

Technical Information

Introduction

Viton™ A-601C* fluoroelastomer is a new generation incorporated cure “A-family” dipolymer designed for compression molding of sealing devices that must meet major fluoroelastomer specifications. In addition to the chemical and heat resistance characteristics typical of fluoroelastomers, Viton™ A-601C offers significant improvements in processing and rheology. Viton™ A-601C can be blended with similar Viton™ types to provide a range of processing performance and physical properties.

Features

- Fully precompounded
 - O-ring curative level
- Improved processing for a high viscosity polymer
 - Improved mold flow
 - Easier mold release
 - Less mold fouling
- Excellent scorch safety
- Excellent physical properties
 - Improved compression set resistance

Applications

- Compression molding of O-rings, gaskets, and other sealing devices
- Applications where a higher polymer viscosity is needed for molding operations. Can be used to modify viscosity of other types of Viton™
- Can be formulated to meet FKM specifications Mil-R-83248C and AMS 7276E

Safety and Handling

*Viton™ A-601C was formerly named VTR-6806.

Product Description

Chemical Composition	Dipolymer of hexafluoropropylene, vinylidene fluoride plus cure chemicals
Physical Form	Slab
Appearance	Off-white
Odor	None
Specific Gravity	1.82
Solubility	Low molecular weight esters and ketones
Storage Stability	Excellent
Mooney Viscosity, ML 1 = 10 at 121 °C (250 °F)	60

Before handling or processing Viton™ A-601C, read and follow the recommendations in the Chemours technical bulletin, “Handling Precautions for Viton™ and Related Chemicals.”

Viton™ A-601C should be handled like other types of Viton™. For the safe handling of other compounding ingredients, please refer to the respective manufacturers’ literature.



Table 1. Performance of Viton™ A-601C in Typical Compounds

	Viton™ A-601C	Viton™ A-401C	Viton™ A-201C	Viton™ B-401C
Viton™ A-601C	100	—	—	—
Viton™ A-401C	—	100	—	—
Viton™ A-201C	—	—	100	—
Viton™ B-601C	—	—	—	100
High-Activity MgO	3	3	3	3
Calcium Hydroxide	6	6	6	6
Carnauba Wax	1	1	1	1
MT Black (N990)	30	30	30	30
Stock Properties				
Viscosity, ML 1 + 10 at 121 °C (250 °F)				
Units	100	70	47	103
Mooney Scorch, MS at 121 °C (250 °F)				
Minimum, in-lb	100	69	48	55
2-pt rise, min	12.1	15.7	>30	16.2
5-pt rise, min	>30	>30	—	>30
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min				
M _v , in-lb	24	16	9	22
t ₃₂ , min	2.1	2.1	2.6	2.7
t _{c90} , min	3.8	3.7	4.3	6.1
M _{c90} , in-lb	129	122	106	106
M _{Hi} , in-lb	140	133	117	115
Rosand Capillary Rheometer at 100 °C (212 °F), 1.5 mm Die, L/D = 0/1				
<i>Piston Speeds</i>	<i>Shear Rate</i>		<i>Pressure, MPa</i>	
12.7 mm/min	113 sec ⁻¹	8.7	6.9	5.6
50.8 mm/min	452 sec ⁻¹	13.3	10.0	7.9
127 mm/min	1130 sec ⁻¹	34.7	17.1	11.7
Vulcanizate Properties				
Slabs Cured: 10 min at 177 °C (350 °F)—Post-Cured: 24 hr at 232 °C (450 °F)				
Stress/Strain at 23 °C (73 °F)—Original, post-cured				
100% Modulus, MPa (psi)	7.9 (1,140)	7.0 (1,010)	6.5 (940)	6.7 (975)
Tensile Strength, MPa (psi)	16.0 (2,320)	13.8 (1,925)	12.1 (1,750)	14.0 (2,030)
Elongation at Break, %	187	175	170	203
Hardness, durometer A, pts	77	78	78	76
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)				
100% Modulus, MPa, % change	7.8 (-1.3)	6.9 (-1.4)	7.2 (10.8)	6.6 (-1.5)
Tensile Strength, MPa, % change	14.7 (-8.1)	13.3 (-3.6)	12.3 (1.7)	13.7 (-2.1)
Elongation at Break, % change	183 (-2.1)	194 (10.9)	169 (-0.6)	213 (4.9)
Hardness, durometer A, pts	77	78	77	75



