

Technical Information

Introduction

Viton™ A-201C* fluoroelastomer is an incorporated cure "A-family" dipolymer designed for injection molding of sealing devices that must meet major fluoroelastomer specifications. In addition to the chemical and heat resistance characteristics typical of fluoroelastomers, Viton™ A-201C offers significant improvements in processing and rheology. Viton™ A-201C can be blended with similar Viton™ types to provide variations in processing, properties, and shrinkage.

Features

Compared with older A-family Viton™ polymers, Viton™ A-201C provides:

- Fully precompounded
 - O-ring curative level
- Improved injection molding
 - Improved mold flow
 - Easier mold release
 - Less mold fouling
- Low viscosity
 - Ultrafast cure rate
- Excellent scorch safety
- Excellent compression set resistance

Product Description

Chemical Composition	Dipolymer of hexafluoropropylene and vinylidene fluoride plus cure chemicals
Physical Form	Sheet
Appearance	Off-white
Odor	None
Mooney Viscosity, ML 1 + 10 at 121 °C (250 °F)	20
Specific Gravity	1.82
Storage Stability	Excellent
Solubility	Low molecular weight esters and ketones

Applications

- Transfer and injection molding
 - O-rings, gaskets, seals, and other complex shapes
- Extrusions
 - Hose and solid fluoroelastomer tubing
 - O-ring cord
- Can be used to modify viscosity of other types of Viton™
- Can be formulated to meet fluoroelastomer specifications Mil-R-83248B and AMS 7276D

Safety and Handling

Viton™ A-201C should be handled like other types of Viton™. Keep off skin and wash well after handling. For the safe handling of other compounding ingredients, refer to the respective manufacturers' literature.

*Viton™ A-201C was formerly named VTR-6402.

Table 1. Performance of Viton™ A-201C in Typical Compounds

	Viton™ A-201C	Viton™ E-430	Viton™ A-401C
Viton™ A-201C	100	—	—
Viton™ E-430	—	100	—
Viton™ A-401C	—	—	100
High-Activity MgO	3	3	3
Calcium Hydroxide	6	6	6
MT Black (N-990)	30	30	30
Viton™ Curative No. 20	—	—	—
Viton™ Curative No. 30	—	—	—
Stock Properties			
Viscosity, ML 1 + 10 at 121 °C (250 °F), Units	42	63	80
Mooney Scorch, MS at 121 °C (250°F)			
Minimum, in·lb	23	35	43
2-Unit Rise, min	>30	>30	17.9
5-Unit Rise, min	—	—	>30
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min			
M _L , in·lb	9	14	15
t _{c2} , min	1.9	2.0	1.7
t _{c90} , min	3.3	6.3	3.2
M _{c90} , in·lb	103	65	112
M _H , in·lb	113	71	122
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 s ⁻¹	5.2
50.8 mm/min		452 s ⁻¹	8.1
127 mm/min		1,130 s ⁻¹	11.0
			6.4
			9.6
			14.2
			7.6
			10.7
			18.7
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, No Post-Cure			
100% Modulus, MPa (psi)	4.0 (575)	2.9 (415)	4.6 (665)
Tensile Strength, MPa (psi)	8.8 (1,275)	8.9 (1,295)	9.9 (1,440)
Elongation at Break, %	261	415	257
Hardness, Durometer A, pts	77	72	74
Stress/Strain at 23 °C (73 °F)—Original, Post-Cured			
100% Modulus, MPa (psi)	5.9 (855)	4.0 (575)	6.4 (925)
Tensile Strength, MPa (psi)	13.0 (1,890)	14.8 (2,150)	13.4 (1,950)
Elongation at Break, %	211	269	199
Hardness, Durometer A, pts	79	71	75
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 200 °C (392 °F)			
100% Modulus, MPa (psi)	5.9 (850)	4.1 (595)	6.9 (995)
Tensile Strength, MPa (psi)	11.9 (1,725)	14.4 (2,095)	14.0 (2,035)
Elongation at Break, %	195	260	198
Hardness, Durometer A, pts	83	72	78
Stress/Strain at 23 °C (73 °F)—After Aging 168 hr at 200 °C (392 °F)			
100% Modulus, MPa (psi)	6.2 (900)	4.4 (645)	7.0 (1,015)
Tensile Strength, MPa (psi)	13.0 (1,880)	15.5 (2,245)	13.9 (2,020)
Elongation at Break, %	200	273	187
Hardness, Durometer A, pts	80	73	76
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 232 °C (450 °F)			
100% Modulus, MPa (psi)	6.2 (905)	4.5 (655)	7.2 (1,050)
Tensile Strength, MPa (psi)	12.4 (1,795)	14.1 (2,040)	14.0 (2,035)
Elongation at Break, %	184	235	177
Hardness, Durometer A, pts	82	74	80
Compression Set, Method B, O-Rings, %			
70 hr at 23 °C (73 °F)	6	11	6
70 hr at 200 °C (392 °F)	16	26	15
168 hr at 200 °C (392 °F)	26	31	21
336 hr at 200 °C (392 °F)	47	—	29
70 hr at 232 °C (450 °F)	38	51	37

