



# Viton™ AL-276C and AL-576C

## Fluoroelastomers

## Technical Information

### Introduction

Viton™ AL-276C\* and Viton™ AL-576C\* fluoroelastomers are two precompounds intended for use in applications that require low temperature flexibility similar to Viton™ B-70. Viton™ AL-276C and AL-576C have a nominal Mooney viscosity (ML 1+10 at 121 °C [250 °F]) of 20 and 50, respectively. Both precompounds are based on 66% fluorine copolymer gums and designed to give the best balance of low temperature flexibility, automotive fuel resistance, and heat resistance.

These precompounds are based on improved rheology polymers (IRP) and contain a proprietary process aid package that has been developed to impart improved processing characteristics over products like Viton™ B-70.

Typical applications for these materials are automotive fuel injector O-rings and other molded parts that require low temperature flexibility similar to Viton™ B-70. By blending Viton™ AL-276C with Viton™ AL-576C, compounds may be tailored to give the viscosity most appropriate for the production equipment (i.e., compression, transfer, or injection molding) and tooling geometry.

These precompounds have been designed to provide more efficient, cost-effective processing with reduced scrap and longer periods between mold cleaning.

### Safety and Handling

Before handling or processing Viton™ AL-276C and AL-576C, read and follow the recommendations as described in the Chemours technical bulletin, "Handling Precautions for Viton™ and Related Chemicals."

Viton™ AL-276C and AL-576C should be handled similar to other types of cure-incorporated Viton™.

For safe handling of other compounding ingredients, please refer to the respective manufacturers' instructions.

### Product Description

Chemical Composition	Terpolymer of hexafluoropropylene, vinylidene fluoride, and tetrafluoroethylene plus cure chemicals
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)	AL-276C: Nominal 20ML AL-576C: 50

### Compound Testing

The properties of Viton™ AL-276C and AL-576C have been measured in typical fuel injector seal formulations and are compared to those of Viton™ B-70 in Table 1.

\*Viton™ AL-276C and Viton™ AL-576C were formerly named VTR-9081 and VTR-9082, respectively.



**Table 1. General Properties of Viton™ AL-276C and Viton™ AL-576C Compared with Viton™ B-70**

Base Polymer 1	Viton™ AL-276C	Viton™ AL-576C	Viton™ B-70	Viton™ B-70	Viton™ AL-276C	Viton™ AL-276C	Viton™ AL-276C	Viton™ AL-276C
Base Polymer 2					Viton™ AL-576C	Viton™ AL-576C	Viton™ AL-576C	Viton™ AL-576C
Color	Black	Black	Black	Green	Black	Green	Black	Green
Viton™ AL-276C	100	—	—	—	10	10	80	80
Viton™ AL-576C	—	100	—	—	90	90	20	20
Viton™ B-70	—	—	97.5	97.5	—	—	—	—
N990 Carbon Black	30	30	30	—	30	—	30	—
Blanc Fixe Micro	—	—	—	70	—	70	—	70
Ti-Pure™ R-960	—	—	—	1	—	1	—	1
Chrome Green	—	—	—	5	—	5	—	5
Calcium Hydroxide	6	6	6	6	6	6	6	6
Elastomag® 170	3	3	3	3	3	3	3	3
VPA No. 2	0.5	0.5	1	1	0.5	0.5	0.5	0.5
Viton™ Curative No. 50	—	—	2.5	2.5	—	—	—	—
<b>Mooney Viscosity (ML 1+4 at 100 °C [212 °F])</b>								
Initial (MU)	129	181	181	200	177	190	140	157
ML 1+4 (MU)	80	123	106	107	120	128	89	92
<b>Mooney Scorch at 121 °C (250 °F)</b>								
Minimum (MU)	25	49	37	40	46	48	30	30
t <sub>5</sub> , min	>45	>45	>45	>45	>45	>45	>45	>45
Final (45 min) (MU)	25	49	38	44	46	48	30	30
<b>Monsanto ODR results (180 °C [356 °F], 1° arc, 12 min)</b>								
M <sub>t</sub> , dN-m	2.9	8.2	5.6	6.1	7.6	8.0	3.8	3.8
M <sub>H</sub> , dN-m	46.8	59.9	68.1	64.5	57.3	58.6	49.6	49.1
Δ M, dN-m	43.9	51.8	62.5	58.4	49.7	50.6	45.8	45.4
T <sub>S2</sub> , min	2.4	2.0	2.4	2.2	2.3	1.8	2.5	1.9
T <sub>50</sub> , min	3.3	3.3	3.4	3.0	3.6	2.8	2.8	2.8
T <sub>90</sub> , min	3.8	3.9	3.6	5.0	4.2	4.6	3.5	4.3
<b>Monsanto MDR results (180 °C [356 °F], 0.5° arc, 12 min)</b>								
M <sub>t</sub> , dN-m	0.63	1.93	1.28	1.49	1.78	2.09	0.84	0.85
M <sub>H</sub> , dN-m	18.1	24.4	28.1	26.8	23.5	23.9	19.3	18.5
Δ M, dN-m	17.5	22.5	26.8	25.3	21.7	21.8	18.4	17.7
T <sub>S2</sub> , min	1.6	1.4	1.7	1.3	1.5	1.1	1.6	1.2
T <sub>50</sub> , min	2.1	2.0	2.2	1.67	2.1	1.7	2.1	1.7
T <sub>90</sub> , min	2.9	3.1	2.9	2.9	2.9	3.0	2.8	2.7
<b>Physical Properties (ISO 37, Mill Direction, Not Post-Cured)</b>								
Tensile Strength, MPa	8.8	9.4	9.3	9.3	9.7	8.6	8.7	8.5
Elongation at Break, %	333	300	276	289	308	329	316	362
10% Modulus, MPa	0.8	0.7	0.9	0.9	0.8	0.7	0.8	0.8
25% Modulus, MPa	1.3	1.3	1.6	1.6	1.3	1.3	1.4	1.3
50% Modulus, MPa	1.9	2.0	2.5	2.4	2.0	2.0	2.0	1.8

