

Technical Information

Introduction

Viton™ AL-600* is an “AL-family” gum polymer that demonstrates improved processing when compared to its precursor Viton™ B-70N. This gum provides:

- Higher viscosity
- Improved mold flow
- Better mold release
- Less mold fouling
- Improved compression set resistance
- Good low temperature characteristics

Applications

- Fuel systems, such as fuel injector O-rings
- Injection and transfer molding of O-rings, gaskets, and other sealing devices
- Extruded cords, profiles, and tubing or calendered sheets, when a blend of gum polymers are used
- Solution coatings of fabrics and other substrates

Product Description

Chemical Composition	Terpolymer of hexafluoropropylene, vinylidene fluoride, and tetrafluoroethylene
Physical Form	Slab
Color	Off-white
Odor	None
Specific Gravity	1.77
Solubility	Low molecular weight esters and ketones
Storage Stability	Excellent
Mooney Viscosity, ML 1+10 at 121 °C (250 °F)	Nominal 60

Safety and Handling

Before handling or processing Viton™ AL-600, read and follow the recommendations as described in the Chemours technical bulletin, “Handling Precautions for Viton™ and Related Chemicals.”

Viton™ AL-600 should be handled similar to other types of Viton™. For safe handling of other compounding ingredients, please refer to the respective manufacturers’ information.

*Viton™ AL-600 was formerly named VTR-7447.

Table 1. Comparison of Polymer Types to Viton™ AL-600

	Viton™ AL-600	Viton™ AL-300	Viton™ B-70N	Viton™ B-70N	Viton™ A-200	Viton™ B-200
Viton™ AL-600	97.5	—	—	—	—	—
Viton™ AL-300	—	97.5	—	—	—	—
Viton™ B-70N	—	—	98	95.0	—	—
Viton™ A-200	—	—	—	—	97.5	—
Viton™ B-200	—	—	—	—	—	97.5
Carbon Black (N-990)	30	30	30	30	30	30
High-Activity MgO	3	3	3	3	3	3
Calcium Hydroxide	6	6	6	6	6	6
Viton™ Curative No. 50	2.5	2.5	2.5	—	2.5	2.5
Viton™ Curative No. 20	—	—	—	1.8	—	—
Viton™ Curative No. 30	—	—	—	3.2	—	—
Mooney Scorch, MS + 1 at 121 °C (250 °F)						
Minimum Viscosity, units	61	31	44	48	29	27
Units Rise at 30 min	1	0	0	2	0	0
MDR at 177 °C (350 °F), Micro Die, 0.5 Arc, 6 min motor						
Minimum Viscosity, M _L , N·m (in·lb)	0.29 (2.6)	0.09 (0.8)	0.19 (1.7)	0.21 (1.9)	0.08 (0.7)	0.05 (0.5)
Scorch Time, t _{s2} , min	0.9	1.0	1.2	0.9	1.0	2.2
Maximum Torque, M _H , N·m (in·lb)	3.16 (28.0)	2.29 (20.2)	3.13 (27.7)	2.02 (17.9)	2.53 (22.4)	1.69 (15.0)
Optimum Cure Time, t _{c90} , min	2.0	2.0	3.1	2.5	2.1	4.3
ODR at 177 °C (350 °F), Micro Die, 3 Arc, 12 min motor						
Minimum Viscosity, M _L , N·m (in·lb)	2.3 (20.0)	0.8 (7.0)	1.4 (12.5)	1.8 (15.5)	0.6 (5.5)	0.4 (3.5)
Scorch Time, t _{s2} , min	1.8	1.8	2.4	1.9	2.0	3.3
Maximum Torque, M _H , N·m (in·lb)	13.6 (120.5)	10.1 (89.0)	13.1 (116.0)	9.3 (82.0)	10.7 (95.0)	3.6 (56.0)
Optimum Cure Time, t _{c90} , min	3.4	3.4	4.6	4.4	3.2	5.7
Slabs Cured 10 min at 177 °C (350 °F) and Post-Cured 24 hr at 232 °C (450 °F)						
Stress/Strain at 23 °C (73 °F)—Original						
100% Modulus, MPa (psi)	6.6 (955)	5.6 (805)	6.3 (915)	4.7 (675)	5.2 (750)	4.0 (575)
Tensile Strength, MPa (psi)	13.7 (1,980)	11.7 (1,695)	12.7 (1,835)	11.9 (1,720)	10.5 (1,520)	10.7 (1,550)
Elongation at Break, %	205	205	205	255	215	260
Hardness, Durometer A	70	73	74	71	75	75
Original Die C Tear at 23 °C (73 °F)						
kN/m (pli)	23.5 (134)	23.8 (136)	25.6 (146)	27.3 (156)	24.7 (141)	24.7 (141)
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	6.8 (985)	5.7 (885)	6.9 (1,000)	5.5 (795)	5.8 (835)	4.7 (680)
Tensile Strength, MPa (psi)	15.0 (2,180)	13.3 (1,925)	14.0 (2,030)	12.1 (1,755)	12.4 (1,795)	10.8 (1,570)
Elongation at Break, %	225	220	220	220	235	255
Hardness, Durometer A	72	74	75	71	76	73