Table 1. Performance of Viton™ A-601C in Typical Compounds (continued)

	Viton™ A-601C	Viton™ A-401C	Viton™ A-201C	Viton™ B-401C
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)				
100% Modulus, MPa, % change	7.7 (-2.5)	7.6 (8.6)	6.7 (3.1)	6.6 (-1.5)
Tensile Strength, MPa, % change	13.8 (-13.8)	13.3 (-3.6)	12.0 (-0.8)	13.2 (-5.7)
Elongation at Break, % change	171 (-8.6)	174 (-0.6)	179 (5.3)	198 (-2.5)
Hardness, durometer A, pts	77	78	79	77
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)				
100% Modulus, MPa, % change	6.9 (-12.7)	6.8 (-2.9)	5.8 (-10.8)	5.0 (-25.4)
Tensile Strength, MPa, % change	13.9 (-13.1)	12.8 (-7.2)	10.6 (-12.4)	11.7 (-16.4)
Elongation at Break, % change	174 (-7.0)	172 (-1.7)	173 (1.8)	208 (2.5)
Hardness, durometer A, pts	77	78	79	75
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 275 °C (527 °F)				
100% Modulus, MPa, % change	5.6 (-29.1)	5.0 (-28.6)	4.9 (-24.6)	3.2 (52.2)
Tensile Strength, MPa, % change	10.6 (-33.8)	10.7 (-22.5)	9.0 (-25.6)	8.6 (-38.6)
Elongation at Break, % change	184 (-1.6)	218 (24.6)	190 (11.8)	283 (39.4)
Hardness, durometer A, pts	77	76	77	72
Compression Set, Method B, O-Rings, %				
70 hr at 23 °C (73 °F)	6	7	9	11
22 hr at 175 °C (347 °F)	6	9	6	11
22 hr at 200 °C (392 °F)	11	14	14	14
70 hr at 200 °C (392 °F)	20	20	21	24
168 hr at 200 °C (392 °F)	29	30	36	37
70 hr at 232 °C (450 °F)	36	44	47	50

*1 MPa is equal to 145 psi

Table 2. Effect of Carbon Black Level in Viton™ A-601C

	60 phr	45 phr	30 phr	15 phr	5 phr	2 phr
Viton™ A-601C	100	100	100	100	100	100
High-Activity MgO	3	3	3	3	3	3
Calcium Hydroxide	6	6	6	6	6	3
MT Black (N990)	60	45	30	15	5	5
Stock Properties						
Viscosity, ML 1 + 10 at 121 °C (250 °F)						
Units	144	124	103	90	84	79
Mooney Scorch, MS at 121 °C (250 °F)						
Minimum, in-lb	79	67	56	48	45	41
2-pt rise, min	28.3	23.1	18.8	>30	>30	>30
5-pt rise, min	>30	>30	>30	—	—	—
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min						
M _i , in-lb	28	26	22	20	19	17
t ₅ 2, min	1.7	1.8	2.0	2.4	2.7	3.1
t _c 90, min	3.7	3.5	3.8	4.3	4.5	5.4
M _c 90, in-lb	151	139	124	107	93	91
M _i 90, in-lb	165	151	136	117	101	99

Table 2. Effect of Carbon Black Level in Viton™ A-601C (continued)

