DuPont™ Viton® GLT-600S

Technical Information — Rev. 2, July 2010

Product Description

DuPont™ Viton® GLT-600S* fluoroelastomer is a 64% fluorine, peroxide-cured, low temperature fluoroelastomer. GLT-600S 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
- Similar to improved low temperature properties compared to Viton® GLT
- 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
- Heat, fluids, and low temperature resistance comparable to Viton® GLT
- Improved water resistance / lower volume swell in water
- Excellent compression set resistance with either low or no postcure

Product Description: Viton® GLT-600S	
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	65
Specific Gravity	1.80
Storage Stability	Excellent
Fluorine percent	~ 64%

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

Processing

A load factor of 72%+ for internal mixing of GLT-600S is preferred. The suggested process aids for GLT-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 GLT-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® GLT-600S, read and be guided by the suggestions in DuPont technical bulletin "Handling Precautions for Viton® and Related Chemicals."

Contents

*Viton® GLT-600S was formerly known a VTR-8500.

Table I
The fundamental properties of DuPont™ Viton® GLT-600S

Compound #	A22-01	A22-03
polymer type used =	**GLT**	**GLT-600S**
Viton® GLT	100	—
Viton® GLT-600S	—	100
N990 (MT Black)	30	30
Zinc Oxide	3	3
DIAK™ 7	3	3
Luperox® 101-XL	3	3
total =	139	139
Mooney Scorch at 121 °C		
Minimum	51	36
2 pt rise (min)	20.4	16.1
5 pt rise (min)	23.0	17.4
10 pt rise (min)	26.0	18.5
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock		
M-L (dNm)	31	19
ts-2 (min)	1.7	1.0
t'50 (min)	4.7	2.1
t'90 (min)	15.9	4.7
M-H (dNm)	115	131
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock		
M-L (dNm)	3.2	2.1
ts-2 (min)	0.6	0.4
t'50 (min)	1.0	0.5
t'90 (min)	3.2	0.8
t'95 (min)	4.1	1.0
M-H (dNm)	17.7	27.4
Rosand Capillary Rheometer at 100 °C, 1.5 mm die — L/D = 0/1 and 10/1		
Shear Rate (s-1)	Pressure , MPa (L/D=0/1 die)	
44	5.1	4.5
113	6.0	5.5
452	8.3	7.0
1129	10.7	8.5
2222	17.5	9.8
Physical Properties at R.T. — Original (Cured 7' at 177 °C — No Postcure)		
M-10, MPa	0.6	0.6
M-100, MPa	4.1	3.2
Tensile, MPa	14.6	13.2
(T-B, psi)	(2121)	(1913)
Elongation, %	230	292
Hardness, A, pts	65	65
Physical Properties at R.T. — Original (Cure 7' at 177 °C — Postcure at 232 °C as noted)		
16 hr PC	**2 hr PC**	
M-10, MPa	0.6	0.6
M-100, MPa	5.9	3.6
Tensile, MPa	17.6	17.8
(T-B, psi)	2558	2587
Elongation, %	181	267
Hardness, A, pts	67	67

Table I (continued)