continued

Table 1. Comparison of Polymer Types to Viton™ AL-600 (continued)

	Viton™ AL-600	Viton™ AL-300	Viton™ B-70N	Viton™ B-70N	Viton™ A-200	Viton™ B-200
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	7.6 (1,100)	6.3 (920)	6.8 (985)	5.8 (840)	6.0 (865)	4.7 (680)
Tensile Strength, MPa (psi)	14.4 (2,095)	13.7 (1,985)	14.8 (2,150)	14.1 (2,045)	13.3 (1,925)	11.4 (1,650)
Elongation at Break, %	190	215	215	260	220	275
Hardness, Durometer A	72	74	74	73	77	76
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)						
100% Modulus, MPa (psi)	7.7 (1,115)	6.7 (965)	7.4 (1,080)	5.8 (845)	6.0 (870)	4.7 (675)
Tensile Strength, MPa (psi)	16.0 (2,320)	12.9 (1,865)	14.7 (2,125)	13.9 (2,015)	13.5 (1,960)	10.9 (1,585)
Elongation at Break, %	200	185	200	240	225	270
Hardness, Durometer A	74	75	76	73	77	79
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 250 °C (482 °F)						
100% Modulus, MPa (psi)	7.2 (1,040)	6.0 (870)	7.2 (1,050)	6.3 (910)	5.7 (820)	4.0 (580)
Tensile Strength, MPa (psi)	13.7 (1,990)	12.2 (1,770)	14.4 (2,085)	13.4 (1,940)	11.8 (1,710)	9.2 (1,340)
Elongation at Break, %	180	215	205	235	220	310
Hardness, Durometer A	73	75	76	73	75	76
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F) in IRM-903 oil						
100% Modulus, MPa (psi)	6.7 (975)	5.8 (835)	6.2 (900)	4.9 (705)	5.0 (730)	4.1 (600)
Tensile Strength, MPa (psi)	12.9 (1,865)	11.9 (1,725)	12.4 (1,795)	10.6 (1,530)	10.4 (1,505)	10.3 (1,500)
Elongation at Break, %	195	220	225	230	225	265
Hardness, Durometer A	70	71	72	69	75	75
Volume Increase, %	2.5	2.5	1.5	2.0	2.5	2.5
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 23 °C (73 °F) in 85% Ref. Fuel C and 15% Methanol						
100% Modulus, MPa (psi)	4.7 (685)	3.8 (555)	4.2 (610)	3.1 (455)	3.8 (550)	2.7 (385)
Tensile Strength, MPa (psi)	6.9 (995)	5.5 (795)	5.7 (825)	6.0 (865)	5.6 (815)	6.5 (945)
Elongation at Break, %	150	140	140	195	150	240
Hardness, Durometer A	58	55	60	51	58	58
Volume Increase, %	33.0	35.0	32.5	33.0	34.5	19.5
Compression Set, Method B, O-Rings, %						
Aged 70 hr at 150 °C (302 °F)	9	15	11	26	10	27
Aged 70 hr at 200 °C (392 °F)	14	21	20	33	17	32
Aged 168 hr at 200 °C (392 °F)	21	31	29	46	24	46
Aged 22 hr at 232 °C (450 °F)	11	11	10	23	8	24
Thermal Analysis, DSC (Glass Transition)						
T _g , °C	-19.0	-20.0	-20.2	-20.0	-16.5	-13.0
Temperature Retraction Test						
TR-10, °C	-19	-19	-19	-19	-16	-13