Table 2. Effect of Carbon Black Level in Viton™ A-401C

	60 phr	45 phr	30 phr	15 phr	5 phr	2 phr
Viton™ A-201C	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 (N-990)	60	45	30	15	5	2
Stock Properties						
Viscosity, ML 1 + 10 at 121 °C (250 °F), Units	82	65	42	41	35	31
Mooney Scorch, MS at 121 °C (250 °F)						
Minimum, in-lb	44	35	23	21	17	15
2-Unit Rise, min	>30	>30	>30	>30	>30	>30
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min						
M _L , in-lb	13	12	9	7	8	6
t _{g2} , min	1.6	1.7	1.9	1.6	2.1	2.9
t _{c90} , min	4.2	3.2	3.3	3.2	3.4	4.6
M _{c90} , in-lb	127	114	103	85	77	72
M _{th} , in-lb	140	126	113	93	84	80
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, No Post-Cure						
100% Modulus, MPa (psi)	6.5 (940)	5.3 (775)	4.0 (575)	2.5 (360)	1.6 (230)	1.2 (180)
Tensile Strength, MPa (psi)	8.5 (1,230)	8.7 (1,260)	8.8 (1,275)	8.3 (1,210)	7.2 (1,045)	5.7 (830)
Elongation at Break, %	189	227	261	287	300	282
Hardness, Durometer A, pts	90	82	77	63	54	49
Stress/Strain at 23 °C (73 °F)—Original, Post-Cured						
100% Modulus, MPa (psi)	11.3 (1,640)	9.0 (1,310)	5.9 (855)	3.2 (470)	1.8 (265)	1.3 (195)
Tensile Strength, MPa (psi)	14.2 (2,065)	13.0 (1,880)	13.0 (1,890)	10.8 (1,565)	10.2 (1,480)	7.9 (1,140)
Elongation at Break, %	136	154	211	224	282	272
Hardness, Durometer A, pts	92	86	79	62	56	52
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	11.1 (1,610)	8.7 (1,260)	5.9 (850)	3.3 (475)	1.9 (270)	1.3 (185)
Tensile Strength, MPa (psi)	12.7 (1,835)	13.0 (1,880)	11.9 (1,725)	12.2 (1,770)	9.9 (1,435)	6.5 (945)
Elongation at Break, %	121	159	195	254	274	255
Hardness, Durometer A, pts	93	87	83	66	57	53
Stress/Strain at 23 °C (73 °F)—After Aging 168 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	12.2 (1,765)	9.7 (1,405)	6.2 (900)	3.3 (480)	2.3 (340)	1.3 (195)
Tensile Strength, MPa (psi)	14.4 (2,090)	13.9 (2,010)	13.0 (1,880)	11.9 (1,725)	9.4 (1,370)	6.8 (985)
Elongation at Break, %	126	151	200	230	230	248
Hardness, Durometer A, pts	93	88	80	66	65	54
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 232 °C (450 °F)						
100% Modulus, MPa (psi)	12.7 (1,845)	9.7 (1,410)	6.2 (905)	3.3 (485)	1.9 (270)	1.3 (195)
Tensile Strength, MPa (psi)	13.6 (1,975)	13.3 (1,930)	12.4 (1,795)	9.2 (1,330)	10.1 (1,460)	6.6 (955)
Elongation at Break, %	109	142	184	193	273	251
Hardness, Durometer A, pts	93	88	82	66	57	54
Compression Set, Method B, O-Rings, %						
70 hr at 23 °C (73 °F)	16	12	6	7	4	6
70 hr at 200 °C (392 °F)	27	22	16	16	13	13
168 hr at 200 °C (392 °F)	37	32	26	25	24	24
336 hr at 200 °C (392 °F)	49	43	47	39	32	31
70 hr at 232 °C (450 °F)	54	49	38	41	40	32