Compound #	A22-01	A22-03
polymer type used =	**GLT**	**GLT-600S**
Compression Set , Method B, 22 hr at 200 °C, O-Rings	**16 hr PC**	**2 hr PC**
- No Postcure	31	16
- Postcured at 232 °C (as noted)	16	11
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven (slabs postcured)		
M-10, MPa	0.7	0.7
(% Change, M10)	18%	16%
M-100, MPa	5.7	3.4
(% Change, M100)	–3%	–6%
Tensile, MPa	17.2	18.8
(% Change, T-B)	–2%	5%
Elongation, %	202	327
(% Change, E-B)	11%	23%
Hardness, A, pts	69	68
(Pts Change)	2	1
Physical Properties at R.T. — Heat Aged 70 hr at 275 °C In Oven (slabs postcured)		
M-10, MPa	0.7	0.7
(% Change, M10)	18%	18%
M-100, MPa	5.0	3.4
(% Change, M100)	–16%	–6%
Tensile, MPa	14.4	14.5
(% Change, T-B)	–19%	–19%
Elongation, %	203	305
(% Change, E-B)	12%	14%
Hardness, A, pts	69	68
(Pts Change)	2	1
Physical Properties at R.T. — Aged 168 hr at 150 °C In ASTM #105 Oil (5W/30) (slabs postcured)		
M-10, MPa	0.8	0.8
(% Change, M10)	27%	24%
M-100, MPa	7.2	4.6
(% Change, M100)	21%	25%
Tensile, MPa	11.0	10.5
(% Change, T-B)	–38%	–41%
Elongation, %	127	167
(% Change, E-B)	–30%	–37%
Hardness, A, pts	69	69
(Pts Change)	2	2
Volume swell, %	1.6	1.0
Volume Swell After Immersion — time and temperature as noted		
Fuel C, 168 hr at 23 °C	7.2	7.5
[2]CM15 Fuel, 168 hr at 23 °C	30.7	32.9
Water, 168 hr at 100 °C	4.8	2.4
Low Temperature Testing — (slabs postcured)		
TR-10, °C	–30.6	–31.4
Tg by DSC, °C	–30.7	–32.9

[1]Compound reference number: DD1959A22
[2]CM15 Fuel is a blend of 85% Fuel C with 15% Methanol

Table II
DuPont™ Viton® GLT-600S Filler Study

Table II shows the reinforcing effect of various levels of MT Black (N990) and some common mineral fillers in GLT-600S. All the compounds contain 0.5 phr of process aid Armeen® 18D. Subsequent experiments shown on Table III and IV indicate that when a process aid is present more than a 2 hour at 232 °C postcure is needed for optimal tensile strength depending on the amount of the process aid. For these compounds a 4 to 8 hour at 232 °C postcure would normally be preferred.

Compound:	A10-01 5-MT	A10-02 30-MT	A10-03 60-MT	A10-04 40-Wollast.	A10-05 40-Albaglos	A10-06 40-$BaSO_4$
Viton® GLT-600S	100	100	100	100	100	100
Zinc oxide	3	3	3	3	3	3
N990 (MT Black)	5	30	60	—	—	—
Wollastocoat® 10022 (10 u)	—	—	—	40	—	—
Albaglos® ($CaCO_3$)	—	—	—	—	40	—
Blanc Fixe ($BaSO_4$)	—	—	—	—	—	40
Armeen® 18D	0.5	0.5	0.5	0.5	0.5	0.5
DIAK™ 7 (TAIC)	3	3	3	3	3	3
Varox® DBPH-50	3	3	3	3	3	3
Total phr =	114.5	139.5	169.5	149.5	149.5	149.5
Mooney Scorch at 121 °C						
Minimum, MU	23	31	43	33	37	27
2 pt rise (min)	15.9	9.3	6.5	13.7	10.7	15.7
5 pt rise (min)	17.1	10.8	8.2	14.9	11.5	16.5
10 pt rise (min)	18.8	12.1	9.8	15.8	12.2	17.5
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock						
M-L (dam)	15	18	20	21	24	19
ts-2 (min)	1.3	1.1	0.9	1.1	1.1	1.4
t'50 (min)	2.4	2.4	2.4	2.4	2.1	2.7
t'90 (min)	6.9	7.1	8.8	5.2	5.1	7.3
M-H (dam)	101	136	182	136	137	120
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock						
M-L (dam)	1.4	2.1	3.3	2.3	2.7	1.9
ts-2 (min)	0.5	0.4	0.3	0.4	0.4	0.4
t'50 (min)	0.6	0.5	0.5	0.5	0.5	0.6
t'90 (min)	0.9	1.0	1.3	0.8	0.7	0.9
t'95 (min)	1.2	1.5	2.2	0.9	0.9	1.1
M-H (dam)	15.4	26.7	45.7	24.8	28.1	20.6
Physical Properties at R.T. — Original (Cure 5' at 177 °C — no postcure)						
M-10, MPa	0.4	0.8	1.5	1.0	0.6	0.7
M-100, MPa	1.2	3.2	6.7	7.0	2.1	1.6
Tensile, MPa	8.9	10.6	10.9	11.2	9.5	9.8
(T-B, psi)	(1286)	(1538)	(1575)	(1617)	(1372)	(1415)
Elongation, %	369	337	229	245	403	393
Hardness, A, pts	52	67	79	66	64	58