Table 2. Viton™ AL-600—The Effect of Carbon Black Types and Levels

Carbon Black Types and Levels	N-990 65 phr	N-990 45 phr	N-990 30 phr	N-990 15 phr	N-990 5 phr	N-774 30 phr	N-550 30 phr
Viton™ AL-600	97.5	97.5	97.5	97.5	97.5	97.5	97.5
MT Carbon Black (N-990)	65	45	30	15	5	—	—
SRF Carbon Black (N-774)	—	—	—	—	—	30	—
FEF Carbon Black (N-550)	—	—	—	—	—	—	30
High-Activity MgO	3	3	3	3	3	3	3
Calcium Hydroxide	6	6	6	6	6	6	6
Viton™ Curative No. 50	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Mooney Scorch, MS + 1 at 121 °C (250 °F)							
Minimum Viscosity, units	82.5	68.5	61.0	52.5	47.0	70.0	84.5
Units Rise at 30 min	0.0	1.4	1.4	0.0	0.0	0.0	0.0
MDR at 177 °C (350 °F), Micro Die, 0.5 Arc, 6 min motor							
Minimum Viscosity, M_L , N·m (in·lb)	0.53 (4.7)	0.37 (3.3)	0.29 (2.6)	0.22 (2.0)	0.20 (1.8)	0.39 (3.5)	0.51 (4.5)
Scorch Time, t_{c1} , min	0.6	0.7	0.8	1.0	1.1	0.8	0.6
Maximum Torque, M_H , N·m (in·lb)	5.84 (51.7)	4.27 (37.8)	3.11 (27.6)	2.16 (19.2)	1.72 (15.3)	3.62 (32.1)	4.42 (39.2)
Optimum Cure Time, t_{c90} , min	2.1	2.0	1.9	2.0	2.0	2.2	1.7
ODR at 177 °C (350 °F), Micro Die, 3 Arc, 12 min motor							
Minimum Torque, M_L , N·m (in·lb)	2.9 (25.5)	2.5 (22.0)	2.4 (21.0)	2.0 (18.0)	1.9 (17.0)	2.8 (24.5)	3.3 (29.0)
Scorch Time, t_{c2} , min	1.4	1.6	1.9	2.2	2.2	2.1	1.5
Maximum Torque, M_H , N·m (in·lb)	16.5 (146.0)	14.8 (131.0)	13.7 (121.0)	12.0 (106.5)	10.7 (94.5)	13.6 (120.0)	14.7 (130.5)
Optimum Cure Time, t_{c90} , min	3.2	3.2	3.5	3.8	3.7	4.3	3.9
Slabs Cured 10 min at 177 °C (350 °F) and Post-Cured 24 hr at 232 °C (450 °F)							
Stress/Strain at 23 °C (73 °F)—Original (Post-Cured)							
100% Modulus, MPa (psi)	10.9 (1,585)	9.0 (1,310)	6.3 (915)	3.7 (530)	2.3 (330)	12.1 (1,750)	16.5 (2,385)
Tensile Strength, MPa (psi)	14.3 (2,070)	14.8 (2,140)	13.8 (2,000)	12.8 (1,850)	10.2 (1,480)	17.6 (2,545)	17.8 (2,580)
Elongation at Break, %	145	175	210	250	250	145	110
Hardness, Durometer A	87	81	72	61	54	79	84
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	11.9 (1,720)	9.3 (1,350)	7.0 (1,015)	4.1 (590)	2.3 (330)	12.4 (1,795)	16.9 (2,445)
Tensile Strength, MPa (psi)	14.7 (2,125)	14.8 (2,140)	13.4 (1,940)	12.6 (1,825)	10.5 (1,525)	16.8 (2,440)	18.0 (2,615)
Elongation at Break, %	135	170	190	230	255	125	105
Hardness, Durometer A	88	81	73	64	58	81	86
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	12.0 (1,740)	10.0 (1,445)	7.0 (1,010)	4.1 (590)	2.3 (335)	13.0 (1,885)	0
Tensile Strength, MPa (psi)	14.9 (2,155)	15.7 (2,280)	14.6 (2,115)	12.6 (1,830)	11.2 (1,630)	17.7 (2,560)	17.8 (2,575)
Elongation at Break, %	130	170	200	250	265	135	95
Hardness, Durometer A	88	81	73	63	58	80	85