	60 phr	45 phr	30 phr	15 phr	5 phr	2 phr
Rosand Capillary Rheometer at 100 °C (212 °F), 1.5 mm Die, L/D = 0/1						
<i>Piston Speeds</i>	<i>Shear Rate</i>		<i>Pressure, MPa</i>			
12.7 mm/min	113 sec ⁻¹	9.7	9.3	8.4	7.7	7.6
50.8 mm/min	452 sec ⁻¹	13.9	13.8	12.6	11.9	11.3
127 mm/min	1130 sec ⁻¹	41.9	37.3	35.6	28.2	23.6
Vulcanizate Properties						
Slabs Cured: 10 min at 177 °C (350 °F)—Post-Cured: 24 hr at 232 °C (450 °F)						
Stress/Strain at 23 °C (73 °F)—Original, post-cured						
100% Modulus, MPa (psi)	11.7 (1,700)	9.8 (1,420)	6.4 (925)	3.6 (525)	2.1 (300)	1.8 (260)
Tensile Strength, MPa (psi)	16.6 (2,400)	16.0 (2,320)	15.3 (2,225)	12.8 (1,850)	10.9 (1,575)	9.6 (1,395)
Elongation at Break, %	159	175	219	236	265	254
Hardness, durometer A, pts	89	83	76	64	58	57
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)						
100% Modulus, MPa, % change	12.4 (6.0)	9.7 (-1.0)	6.9 (7.8)	3.7 (2.8)	2.1 (0.0)	1.8 (0.0)
Tensile Strength, MPa, % change	16.8 (1.2)	16.0 (0.0)	15.8 (3.3)	12.7 (-0.8)	10.8 (-0.9)	9.1 (-5.2)
Elongation at Break, % change	149 (-6.3)	174 (-0.6)	210 (-4.1)	233 (-1.3)	269 (1.5)	250 (-1.6)
Hardness, durometer A, pts	88	82	75	65	58	56
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)						
100% Modulus, MPa, % change	12.4 (6.0)	9.9 (1.0)	6.9 (7.8)	3.8 (5.6)	2.2 (4.8)	1.8 (0.0)
Tensile Strength, MPa, % change	16.6 (0.0)	16.6 (3.8)	15.3 (0.0)	13.2 (3.1)	9.9 (-9.2)	8.0 (-16.7)
Elongation at Break, % change	142 (-10.7)	175 (0.0)	201 (-8.2)	233 (-1.3)	240 (-9.4)	233 (-8.3)
Hardness, durometer A, pts	89	83	75	65	58	56
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (450 °F)						
100% Modulus, MPa, % change	13.2 (12.8)	9.9 (1.0)	6.0 (-6.3)	3.1 (-13.9)	1.8 (14.3)	1.4 (-22.2)
Tensile Strength, MPa, % change	16.7 (0.6)	15.8 (-1.3)	14.3 (-6.5)	11.4 (-10.9)	11.5 (5.5)	8.9 (-7.3)
Elongation at Break, % change	127 (-20.1)	152 (-13.1)	189 (-13.7)	218 (-7.6)	299 (12.8)	284 (11.8)
Hardness, durometer A, pts	89	83	74	64	56	53
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 275 °C (527 °F)						
100% Modulus, MPa, % change	8.9 (-23.9)	6.3 (-35.7)	4.3 (-32.8)	2.1 (-41.7)	1.3 (38.1)	1.0 (-44.4)
Tensile Strength, MPa, % change	12.3 (-25.9)	12.0 (-25.0)	11.5 (-24.8)	10.4 (-18.8)	8.6 (-21.1)	7.7 (-19.8)
Elongation at Break, % change	148 (-6.9)	196 (12.0)	238 (8.7)	304 (28.8)	333 (25.7)	349 (37.4)
Hardness, durometer A, pts	88	82	71	59	52	49
Compression Set, Method B, O-Rings, %						
70 hr at 23 °C (73 °F)	9	10	6	6	3	3
22 hr at 175 °C (347 °F)	11	9	6	6	4	4
22 hr at 200 °C (392 °F)	14	11	9	9	7	6
70 hr at 200 °C (392 °F)	20	19	11	11	11	11
168 hr at 200 °C (392 °F)	29	23	21	17	17	17
70 hr at 232 °C (450 °F)	39	33	31	26	23	29