(Continued)

Table II — DuPont™ Viton® GLT-600S Filler Study (continued)

Compound:	A10-01 5-MT	A10-02 30-MT	A10-03 60-MT	A10-04 40-Wollast.	A10-05 40-Albaglos	A10-06 40-$BaSO_4$
Physical Properties at R.T. — Original (Cured 5' at 177 °C — Postcured 2 hr at 232 °C)						
M-10, MPa	0.4	1.0	1.8	1.1	0.7	0.7
M-100, MPa	1.3	4.0	8.6	8.3	2.6	1.7
Tensile, MPa	13.7	16.7	16.3	14.7	9.7	10.9
(T-B, psi)	(1981)	(2422)	(2364)	(2129)	(1408)	(1583)
Elongation, %	374	314	234	274	384	400
Hardness, A, pts	54	71	84	69	67	62
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven						
M-100, MPa	1.4	5.0	10.3	11.0	8.5	4.3
(% Change, M100)	5%	25%	19%	33%	235%	160%
Tensile, MPa	9.6	14.4	14.9	13.3	14.9	12.8
(% Change, T-B)	–17%	–14%	–9%	-9%	73%	17%
Elongation, %	305	235	144	203	204	298
(% Change, E-B)	–18%	–25%	–38%	–26%	–46%	–26%
Hardness, A, pts	55	75	87	74	75	65
(Pts Change)	1	4	3	5	8	3
Physical Properties at R.T. — ASTM #105 Oil (5W/30) Aged 168 hr at 150 °C In Oven						
M-100, MPa	1.4	3.0	9.5	8.9	3.2	2.0
(% Change, M100)	5%	–25%	10%	7%	27%	23%
Tensile, MPa	3.4	9.3	11.5	10.1	4.2	3.1
(% Change, T-B)	–71%	–44%	–30%	–31%	–51%	–71%
Elongation, %	212	165	127	113	156	223
(% Change, E-B)	–43%	–48%	–46%	–59%	–58%	–44%
Hardness, A, pts	56	72	85	71	69	62
(Pts Change)	2	1	1	2	2	0
Volume Change (%)	1.0	1.0	1.0	0.9	0.9	0.9
Compression Set, Method B, O-Rings — (postcured 2 hr at 232 °C)						
22 hr at 200 °C						
- No Postcure	23	27	27	20	31	36
- Postcured at 232 °C	15	14	20	12	17	17
70 hr at 200 °C						
- No Postcure	34	37	39	26	43	47
- Postcured at 232 °C	23	29	33	21	29	31
Compression Set, Method B, Plied Discs — (postcured 2 hr at 232 °C)						
22 hr at 200 °C						
- Postcured at 232 °C	14	14	17	16	16	19
70 hr at 200 °C						
- Postcured at 232 °C	23	19	21	20	19	27

(Continued)

Table II — DuPont™ Viton® GLT-600S Filler Study (continued)

Compound:	A10-01 5-MT	A10-02 30-MT	A10-03 60-MT	A10-04 40-Wollast.	A10-05 40-Albaglos	A10-06 40-BaSO4
Volume Swell After Immersion — time and temperature as noted — (postcured 2 hr at 232 °C)						
Fuel C, 168 hr at 23 °C	10.8	8.6	8.3	8.6	7.8	8.8
CM15 Fuel, 168 hr at 23 °C	41.7	30.2	27.8	33.8	34.5	39.2
Water, 168 hr at 100 °C	7.0	5.0	4.0	7.4	9.5	12.0
Low Temperature Properties (postcured 2 hr at 232 °C)						
- Tg by DSC, °C	–32.3	–33.0	–32.6	–33.0	–33.1	–33.0
- TR-10, °C	–30.5	–29.6	–30.0	–29.5	–29.7	–29.9

[1]Compound reference number: DD-1964 A10

Table III
Fuel, Fluids, and Heat Resistance of
DuPont™ Viton® GLT-600S vs. DuPont™ Viton® GLT