continued

Table 2. Viton™ AL-600—The Effect of Carbon Black Types and Levels (continued)

Carbon Black Types and Levels	N-990 65 phr	N-990 45 phr	N-990 30 phr	N-990 15 phr	N-990 5 phr	N-774 30 phr	N-550 30 phr
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	13.9 (2,020)	9.9 (1,435)	7.2 (1,045)	3.8 (550)	2.1 (310)	10.2 (1,485)	15.2 (2,210)
Tensile Strength, MPa (psi)	15.4 (2,235)	15.3 (2,215)	14.9 (2,155)	11.3 (1,635)	12.1 (1,760)	16.3 (2,365)	17.0 (2,635)
Elongation at Break, %	115	155	185	200	275	150	120
Hardness, Durometer A	88	82	73	64	56	80	86
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	12.8 (1,855)	9.7 (1,405)	7.1 (1,035)	3.7 (535)	2.2 (315)	10.4 (1,505)	13.6 (1,965)
Tensile Strength, MPa (psi)	13.7 (1,990)	14.0 (2,025)	14.2 (2,055)	13.2 (1,920)	10.9 (1,580)	15.5 (2,240)	15.8 (2,290)
Elongation at Break, %	105	140	180	240	255	145	120
Hardness, Durometer A	88	82	73	63	55	81	87
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F) in IRM-903 oil							
100% Modulus, MPa (psi)	10.8 (1,570)	8.7 (1,255)	6.5 (935)	4.1 (595)	2.5 (365)	12.2 (1,765)	16.9 (2,445)
Tensile Strength, MPa (psi)	13.2 (1,915)	13.0 (1,880)	12.6 (1,820)	12.3 (1,790)	12.2 (1,775)	18.12 (2,635)	18.8 (2,725)
Elongation at Break, %	150	190	205	240	270	155	120
Hardness, Durometer A	85	81	71	62	55	85	84
Volume Increase, %	2.0	2.0	2.0	2.5	3.0	2.5	3
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 23 °C (73 °F) in 85% Ref. Fuel C and 15% Methanol							
100% Modulus, MPa (psi)	8.3 (1,205)	6.4 (925)	4.8 (700)	3.1 (455)	2.3 (330)	8.3 (1,200)	0
Tensile Strength, MPa (psi)	9.2 (1,330)	7.7 (1,110)	5.9 (855)	4.1 (600)	2.8 (410)	8.5 (1,230)	10.6 (1,540)
Elongation at Break, %	115	125	120	130	120	105	90
Hardness, Durometer A	73	66	58	52	47	66	71
Volume Increase, %	27	30	34	39	44	33	32
Compression Set, Method B, O-Rings, %							
Aged 70 hr at 200 °C (392 °F)	24	19	15	10	8	21	26
Aged 168 hr at 200 °C (392 °F)	30	23	23	19	21	29	35
Aged 22 hr at 232 °C (450 °F)	19	13	11	5	7	17	20
Thermal Analysis, DSC (Glass Transition)							
T _g , °C	-19	-19	-19	-19	-19	-19	-19
Temperature Retraction Test							
TR-10, °C	-19	-19	-19	-18	-18	-19	-18