*1 MPa is equal to 145 psi



Table 3. Effect of Mineral Fillers in Viton™ A-601C

	MT Black	Albaglos®	Nyad® 400	Celite® 350	Blanc Fixe	Ti-Pure™ R-960	
Viton™ A-601C	100	100	100	100	100	100	
High-Activity MgO	3	3	3	3	3	3	
Calcium Hydroxide	6	6	6	6	6	3	
MT Black (N990)	30	—	—	—	—	—	
Albaglos®	—	30	—	—	—	—	
Nyad® 400	—	—	30	—	—	—	
Celite® 350	—	—	—	30	—	—	
Blanc Fixe	—	—	—	—	30	—	
Ti-Pure™ R-960	—	—	—	—	—	30	
Stock Properties							
Viscosity, ML 1 + 10 at 121 °C (250 °F)							
Units	103	111	103	131	91	90	
Mooney Scorch, MS at 121 °C (250 °F)							
Minimum, in-lb	56	59	55	69	51	49	
2-pt rise, min	18.8	>30	>30	>30	>30	>30	
5-pt rise, min	>30	—	—	—	—	—	
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min							
M _L , in-lb	22	26	24	27	20	20	
t _{g2} , min	2.0	2.3	2.2	2.0	2.4	2.7	
t _{c90} , min	3.8	4.1	3.5	3.3	4.1	5.1	
M _{c90} , in-lb	124	116	112	126	104	98	
M _H , in-lb	136	126	122	137	113	106	
Rosand Capillary Rheometer at 100 °C (212 °F), 1.5 mm Die, L/D = 0/1							
<i>Piston Speeds</i>	<i>Shear Rate</i>		<i>Pressure, MPa</i>				
12.7 mm/min	113 sec ⁻¹	8.4	7.8	7.3	8.4	7.1	8.0
50.8 mm/min	452 sec ⁻¹	12.6	11.8	10.3	12.1	11.6	11.5
127 mm/min	1130 sec ⁻¹	35.6	29.3	19.5	24.2	23.9	26.2
Vulcanizate Properties							
Slabs Cured: 10 min at 177 °C (350 °F)—Post-Cured: 24 hr at 232 °C (450 °F)							
Stress/Strain at 23 °C (73 °F)—Original, post-cured							
100% Modulus, MPa (psi)	6.4 (925)	5.4 (790)	6.0 (870)	9.5 (1,375)	3.4 (495)	3.8 (555)	
Tensile Strength, MPa (psi)	15.3 (2,225)	14.9 (2,160)	11.0 (1,600)	14.8 (2,145)	11.4 (1,655)	13.3 (1,925)	
Elongation at Break, %	219	216	230	188	258	228	
Hardness, durometer A, pts	76	69	67	76	63	65	
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F)							
100% Modulus, MPa, % change	6.9 (7.8)	5.5 (1.9)	7.1 (18.3)	11.4 (20.0)	3.4 (0.0)	4.1 (7.9)	
Tensile Strength, MPa, % change	15.8 (3.3)	13.8 (-7.4)	11.4 (3.6)	15.3 (3.4)	9.3 (-18.4)	12.6 (-5.3)	
Elongation at Break, % change	210 (-4.1)	198 (-8.3)	198 (-13.9)	143 (-23.9)	203 (-21.3)	200 (-12.3)	
Hardness, durometer A, pts	75	69	68	76	64	67	



Table 3. Effect of Mineral Fillers in Viton™ A-601C (continued)

	MT Black	Albaglos®	Nyad® 400	Celite® 350	Blanc Fixe	Ti-Pure™ R-960
Stress/Strain at 23 °C (73 °F)—After aging 168 hr at 200 °C (392 °F)						
100% Modulus, MPa, % change	6.9 (7.8)	6.4 (18.5)	6.9 (15.0)	12.9 (35.8)	3.7 (8.8)	4.4 (15.8)
Tensile Strength, MPa, % change	15.3 (0.0)	14.0 (-6.0)	11.2 (1.8)	16.9 (14.2)	11.4 (0.0)	13.1 (-1.5)
Elongation at Break, % change	201 (-8.2)	173 (-19.9)	173 (-24.8)	136 (-27.7)	228 (-11.6)	190 (-16.7)
Hardness, durometer A, pts	75	69	68	77	64	67
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 250 °C (482 °F)						
100% Modulus, MPa, % change	6.0 (-6.3)	6.3 (16.7)	6.6 (10.0)	9.4 (-1.1)	2.9 (-14.7)	3.3 (-13.2)
Tensile Strength, MPa, % change	14.3 (-6.5)	13.8 (-7.4)	10.8 (-1.8)	14.1 (-4.7)	10.1 (-11.4)	14.2 (6.8)
Elongation at Break, % change	189 (-13.7)	175 (-19.0)	196 (-14.8)	160 (-14.9)	237 (-8.1)	258 (13.2)
Hardness, durometer A, pts	74	71	66	76	62	67
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 275 °C (527 °F)						
100% Modulus, MPa, % change	4.3 (-32.8)	7.7 (42.6)	5.4 (-10.0)	6.2 (-34.7)	2.2 (-35.3)	4.1 (7.9)
Tensile Strength, MPa, % change	11.5 (-24.8)	12.9 (-13.4)	9.0 (-18.2)	8.9 (-39.9)	9.0 (-21.1)	10.5 (-21.1)
Elongation at Break, % change	238 (8.7)	158 (-26.9)	207 (-10.0)	183 (-2.7)	305 (18.2)	215 (-5.7)
Hardness, durometer A, pts	71	74	65	76	59	71
Compression Set, Method B, O-Rings, %						
70 hr at 23 °C (73 °F)	6	6	3	6	4	7
22 hr at 175 °C (347 °F)	6	6	4	4	6	4
22 hr at 200 °C (392 °F)	9	9	6	9	7	9
70 hr at 200 °C (392 °F)	11	17	9	15	11	14
168 hr at 200 °C (392 °F)	21	23	20	25	20	23
70 hr at 232 °C (450 °F)	31	37	29	35	31	27