Compound:	A36-01	A36-02
Type of Viton® used =	**GLT**	**GLT-600S**
Viton® GLT	100	—
Viton® GLT-600S	—	100
Zinc Oxide	3	3
N990	30	30
Armeen® 18D		0.5 0.5
DIAK™ 7		3 3
Varox® DBPH-50		3 2
Total phr =	139.5	138.5
Mooney Scorch at 121 °C		
Minimum	40	34
2 pt rise (min)	19.4	12.2
5 pt rise (min)	23.0	14.8
10 pt rise (min)	27.9	17.1
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock		
M-L (dNm)	2.5	2.0
ts-2 (min)	0.6	0.4
t'50 (min)	0.9	0.6
t'90 (min)	3.0	1.1
t'95 (min)	4.0	1.5
M-H (dNm)	16.8	24.7
Physical Properties at R.T. — Original (Cured 7' at 177 °C — No Postcure)		
M-10, MPa	0.7	0.7
M-25, MPa	1.2	1.2
M-100, MPa	4.7	2.8
Tensile, MPa	13.4	9.3
(T-B, psi)	(1946)	(1353)
Elongation, %	213	353
Hardness, A, pts	65	64
Physical Properties at R.T. — Original (Cured 7' at 177 °C — Postcured at 232 °C as noted)		
	16 hr	**8 hr**
M-10, MPa	0.9	0.8
M-25, MPa	1.4	1.4
M-100, MPa	5.9	3.5
Tensile, MPa	18.2	18.4
(T-B, psi)	(2636)	(2669)
Elongation, %	189	316
Hardness, A, pts	70	70

(Continued)

Table III - Fuel, Fluids, and Heat Resistance of DuPont™ Viton® GLT-600S vs. DuPont™ Viton® GLT (cont.)

Compound #	A36-01	A36-02	Typical
Type of Viton® used =	**GLT**	**GLT-600S**	ASTM D2000 / SAE J200 spec & values
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven			**A1-10**
M-25, MPa	1.5	1.5	
(% Change, M25)	3%	7%	
M-100, MPa	5.5	3.5	
(% Change, M100)	–6%	0%	
Tensile, MPa	17.5	17.6	
(% Change, T-B)	–4%	–5%	–25% max
Elongation, %	208	395	
(% Change, E-B)	10%	25%	–25% max
Hardness, A, pts	71	71	
(Pts Change)	1	1	+10 max
Physical Properties at R.T. — Aged 168 hr at 60 °C In Diesel Fuel			
M-25, MPa	1.3	1.4	
(% Change, M25)	–8%	4%	
M-100, MPa	6.0	3.7	
(% Change, M100)	1%	6%	
Tensile, MPa	17.5	14.7	
(% Change, T-B)	–4%	–20%	
Elongation, %	189	309	
(% Change, E-B)	0%	–2%	
Hardness, A, pts	69	69	
(Pts Change)	–1	–1	
Volume Swell, %	2.7	3.1	
Physical Properties at R.T. — Aged 70 hr at 23 °C In Fuel C			**EF31**
M-25, MPa	1.2	1.2	
(% Change, M25)	–13%	–10%	
M-100, MPa	5.4	3.3	
(% Change, M100)	–9%	–6%	
Tensile, MPa	15.0	13.6	
(% Change, T-B)	–18%	–26%	–25% max
Elongation, %	172	274	
(% Change, E-B)	–9%	–13%	–20% max
Hardness, A, pts	68	68	
(Pts Change)	–2	–2	± 5
Volume Swell, %	5.8	6.6	0 to +10

(Continued)

Table III - Fuel, Fluids, and Heat Resistance of DuPont™ Viton® GLT-600S vs. DuPont™ Viton® GLT (cont.)

