67)	353 (66)	360 (81)
Hardness, A, pts (pts change)	67 (–2)	70 (0)	71 (–1)	68 (–1)	69 (–2)	70 (1)
Compression Set, Method B, O-Rings						
22 hr at 200 °C (392 °F)						
– No Post-cure	14	14	13	14	13	13
– Post-cured 2 hr at 232 °C (450 °F)	11	11	10	14	14	11
70 hr at 200 °C (392 °F)						
– No Post-cure	20	20	17	19	20	14
– Post-cured 2 hr at 232 °C (450 °F)	19	16	20	20	19	16
Volume Swell After Immersion—Tested 168 hr at Temperature Noted (2 hr Post-Cure)						
Fuel C at 23 °C (73 °F)	5.3	5.3	5.0	5.2	6.2	5.7
CM-15 Fuel at 23 °C (73 °F)	14.4	14.1	14.1	14.4	14.3	14.9
Methanol at 23 °C (73 °F)	7.8	8.3	8.9	8.3	8.3	8.6
Water at 100 °C (212 °F)	1.7	2.9	4.1	1.9	3.1	3.6
Low Temperature Properties (2 hr Post-Cure)						
Tg by DSC, °C	–26.1	–26.2	–25.7	–25.3	–25.3	–25.5

Table 4. Fuel, Fluids, and Heat Resistance of Viton™ GFLT-600S

	Viton™ GFLT-600S	Typical ASTM D2000/SAE J200 Spec and Values
Viton™ GFLT-600S	100	
Zinc Oxide	3	
N990 (MT Black)	30	
Armeen® 18D	0.5	
Diak™ 7 (TAIC)	3	
Varox® DBPH-50	2	
Total phr lab	138.5	
Mooney Scorch at 121 °C (250 °F)		
Minimum, MU	42	
2 pt Rise, min	10.5	
5 pt Rise, min	11.8	
MDR 2000 at 177 °C (350 °F), 0.5° Arc, 100 Range, 6 Min Clock		
ML, dNm	2.5	
ts2, min	0.4	
t'50, min	0.6	
t'90, min	1.2	
t'95, min	1.6	
MH, dNm	29.2	
Physical Properties at RT—Original (Cured 7 min at 177 °C [350 °F]—No Post-Cure)		
M-10, MPa	0.8	
M-25, MPa	1.3	
M-100, MPa	3.8	
Tensile, MPa (T-B, psi)	9.3 (1,346)	
Elongation, %	251	
Hardness, A, pts	66	
Physical Properties at RT—Original (Cured 7 min at 177 °C [350 °F])—Post-Cured at 232 °C [450 °F] As Noted)		
	8 hr	
M-10, MPa	0.9	
M-25, MPa	1.5	
M-100, MPa	5.4	
Tensile, MPa (T-B, psi)	18.2 (2,632)	
Elongation, %	234	
Hardness, A, pts	72	
Physical Properties at RT—Heat-Aged 70 hr at 250 °C (482 °F) in Oven		A1-10
M-25, MPa (% change, M25)	1.5 (2)	
M-100, MPa (% change, M100)	4.3 (–20)	
Tensile, MPa (% change, T-B)	16.6 (–9)	–25% max.
Elongation, % (% change, E-B)	312 (33)	–25% max.
Hardness, A, pts (pt change)	73 (1)	+10 max.