Table 3. Viton™ AL-600—The Effect of Mineral Fillers Types and Levels

Mineral Fillers and Levels	N-990 30 phr	Albaglos® 30 phr	Nyad® 400 30 phr	Blanc Fixe 30 phr	Blanc Fixe 30 phr	Celite® 350 30 phr	Ti-Pure™ R-960 30 phr
Viton™ AL-600	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Carbon Black (N-990)	30	—	—	—	—	—	—
Albaglos®	—	30	—	—	—	—	—
Nyad® 400	—	—	30	—	—	—	—
Blanc Fixe	—	—	—	30	60	—	—
Celite® 350	—	—	—	—	—	30	—
Ti-Pure™ R-960	—	—	—	—	—	—	30
High-Activity MgO	3	3	3	3	3	3	3
Calcium Hydroxide	6	6	6	6	6	6	6
Viton™ Curative No. 50	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Mooney Scorch, MS + 1 at 121 °C (250 °F)							
Minimum Viscosity, units	63.0	60.5	55.0	53.0	63.0	74.5	49.5
Units Rise at 30 min	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MDR at 177 °C (350 °F), Micro Die, 0.5 Arc, 6 min motor							
Minimum Viscosity, M _L , N·m (in·lb)	0.30 (2.7)	0.35 (3.1)	0.29 (2.6)	0.29 (2.6)	0.37 (3.3)	0.45 (4.0)	0.25 (2.2)
Scorch Time, t _{s1} , min	0.8	0.8	0.9	0.9	0.8	0.7	1.1
Maximum Torque, M _H , N·m (in·lb)	2.92 (25.8)	2.83 (25.1)	2.44 (21.6)	2.30 (20.4)	2.58 (22.8)	3.53 (31.3)	1.94 (17.2)
Optimum Cure Time, t _{c90} , min	1.8	1.4	1.6	1.8	1.7	1.4	2.7
ODR at 177 °C (350 °F), Micro Die, 3 Arc, 12 min motor							
Minimum Torque, M _L , N·m (in·lb)	2.3 (20.5)	2.7 (23.5)	2.5 (22.0)	2.4 (21.0)	2.9 (25.5)	3.0 (26.5)	2.2 (19.0)
Scorch Time, t _{s2} , min	1.7	1.9	1.8	2.1	1.5	1.6	2.2
Maximum Torque, M _H , N·m (in·lb)	12.9 (114.5)	13.8 (122.5)	13.3 (117.5)	11.7 (103.5)	13.2 (117.0)	14.8 (131.0)	11.0 (97.5)
Optimum Cure Time, t _{c90} , min	3.1	3.0	2.9	3.6	3.2	2.6	4.1
Slabs Cured 10 min at 177 °C (350 °F) and Post-Cured 24 hr at 232 °C (450 °F)							
Stress/Strain at 23 °C (73 °F), Original (Post-Cured)							
100% Modulus, MPa (psi)	6.7 (965)	7.4 (1,075)	9.1 (1,325)	3.7 (540)	6.7 (975)	17.0 (2,470)	4.7 (675)
Tensile Strength, MPa (psi)	14.8 (2,145)	12.3 (1,780)	11.4 (1,650)	10.7 (1,550)	12.5 (1,805)	19.1 (2,765)	13.2 (1,915)
Elongation at Break, %	215	160	150	230	200	120	220
Hardness, Durometer A	72	69	69	62	68	79	63
Original Die C Tear at 23 °C (73 °F)							
kN/m (pli)	25.4 (145)	22.8 (130)	19.3 (110)	20.5 (117)	22.4 (128)	21.4 (122)	18.7 (107)
Stress/Strain at 23 °C (73 °F), After aging 70 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	6.9 (995)	8.9 (1,295)	10.5 (1,515)	4.4 (640)	4.3 (620)	0	5.2 (750)
Tensile Strength, MPa (psi)	14.6 (2,110)	11.9 (1,725)	11.1 (1,605)	10.9 (1,580)	10.8 (1,565)	16.7 (2,425)	13.3 (1,925)
Elongation at Break, %	195	125	105	200	200	95	190
Hardness, Durometer A	74	71	68	64	62	78	64