Compound #	A36-01	A36-02	Typical
Type of Viton® used =	**GLT**	**GLT-600S**	ASTM D2000 / SAE J200 spec & values
Physical Properties at R.T. — Aged 168 hr at 23 °C In CE10 (90% Fuel C/10% Ethanol)			
M-25, MPa	0.8	1.0	
(% Change, M25)	–41%	–28%	
M-100, MPa	4.3	3.0	
(% Change, M100)	–27%	–16%	
Tensile, MPa	12.3	10.2	
(% Change, T-B)	–32%	–45%	
Elongation, %	161	226	
(% Change, E-B)	–15%	–29%	
Hardness, A, pts	61	63	
(Pts Change)	–9	–7	
Volume Swell, %	17.3	18.8	
Physical Properties at R.T. — Aged 168 hr at 23 °C In CM15 (85% Fuel C/15% Methanol)			
M-25, MPa	0.7	0.9	
(% Change, M25)	–50%	–36%	
M-100, MPa	4.6	2.7	
(% Change, M100)	–22%	–23%	
Tensile, MPa	8.5	9.3	
(% Change, T-B)	–53%	–50%	
Elongation, %	135	218	
(% Change, E-B)	–29%	–31%	
Hardness, A, pts	56	61	
(Pts Change)	–14	–9	
Volume Swell, %	31.1	32.0	
Physical Properties at R.T. — Aged 70 hr at 200 °C In Service Fluid 101			**EO78**
M-25, MPa	1.2	1.0	
(% Change, M25)	–15%	–27%	
M-100, MPa	6.0	3.1	
(% Change, M100)	1%	–12%	
Tensile, MPa	15.5	15.8	
(% Change, T-B)	–15%	–14%	–40% max
Elongation, %	181	309	
(% Change, E-B)	–5%	–2%	–20% max
Hardness, A, pts	67	65	
(Pts Change)	–3	–5	–15 to +5
Volume Swell, %	19.1	15.4	0 to +15

(Continued)

Table III - Fuel, Fluids, and Heat Resistance of DuPont™ Viton® GLT-600S vs. DuPont™ Viton® GLT (cont.)

Compound #	A36-01	A36-02	Typical
Type of Viton® used =	**GLT**	**GLT-600S**	ASTM D2000 / SAE J200 spec & values
Physical Properties at R.T. — Aged 336 hr at 60 °C In 180PN Sour Fuel (Ford Method)			
M-25, MPa	0.8	0.8	
(% Change, M25)	–46%	–42%	
M-100, MPa	5.1	2.6	
(% Change, M100)	–13%	–25%	
Tensile, MPa	11.0	7.5	
(% Change, T-B)	–39%	–59%	
Elongation, %	153	210	
(% Change, E-B)	–19%	–33%	
Hardness, A, pts	57	56	
(Pts Change)	–13	–14	
Volume Swell, %	28.6	36.9	
NOTE : Ford "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			
Physical Properties at R.T. — Aged 70 hr at 200 °C In 7700 Fluid/SAE Fluid #2			
M-25, MPa	0.8	0.9	**EO88**
(% Change, M25)	-42%	–33%	
M-100, MPa	4.7	3.0	
(% Change, M100)	–20%	–16%	
Tensile, MPa	14.5	13.3	
(% Change, T-B)	–20%	–28%	–40% max
Elongation, %	187	267	
(% Change, E-B)	–1%	–16%	–20% max
Hardness, A, pts	62	63	
(Pts Change)	–8	–7	–15 to +5
Volume Swell, %	18.1	19.4	+25% max
Compression Set, Method B, O-Rings (postcured at 232 °C as noted)			
	16 hr	**8 hr**	
70 hr at 200 °C	31	23	
Low Temperature Testing			
Tg by DSC (Modulated), °C	–29.5	–31.7	
TR-10, °C	–29.2	–30.0	