Table 4. Fuel, Fluids, and Heat Resistance of Viton™ GFLT-600S (continued)

	Viton™ GFLT-600S	Typical ASTM D2000/SAE J200 Spec and Values
Physical Properties at RT—Heat-Aged 168 hr at 60 °C (140 °F) in Diesel Fuel		
M-25, MPa (% change, M25)	1.5 (4)	
M-100, MPa (% change, M100)	6.1 (12)	
Tensile, MPa (% change, T-B)	14.4 (–21)	
Elongation, % (% change, E-B)	220 (–6)	
Hardness, A, pts (pt change)	71 (–1)	
Volume Swell, %	2.4	
Physical Properties at RT—Heat-Aged 70 hr at 23 °C (73 °F) in Fuel C		EF31
M-25, MPa (% change, M25)	1.3 (–14)	
M-100, MPa (% change, M100)	4.8 (–11)	
Tensile, MPa (% change, T-B)	14.6 (–19)	–25% max.
Elongation, % (% change, E-B)	219 (–7)	–20% max.
Hardness, A, pts (pt change)	70 (–2)	±5
Volume Swell, %	4.5	0 to +10
Physical Properties at RT—Heat-Aged 168 hr at 23 °C (73 °F) in E10 (90% Fuel C/10% Ethanol)		
M-100, MPa (% change, M100)	3.9 (–28)	
Tensile, MPa (% change, T-B)	11.7 (–36)	
Elongation, % (% change, E-B)	193 (–18)	
Hardness, A, pts (pt change)	67 (–5)	
Volume Swell, %	11.7	
Physical Properties at RT—Heat-Aged 168 hr at 23 °C (73 °F) in CM15 (85% Fuel C/15% Methanol)		
M-25, MPa (% change, M25)	1.1 (–29)	
M-100, MPa (% change, M100)	3.9 (–27)	
Tensile, MPa (% change, T-B)	9.9 (–46)	
Elongation, % (% change, E-B)	183 (–22)	
Hardness, A, pts (pt change)	67 (–5)	
Volume Swell, %	16.3	
Physical Properties at RT—Aged 70 hr at 200 °C (392 °F) in Service Fluid 101		E078
M-25, MPa (% change, M25)	1.2 (–20)	
M-100, MPa (% change, M100)	4.8 (–11)	
Tensile, MPa (% change, T-B)	16.3 (–10)	–40% max.
Elongation, % (% change, E-B)	242 (4)	–20% max.
Hardness, A, pts (pt change)	70 (–2)	–15 to +5
Volume Swell, %	8.9	0 to +15
Physical Properties at RT—Aged 336 hr at 60 °C (140 °F) in 180PN Sour Fuel (Ford Method)*		
M-25, MPa (% change, M25)	1.0 (–35)	
M-100, MPa (% change, M100)	3.4 (–38)	
Tensile, MPa (% change, T-B)	9.2 (–49)	
Elongation, % (% change, E-B)	201 (–14)	
Hardness, A, pts (pt change)	64 (–8)	
Volume Swell, %	22.4	

*"Sour Fuel" is a 80% Fuel C/15% Methanol/5% T-Butyl Alcohol blend with copper ion and t-butyl hydroperoxide added to bring up the peroxide number to 180

Table 4. Fuel, Fluids, and Heat Resistance of Viton™ GFLT-600S (continued)

	Viton™ GFLT-600S	Typical ASTM D2000/SAE J200 Spec and Values
Physical Properties at RT—Aged 70 hr at 200 °C (392 °F) in 7700 Fluid/SAE Fluid #2		E088
M-100, MPa (% change, M100)	4.3 (–21)	
Tensile, MPa (% change, T-B)	15.3 (–16)	–40% max.
Elongation, % (% change, E-B)	230 (–2)	–20% max.
Hardness, A, pts (pt change)	69 (–3)	–15 to +5
Volume Swell, %	9.5	+25% max.
Compression Set, Method B, O-Rings (Post-Cured at 232 °C [450 °F] As Noted)		
	8 hr	
70 hr at 200 °C (392 °F)	23	
Low Temperature Testing		
Tg by DSC (Modulated)	–24.6	
TR-10	–24.7	

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 (250 °F)
Mooney Viscosity	ASTM D1646, ten pass, 121 °C (250 °F)
ODR (oscillating disk rheometer)	ASTM D2084
Property Change After Oven 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)
Temperature Retraction	ASTM D1329
Volume Change In Fluids	ASTM D471

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