Table 3. Effect of Mineral Fillers on Viton™ A-201C

	MT Black	Albaglos®	Nyad® 400	Celite® 350	Blanc Fixe	Ti-Pure™ R-960
Viton™ A-201C	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 (N-990)	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	42	49	45	65	41	43
Mooney Scorch, MS at 121 °C (250 °F)						
Minimum, in-lb	23	24	22	39	21	21
5-Pt Rise, min	>30	>30	>30	>30	>30	>30
ODR at 177 °C (350 °F), Microdie, 3° Arc, 15 min						
M _L , in-lb	9	11	10	12	7	10
t _{s2} , min	1.9	1.7	1.7	1.6	1.6	1.8
t _{c90} , min	3.3	3.3	2.7	2.6	3.1	3.6
M _{c90} , in-lb	103	95	95	105	85	80
M _H , in-lb	113	105	104	115	94	88
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, No Post-Cure						
100% Modulus, MPa (psi)	4.0 (575)	3.4 (500)	3.4 (495)	5.3 (765)	2.3 (340)	2.6 (380)
Tensile Strength, MPa (psi)	8.8 (1,275)	8.2 (1,185)	6.9 (1,005)	8.9 (1,290)	7.2 (1,040)	8.1 (1,180)
Elongation at Break, %	261	243	273	251	291	286
Hardness, Durometer A, pts	77	66	65	77	60	61
Stress/Strain at 23 °C (73 °F)—Original, Post-Cured						
100% Modulus, MPa (psi)	5.9 (855)	5.0 (720)	7.4 (1,080)	12.5 (1,815)	3.2 (465)	3.6 (525)
Tensile Strength, MPa (psi)	13.0 (1,890)	12.2 (1,770)	10.8 (1,570)	15.5 (2,245)	11.0 (1,595)	11.4 (1,660)
Elongation at Break, %	211	188	167	130	253	208
Hardness, Durometer A, pts	79	68	67	80	62	64
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	5.9 (850)	5.4 (785)	6.9 (995)	13.1 (1,895)	3.2 (470)	3.8 (550)
Tensile Strength, MPa (psi)	11.9 (1,725)	10.9 (1,575)	10.7 (1,555)	15.0 (2,175)	10.4 (1,505)	11.9 (1,725)
Elongation at Break, %	195	168	188	120	261	212
Hardness, Durometer A, pts	83	69	68	81	62	66
Stress/Strain at 23 °C (73 °F)—After Aging 168 hr at 200 °C (392 °F)						
100% Modulus, MPa (psi)	6.2 (900)	5.8 (840)	7.4 (1,070)	12.6 (1,825)	3.2 (460)	3.7 (540)
Tensile Strength, MPa (psi)	13.0 (1,880)	10.5 (1,520)	11.2 (1,625)	15.2 (2,200)	10.3 (1,490)	11.3 (1,645)
Elongation at Break, %	200	144	165	123	227	193
Hardness, Durometer A, pts	80	69	69	82	63	66
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 232 °C (450 °F)						
100% Modulus, MPa (psi)	6.2 (905)	5.8 (835)	7.2 (1,045)	11.9 (1,720)	3.0 (435)	3.8 (545)
Tensile Strength, MPa (psi)	12.4 (1,795)	12.7 (1,840)	10.9 (1,585)	15.3 (2,220)	10.2 (1,480)	12.0 (1,735)
Elongation at Break, %	184	186	175	134	266	210
Hardness, Durometer A, pts	82	70	68	80	63	67
Compression Set, Method B, O-Rings, %						
70 hr at 23 °C (73 °F)	6	3	3	6	4	7
70 hr at 200 °C (392 °F)	16	21	18	21	16	15
168 hr at 200 °C (392 °F)	26	34	28	31	26	26
336 hr at 200 °C (392 °F)	47	47	40	47	38	38
70 hr at 232 °C (450 °F)	38	50	44	50	41	38

Table 4. Performance of Viton™ A-201C in Fluoroelastomer Specifications

Viton™ A-201C			
Viton™ A-201C	100		
High-Activity MgO	3		
Calcium Hydroxide	6		
MT Black (N-990)	30		
Vulcanizate Properties		Mil-R-83248B (Amendment I)	AMS 7276D
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			
Tensile Strength, MPa (psi)	12.6 (1,820)	9.65 (1,400)	9.65 (1,400)
Elongation at Break, %	205	125	125
Hardness, Durometer A, pts	77	75 ± 5	75 ± 5
TR10 (max., °C [°F])	-15 (5)	-15 (5)	-15 (5)
Specific Gravity	1.84	—	—
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 275 °C (527 °F)			
Tensile Strength, % change (max.)	-26	-35	-35
Elongation at Break, % change (max.)	12	-15	-15
Hardness, pts change	2	-5 to 10	0 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.)	-8	-20	-35
Elongation at Break, % change (max.)	-6	-20	-15
Hardness, pts change	-2	-5 to 5	-5 to 5
Volume Swell, %	1	1 to 10	0 to 5
Stress/Strain at 23 °C (73 °F)—After Aging 70 hr at 175 °C (347 °F) in AMS 3021 (Stauffer 7700 Blend)			
Tensile Strength, % change (max.)	-14	-30	-30
Elongation at Break, % change (max.)	0	-20	-20
Hardness, pts change	-9	0 to -15	-15 to 5
Volume Swell, %	15	1 to 20	0 to 20
Compression Set, Method B, %, O-Rings, 25 x 3.5 mm (0.984 x 0.139 in)			
70 hr at 23 °C (73 °F)	6	15	—
166 hr at 175 °C (347 °F)	19	20	—
22 hr at 200 °C (392 °F)	12	20	—
70 hr at 200 °C (392 °F)	20	—	20
336 hr at 200 °C (392 °F)	35	—	40

Test Procedures

Property Measured	Test Procedure
Compression Set	ASTM D3955, Method B (25% deflection)
Compression Set, O-Rings	ASTM D1414
Hardness	ASTM D2240, durometer A
Mooney Scorch	ASTM D1646, using the small rotor. Minimum viscosity and time to a 1-, 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 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

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

For more information, visit Viton.com

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