[1]Compound reference number: DD-1972A36

Table IV
Process Aid Study In N990 filled GLT-600S stocks

process aid:	none	C. Wax	18D	WS280	HT-290	PAT777	18D / WS280	HT-290 / PAT-777
Compound:	A34-01	A34-02	A34-03	A34-04	A34-05	A34-06	A34-07	A34-08
Viton® GLT-600S	100	100	100	100	100	100	100	100
Zinc oxide	3	3	3	3	3	3	3	3
N990	30	30	30	30	30	30	30	30
DIAK™ 7	3	3	3	3	3	3	3	3
Varox® DBPH-50	2	2	2	2	2	2	2	2
Carnauba wax	—	1	—	—	—	—		—
Armeen® 18D	—	—	0.5	—	—	—	0.5	—
Struktol® WS280	—	—	—	0.5	—	—	0.5	—
Struktol ® HT-290	—	—	—	—	0.75	—	—	0.75
PAT-777	—	—	—	—	0.5	—	0.5	
Total phr =	138	139	138.5	138.5	138.75	138.5	139	139.25
Mooney Scorch at 121 °C								
Minimum, MU	30	27	26	30	25	29	26	24
2 Pt. Rise (min)	>30	29.9	12.8	28.5	19.7	23.0	15.5	21.5
5 Pt. Rise (min)	—	>30	16.1	>30	22.9	25.6	19.2	25.2
10 Pt. Rise (min)	—	—	19.0	—	25.7	28.7	22.3	28.7
ODR at 162 °C, 3° Arc, 100 Range, 30 Minute Clock								
M-L (dNm)	14	13	13	14	13	14	13	12
ts-2 (min)	1.3	1.4	1.1	1.2	1.2	1.3	1.1	1.2
t'50 (min)	2.6	2.9	2.4	2.4	2.5	2.5	2.8	2.6
t'90 (min)	5.0	4.8	4.9	4.1	7.0	4.3	9.9	7.1
M-H (dNm)	143	134	133	138	128	137	128	111
MDR 2000 at 177 °C, 0.5° Arc, 100 Range, 6 Minute Clock								
M-L (dNm)	1.6	1.5	1.5	1.6	1.4	1.6	1.5	1.4
ts-2 (min)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
t'50 (min)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6
t'90 (min)	1.3	1.3	1.2	1.1	1.2	1.1	1.2	1.2
t'95 (min)	1.8	1.7	1.6	1.5	1.7	1.5	1.7	1.8
M-H (dNm)	25.4	24.8	24.8	26.9	25.4	25.5	23.5	23.5
"Hot" Tear Die B at 150 °C (Cure 5' at 177 °C — no postcure)								
Tear Die B, (N/mm)	7.5	6.2	6.3	7.5	6.4	7.4	6.2	6.6
Spider Mold Flow Test — Sprue ~0.8 mm at 124 bar (1,800 psi) transfer pressure (cure 7' at 177 °C)								
Total shot weight (gms)	39.9	39.9	39.9	39.9	40.0	40.0	40.0	39.9
Weight of spider (gms)	14.6	21.5	18.4	19.0	23.3	19.9	22.2	22.9
Fill factor (%)	36%	54%	46%	48%	58%	50%	55%	57%
Physical Properties at R.T. — Original (Cure 5' at 177 °C — no postcure)								
M-10, MPa	0.7	0.8	0.7	0.7	0.8	0.8	0.7	0.8
M-100, MPa	2.8	2.8	2.7	3.1	2.8	2.8	2.4	2.5
Tensile, MPa	9.0	8.3	7.9	10.2	8.6	9.5	7.1	7.3
(T-B, psi)	1311	1204	1143	1473	1253	1372	1028	1063
Elongation, %	278	320	329	297	338	335	353	332
Hardness, A, pts	62	66	64	65	66	64	63	65

(Continued)

Table IV — Process Aid Study In N990 filled GLT-600S stocks (cont.)