continued

**Table 1. General Properties of Viton™ AL-276C and Viton™ AL-576C Compared with Viton™ B-70 (continued)**

Base Polymer 1	Viton™ AL-276C	Viton™ AL-576C	Viton™ B-70	Viton™ B-70	Viton™ AL-276C	Viton™ AL-276C	Viton™ AL-276C	Viton™ AL-276C
Base Polymer 2					Viton™ AL-576C	Viton™ AL-576C	Viton™ AL-576C	Viton™ AL-576C
100% Modulus, MPa	3.4	3.9	4.2	4.0	3.8	3.2	3.5	2.9
200% Modulus, MPa	6.7	7.7	7.4	6.7	7.7	5.4	6.8	4.9
300% Modulus, MPa	8.5	—	—	—	9.6	7.9	8.6	7.0
Hardness Shore A	70	70	76	73	69	69	70	66
<b>Physical Properties (ISO 37, Mill Direction, Post-Cured 24 hr at 232 °C [450 °F])</b>								
Tensile Strength, MPa	14.8	15.7	15.3	13.2	16.9	13.8	16.2	11.2
Elongation at Break, %	248	227	178	198	241	268	257	263
10% Modulus, MPa	1.0	0.9	1.2	1.1	0.9	1.0	1.0	1.0
25% Modulus, MPa	1.6	1.6	2.0	2.0	1.6	1.7	1.7	1.6
50% Modulus, MPa	2.4	2.6	3.4	3.6	2.6	2.8	2.6	2.5
100% Modulus, MPa	4.8	5.7	7.5	7.3	5.9	5.5	5.2	4.6
200% Modulus, MPa	11.5	13.5	0.0	0.0	13.7	10.7	12.0	9.2
Hardness Shore A	72	73	77	75	73	72	74	71
Tear Strength (kN/m) ISO 34 Die B	23.7	25.1	21.6	22	24.2	23.5	23.3	22.7
Compression Set 70 hr at 200 °C (392 °F) Small Pips (%)	25	22	24	28	22	25	24	26
Temperature Retraction (TR-10 °C [50 °F])	-18	-18	-18					
<b>Physical Properties and Changes After Aging 168 hr at 250 °C (482 °F)</b>								
Tensile Strength, MPa	13.6	16.7	15.7	12.9	16.0	15.5	15.0	13.5
△ Tensile Strength, %	-8	6	3	-2	-5	12	-7	21
Elongation at Break, %	215	210	182	132	203	199	222	208
△ Elongation at Break, %	-13	-7	2	-33	-16	-26	-14	-21
100% Modulus, MPa	5.3	6.2	7.5	10.1	6.2	8.0	5.6	6.4
△ M100, %	10	9	0	38	5	46	8	39
Shore A	76	74	77	79	74	74	75	76
Delta Hardness, pts	5	1	0	4	1	2	1	5
<b>Physical Properties and Changes After Aging 168 hr at 23 °C (73 °F) in 85% Fuel C/15% MeOH</b>								
Tensile Strength, MPa	7.2	7.4	7.0	5.4	8.0	5.7	7.4	4.8
△ Tensile Strength, %	-51	-53	-54	-59	-53	-59	-54	-57
Elongation at Break, %	181	165	123	153	176	214	177	217
△ Elongation at Break, %	-27	-27	-31	-23	-27	-20	-31	-18
100% Modulus, MPa	3.8	4.4	5.5	3.8	4.2	3.0	3.8	2.5
△ M100, %	-21	-23	-27	-48	-29	-46	-27	-46
Shore A	57.1	60.3	64.7	60.3	59.5	56.1	57.1	52.7
Delta Hardness, pts	-14	-13	-12	-15	-13	-16	-17	-18
Volume Change, %	34	33	34	34	34	34	35	35

## Formulation and Mixing

- In many cases, a blend of Viton™ AL-276C and AL-576C should be used in order to ensure the optimum compound viscosity for a particular molding process.
- The precompounds already contain a process aid package. If these precompounds are being used to replace another polymer (e.g., Viton™ B-70), then any process aids in the existing formulation should be removed. It may be desirable to include 0.5 phr wax (either Viton™ Process Aid No. 2 or Carnuba Wax) in the final formulation to further assist in mold release.
- These precompounds have not been designed for applications involving bonded metal inserts.
- The base polymers for Viton™ AL-276C and AL-576C have inherently better compression set resistance than Viton™ B-70. Due to this, the pre-compounds (Viton™ AL-276C and AL-576C) contain lower level of curative than would be commonly used with Viton™ B-70. To achieve equivalent hardness when replacing Viton™ B-70 with the new pre-compounds, it will usually be necessary to use a higher filler level.

## Injection Molding

A suggested blend ratio of Viton™ AL-276C and AL-576C for injection molding would be 80% Viton™ AL-276C and 20% Viton™ AL-576C. This should give a precompound viscosity in the region of 25 ML 1+10 at 121 °C (250 °F).

## Compression Molding

For compression molding, the blend ratio of Viton™ AL-276C and AL-576C will tend towards higher viscosity, and, in general, the final blend will contain between 80 and 100% of the higher viscosity Viton™ AL-576C.

**For more information, visit [Viton.com](http://Viton.com)**

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