continued

Table 3. Viton™ AL-600—The Effect of Mineral Fillers Types and Level (continued)

Mineral Fillers and Levels	N-990 30 phr	Albaglos® 30 phr	Nyad® 400 30 phr	Blanc Fixe 30 phr	Blanc Fixe 30 phr	Celite® 350 30 phr	Ti-Pure™ R-960 30 phr
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	6.9 (1,005)	9.0 (1,300)	10.4 (1,510)	4.3 (625)	7.4 (1,075)	18.0 (2,615)	4.8 (700)
Tensile Strength, MPa (psi)	13.8 (1,995)	12.3 (1,790)	12.4 (1,800)	11.2 (1,625)	11.1 (1,615)	18.8 (2,730)	12.7 (1,840)
Elongation at Break, %	185	130	135	205	145	105	180
Hardness, Durometer A	73	70	67	63	70	78	65
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	6.5 (945)	8.2 (1,190)	9.6 (1,385)	3.9 (565)	4.7 (685)	16.3 (2,365)	4.7 (685)
Tensile Strength, MPa (psi)	14.2 (2,055)	11.7 (1,690)	11.5 (1,660)	9.7 (1,410)	8.9 (1,285)	18.7 (2,710)	13.6 (1,965)
Elongation at Break, %	190	135	125	205	180	125	210
Hardness, Durometer A	71	70	68	62	68	78	65
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	6.6 (955)	9.8 (1,415)	9.2 (1,335)	4.0 (585)	5.2 (760)	14.8 (2,140)	4.8 (695)
Tensile Strength, MPa (psi)	13.9 (2,015)	11.5 (1,665)	11.2 (1,625)	10.7 (1,550)	11.2 (1,630)	17.0 (2,460)	12.9 (1,780)
Elongation at Break, %	185	120	130	200	200	125	195
Hardness, Durometer A	73	70	68	61	70	78	66
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F) in IRM-903 oil							
100% Modulus, MPa (psi)	6.4 (925)	8.7 (1,260)	9.6 (1,395)	4.1 (590)	7.0 (1,010)	17.3 (2,510)	4.6 (670)
Tensile Strength, MPa (psi)	12.7 (1,845)	10.8 (1,565)	11.8 (1,705)	12.6 (1,825)	13.6 (1,965)	17.6 (2,550)	13.3 (1,925)
Elongation at Break, %	205	120	130	225	190	110	200
Hardness, Durometer A	72	68	68	61	68	77	62
Volume Increase, %	2.5	2.5	2.5	2.0	2.0	3.5	2.5
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 23 °C (73 °F) in 85% Ref. Fuel C and 15% Methanol							
100% Modulus, MPa (psi)	4.7 (675)	0	4.2 (615)	2.6 (370)	3.4 (490)	7.5 (1,080)	3.1 (450)
Tensile Strength, MPa (psi)	6.6 (955)	4.2 (615)	4.3 (625)	3.1 (455)	5.0 (725)	8.4 (1,215)	5.4 (785)
Elongation at Break, %	145	95	100	120	150	130	150
Hardness, Durometer A	59	57	57	50	55	65	51
Volume Increase, %	32.0	36.0	31.0	37.0	34.0	32.0	37
Compression Set, Method B, O-Rings, %							
Aged 70 hr at 150 °C (302 °F)	8	7	8	7	7	7	11
Aged 70 hr at 200 °C (392 °F)	13	17	11	12	11	15	13
Aged 168 hr at 200 °C (392 °F)	17	22	17	12	22	19	21
Aged 22 hr at 232 °C (450 °F)	13	19	12	13	14	17	16