process aid:	none	C. Wax	18D	WS280	HT-290	PAT777	18D / WS280	HT-290 / PAT-777
Compound:	A34-01	A34-02	A34-03	A34-04	A34-05	A34-06	A34-07	A34-08
Physical Properties at R.T. — Original (Cured 5' at 177 °C — **Postcured 2 hr at 232 °C**)								
M-10, MPa	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0
M-100, MPa	3.1	3.3	3.3	3.5	3.2	3.3	3.1	3.0
Tensile, MPa	13.7	12.3	13.4	15.1	11.6	14.3	11.2	10.1
(T-B, psi)	1989	1776	1937	2187	1681	2071	1628	1457
Elongation, %	291	318	339	311	298	310	372	354
Hardness, A, pts	68	70	71	69	71	70	70	71
Physical Properties at R.T. — Original (Cured 5' at 177 °C — **Postcured 6 hr at 232 °C**)								
M-10, MPa	0.8	0.9	0.9	0.9	1.0	0.9	1.0	1.1
M-100, MPa	3.4	3.4	3.7	3.8	3.6	3.6	3.5	3.4
Tensile, MPa	16.8	15.0	17.6	17.7	16.3	18.2	15.2	13.5
(T-B, psi)	2429	2174	2546	2564	2366	2635	2205	1955
Elongation, %	321	292	306	296	343	322	326	327
Hardness, A, pts	70	71	72	71	73	71	73	73
Physical Properties at R.T. — Heat Aged 70 hr at 250 °C In Oven (2 hr at 232 °C postcure)								
M-100, MPa	3.1	3.5	3.6	3.5	3.7	3.4	3.6	3.7
(% Change, M100)	0%	6%	9%	-2%	14%	5%	19%	24%
Tensile, MPa	15.5	15.6	16.0	16.5	16.1	16.5	15.9	15.1
(% Change, T-B)	13%	28%	20%	10%	39%	15%	42%	51%
Elongation, %	412	351	398	380	350	392	391	364
(% Change, E-B)	42%	10%	18%	22%	17%	26%	5%	3%
Hardness, A, pts	71	74	74	72	75	73	74	77
(Pts Change)		3	4	3	3	4	3	4 6
Physical Properties at R.T. — Heat Aged 70 hr at 275 °C In Oven (2 hr at 232 °C postcure)								
M-100, MPa	3.0	3.4	3.8	3.4	3.6	3.2	3.5	3.4
(% Change, M100)	–4%	4%	13%	–4%	13%	–1%	15%	15%
Tensile, MPa	12.1	12.3	12.0	12.5	11.8	12.0	11.1	11.2
(% Change, T-B)	–12%	0%	–10%	–17%	2%	–16%	–1%	12%
Elongation, %	340	303	302	304	300	314	306	324
(% Change, E-B)	17%	–5%	–11%	–2%	1%	1%	–18%	–9%
Hardness, A, pts	71	74	75	72	75	73	76	77
(Pts Change)	3	4	4	3	4	3	6	6
Compression Set, Method B, O-Rings — (2 hr at 232 °C postcure)								
70 hr at 200 °C								
- No Postcure	26	42	37	18	35	39	42	49
- PC: 2 hr at 232 °C	24	31	39	22	32	27	35	39
- PC: 6 hr at 232 °C	24	24	25	22	25	23	26	25
Volume Swell After Immersion — 168 hr at 23 °C (2 hr postcure at 232 °C)								
Fuel C, %VS	9.8	12.3	12.0	10.0	11.8	10.5	13.1	13.6
Compound Sp. Gravity	1.817	1.804	1.811	1.813	1.809	1.815	1.811	1.811
Low Temperature Properties — (2 hr at 232 °C postcure)								
Tg by DSC, °C	–32.7	–32.8	–32.4	–32.5	–32.6	–32.7	–32.7	–32.7
TR-10, °C	–30.2	–29.7	–29.8	–30.0	–30.0	–29.8	–30.0	–30.1

[1]Compound reference number: DD-1992A34

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
Albaglos®[1]	Calcium carbonate	Specialty Minerals Inc. Bethlehem, PA 18017
Armeen® 18D[2]	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
Luperco® 101XL[3]	50% active dispersion of 2,5 Dimethyl-2,5-di(t-butyl-peroxy)-hexane	Arkema (Atofina) Paris, France
PAT-777	Fatty acid derivatives	IDE Processes International Sales LLC (E und P Wurtz GmbH) Kew Gardens, NY 11415
Struktol® HT-290[4]	Blend of fatty acid derivatives	Struktol Co. of America Stow, OH 44224
Struktol® WS-280[4]	silicone-organic compounds	Struktol Co. of America Stow, OH 44224
Varox® DBPH-50[5]	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
Wollastocoat® 10022[6] (10μ)	treated calcium metasilicate	NYCO Minerals, Inc Willsboro, NY 12996-0368

[1] Trademark of Specialty Minerals Inc.
[2] Trademark of Akzo Nobel Polymer Chemicals LLC
[3] Trademark of R.T.Vanderbilt Co.
[4] Trademark of Struktol Co. of America.
[5] Trademark of R.T.Vanderbilt Co.
[6] Trademark of NYCO Minerals, Inc

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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