*1 MPa is equal to 145 psi



Table 4. Performance of Viton™ A-601C in Fluoroelastomer Specifications

Viton™ A-601C			
Viton™ A-601C	100		
High-Activity MgO	3		
Calcium Hydroxide	6		
MT Black (N990)	30		
Vulcanizate Properties		Mil-R-83248B (Type I, Class I)	AMS 7276E
Slabs Cured: 10 min at 177 °C (350 °F)—Post-Cured: 24 hr at 232 °C (450 °F)			
Stress/Strain at 23 °C (73 °F)—Original, post-cure			
Tensile Strength, MPa (psi)	11.0 (1,600)	9.65 (1,400)	9.65 (1,400)
Elongation at Break, %	175	125	125
Hardness, durometer A, points	77	75±5	75±5
TR ₁₀ (max. °C [°F])	-17 (+1)	-15 (+5)	-15 (+5)
Specific Gravity	1.84	—	—
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 270 °C (518 °F)			
Tensile Strength, % change (max.)	-25	-35	-35
Elongation at Break, % change (max.)	+10	-15	-15
Hardness, pts change	+1	-5 to +10	-5 to +10
Weight Loss, %	4	10	10
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 23 °C (73 °F) in TT-S-735 Type III (ASTM Reference Fuel B)			
Tensile Strength, % change (max.)	-10	-20	-20
Elongation at Break, % change (max.)	-9	-20	-20
Hardness, pts change	-1	±5	±5
Volume Swell, %	+1	+0 to +5	+0 to +5
Stress/Strain at 23 °C (73 °F)—After aging 70 hr at 200 °C (392 °F) in ARM-200 (AMS 3023)			
Tensile Strength, % change (max.)	-21	-35	-35
Elongation at Break, % change (max.)	-11	-20	-20
Hardness, pts change	-11	0 to -15	0 to -15
Volume Swell, %	+16	+1 to +25	+1 to +25
Compression Set, %, Method B	4	10	10
Compression Set, Method B, %, O-Rings, 25 x 3.5 mm (0.984 x 0.139 in)			
22 hr at 200 °C (392 °F)	8	15	15
70 hr at 200 °C (392 °F)	14	—	—
336 hr at 200 °C (392 °F)	28	40	40



Test Procedures

Property Measured	Test Procedure
Compression Set	ASTM D3955, Method B (25% deflection)
Compression Set, O-Rings	ASTM D1414-90 ASTM D1229-79 (low temperature)
Hardness	ASTM D2240, durometer A
Mooney Scorch	ASTM D1646, 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 D2084-91
Property Change After Oven Heat-Aging	ASTM D573-88
Stress/Strain Properties 100% Modulus Tensile Strength Elongation at Break	ASTM D412, pulled at 8.5 mm/sec (20 in/min)
Volume Change in Fluids	ASTM D471-79
Temperature Retraction	ASTM D1329-88
Low Temperature Brittleness	ASTM D2137-75

Note: Test temperature is 24 °C (75 °F), except where specified otherwise.