Table 4. Viton™ AL-600—The Effect of Curative and Acid Acceptor Levels

Ingredients	Effect of Curative Levels				Effect of Acid Acceptors		
	A-4	B-4	C-4	D-4	E-4	F-4	G-4
Viton™ AL-600	97	97.5	98	98.5	97.5	97.5	98.5
Carbon Black (N-990)	30	30	30	30	30	30	30
High-Activity MgO	3	3	3	3	6	3	6
Calcium Hydroxide	6	6	6	6	3	3	3
Viton™ Curative No. 50	3	2.5	2	1.5	2.5	2.5	1.5
Mooney Scorch, MS + 1 at 121 °C (250 °F)							
Minimum Viscosity, units	59	59	59	58	56	54	59
Units Rise at 30 min	2.1	1.7	0.0	0.0	1.0	1.8	10.0
MDR at 177 °C (350 °F), Micro Die, 0.5 Arc, 6 min motor							
Minimum Viscosity, M_L , N·m (in·lb)	0.27 (2.4)	0.29 (2.5)	0.30 (2.6)	0.31 (2.7)	0.28 (2.5)	0.25 (2.2)	0.33 (2.9)
Scorch Time, t_{s1} , min	1.0	0.8	0.7	0.7	0.8	1.1	0.6
Maximum Torque, M_H , N·m (in·lb)	3.63 (32.2)	3.10 (27.5)	2.49 (22.1)	1.98 (16.7)	2.94 (26.0)	3.01 (26.7)	1.55 (13.7)
Optimum Cure Time, t_c , 90, min	2.3	1.9	1.6	1.5	2.1	3.2	1.7
ODR at 177 °C (350 °F), Micro Die, 3 Arc, 12 min motor							
Minimum Torque, M_L , N·m (in·lb)	2.1 (18.5)	2.2 (19.5)	2.4 (21.5)	2.5 (22.0)	2.3 (20.0)	1.9 (17.0)	2.7 (24.0)
Scorch Time, t_s , 2, min	2.0	1.7	1.7	1.4	1.9	2.2	1.3
Maximum Torque, M_H , N·m (in·lb)	16.1 (142.5)	13.9 (123.0)	11.8 (104.5)	9.2 (81.5)	13.5 (119.0)	14.0 (123.5)	7.7 (68.5)
Optimum Cure Time, t_c , 90, min	3.8	3.2	3.1	2.9	3.7	4.6	3.4
Slabs Cured 10 min at 177 °C (350 °F) and Post-Cured 24 hr at 232 °C (450 °F)							
Stress/Strain at 23 °C (73 °F), Original (Post-Cured)							
100% Modulus, MPa (psi)	8.3 (1,210)	6.7 (970)	5.6 (815)	4.3 (630)	6.3 (915)	6.2 (905)	3.4 (495)
Tensile Strength, MPa (psi)	4.3 (2,080)	15.0 (2,170)	15.7 (2,275)	5.2 (2,205)	14.5 (2,100)	13.8 (1,995)	15.1 (2,185)
Elongation at Break, %	175	215	250	300	225	215	340
Hardness, Durometer A	74	71	70	68	72	72	64
Original Die C Tear at 23 °C (73 °F)							
kN/m (pli)	22.1 (126)	24.9 (142)	25.7 (147)	26.6 (152)	24.2 (138)	25.9 (148)	28.7 (164)
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	8.7 (1,265)	7.1 (1,035)	6.3 (910)	4.9 (705)	6.4 (925)	6.6 (950)	4.3 (625)
Tensile Strength, MPa (psi)	14.5 (2,105)	13.7 (1,980)	15.0 (2,175)	15.2 (2,200)	14.3 (2,080)	13.4 (1,945)	16.0 (2,325)
Elongation at Break, %	180	195	230	290	235	205	330
Hardness, Durometer A	75	73	71	70	72	72	68
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)							
100% Modulus, MPa (psi)	8.6 (1,245)	6.9 (1,005)	6.1 (890)	4.8 (695)	6.7 (975)	6.3 (920)	4.0 (580)
Tensile Strength, MPa (psi)	15.7 (2,270)	15.6 (2,255)	16.2 (2,345)	16.2 (2,345)	16.1 (2,330)	13.7 (1,985)	16.2 (2,355)
Elongation at Break, %	190	210	240	285	225	210	335
Hardness, Durometer A	76	75	72	70	72	74	70

continued

Table 4. Viton™ AL-600—The Effect of Curative and Acid Acceptor Levels (continued)

Ingredients	Effect of Curative Levels				Effect of Acid Acceptors		
	A-4	B-4	C-4	D-4	E-4	F-4	G-4
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	8.9 (1,290)	6.9 (1,005)	6.0 (865)	4.4 (640)	6.9 (995)	6.6 (950)	3.9 (565)
Tensile Strength, MPa (psi)	14.8 (2,150)	15.5 (2,240)	15.2 (2,205)	13.3 (1,930)	15.3 (2,215)	13.6 (1,970)	14.6 (2,120)
Elongation at Break, %	155	195	215	235	200	185	295
Hardness, Durometer A	74	72	69	67	71	73	68
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 250 °C (482 °F)							
100% Modulus, MPa (psi)	7.7 (1,110)	7.0 (1,010)	6.0 (875)	4.8 (695)	6.5 (945)	6.1 (885)	3.9 (560)
Tensile Strength, MPa (psi)	14.8 (2,145)	15.6 (2,265)	15.3 (2,225)	13.6 (1,965)	15.4 (2,235)	13.7 (1,990)	15.3 (2,225)
Elongation at Break, %	180	200	220	240	205	195	330
Hardness, Durometer A	75	74	72	70	72	73	69
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F) in IRM-903 oil							
100% Modulus, MPa (psi)	7.4 (1,070)	6.4 (930)	5.2 (750)	4.0 (580)	5.8 (840)	5.7 (830)	3.5 (505)
Tensile Strength, MPa (psi)	2.5 (1,810)	13.2 (1,910)	13.6 (1,965)	13.3 (1,925)	12.7 (1,840)	11.5 (1,665)	14.1 (2,040)
Elongation at Break, %	195	215	270	320	235	215	350
Hardness, Durometer A	75	71	70	67	72	73	65
Compression Set, Method B, O-Rings, %							
Aged 70 hr at 150 °C (302 °F)	8	8	11	22	10	9	32
Aged 70 hr at 200 °C (392 °F)	12	17	10	22	14	14	36
Aged 168 hr at 200 °C (392 °F)	18	24	28	31	23	26	45
Aged 22 hr at 232 °C (392 °F)	16	17	21	25	20	20	33

Test Procedures

Property Measured	Test Procedure
Compression Set	ASTM D395-89, Method B (25% deflection)
Compression Set, O-Rings	ASTM D1414-94
Hardness	ASTM D2240-91, durometer A
Mooney Scorch	ASTM D1646-95, using the small rotor. Minimum viscosity and time to a 1-, 2-, 5-, and 10-unit rise are reported.
Mooney Viscosity	ASTM D1646, ten pass, 121 °C (250 °F)
ODR (vulcanization characteristics measured with an oscillating disk cure meter)	ASTM D2084
Property Change After Oven Heat-Aging	ASTM D573
Stress/Strain Properties	ASTM D412, dumbbell specimens tested at 50 m/min (20 in/min)
Volume Change in Fluids	ASTM D471
Temperature Retraction	ASTM D1329

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

For more information, visit Viton.com

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