



Ensolute®

IV1

PVC/NBR/CR, CLOSED CELL FOAM, IN ROLL FORM



Armacell LLC (Conover, NC Plant) manufactures a black, continuous, (rolls / sheets) closed cell, 3.0 - 5.5 lb/ft³ (48 - 88 kg/m³) density, PVC/ NBR / CR rubber product IV1, that meets all the physical property requirements of ASTM D 1056-14 2A1 / 2C1.

- Has good resistance to oil & fuel.
- Manufactured with nonstaining oils and anti-oxidants.
- Meets the horizontal burn / flame requirements of FMVSS-302 at most thicknesses.
- Listed to UL94 HF-1 at 1.3 mm (0.051") and UL94 V-0 at 11.7 mm (0.460") and higher (UL File # QMFZ2.E55798).
- Listed with UL to UL50E [periodic & continuous compression] (UL File # JMST2.MH10189).
- Listed on the approved source list for Chrysler MSAY 516 Type 1.

- UL 94 V-0, and HF-1 listed for flame
- UL 50E (periodic and continuous compression) listed for gaskets and seals
- ASTM D 1056-14 2A1 / 2C1 grade product
- ASTM D 6576-13 Type II, Grades A & B, Condition Soft material
- PVC / NBR / CR closed cell rubber material manufactured in continuous rolls



armacell®

Engineered For Success.

Roll Size Information:

Gauge (in)	Gauge (fraction of an inch)	Gauge (mm)	Tolerance (in)	Tolerance (mm)	Roll Size		Roll Size		Comments
					W (in)	L (ft)	W (m)	L (m)	
0.375	3/8	9.53	0.328 - 0.422	8.33 - 10.72	33	180	0.84	54.86	S1S
0.375	3/8	9.53	0.328 - 0.422	8.33 - 10.72	45	180	1.15	54.86	S1S
0.75	3/4	19.05	0.670 - 0.830	17.02 - 21.09	72	90	1.83	27.43	S2S
0.75	3/4	19.05	0.670 - 0.830	17.02 - 21.09	60	200	1.52	60.96	S2S
1.00	1	25.40	1.000 - 1.200	25.40 - 30.48	75	75	1.91	22.86	S2S
1.25	1-1/4	31.75	1.250 - 1.450	31.75 - 36.83	54	50	1.37	15.24	S2S, NS
1.25	1-1/4	31.75	1.250 - 1.450	31.75 - 36.83	54	50	1.37	15.24	S2S, L
1.25	1-1/4	31.75	1.250 - 1.450	31.75 - 36.83	60	50	1.52	15.24	S2S
1.50	1-1/2	38.10	1.500 - 1.700	38.10 - 43.18	54	50	1.37	15.24	S2S
1.50	1-1/2	38.10	1.500 - 1.700	38.10 - 43.18	54	100	1.37	30.48	S2S

Automotive and Industrial Specifications:

Source	Specification	Armacell (Ensolite®) IV1	Comments
ASTM	ASTM D1056-14	2A1 / 2C1	Additional (optional) suffixes can be added
ASTM	ASTM G21	Rating 0	Fungus resistance test method. Note: IV1 does not incorporate an added biocide.
ASTM	ASTM D 1149	Rating 0	Ozone resistance test method
ASTM	ASTM D 6576-13	Type II, Grades A & B, Condition Soft	Formerly MIL-R-6130-C
Caterpillar	1E0720	1E0720D Grade 1	Request information regarding exceptions
Chrysler	Chrysler MSZ-75 J18	2A1 / 2C1	Additional (optional) suffixes can be added
Chrysler	Chrysler MS JP9-4	Meets at most thicknesses	Flame resistance (horizontal burn rate)
Chrysler	Chrysler MSAY 516	Type 1	Approved source list
Federal	FMVSS-302	Meets at most thicknesses	Flame resistance (horizontal burn rate). See note 1
Federal	FAR 25.853		12 Second Vertical Burn Test. (Test report available upon request)
Ford	Ford WSK M2D 419-A	Type 2	See note 2
GM	GM 6086-M	Type II	CD tested at 50% deflection. See note 3
GM	GMN11106	Type II	CD tested at 50% deflection. See note 3
GM	GM 6090-M	(B4A) Meets at most thicknesses	Flame resistance tested per GM 9070-P (horizontal burn rate)
GM	GMW15473	Class I Type IV	CD tested at 50% deflection. See note 3
Gulfstream	GAP105K Rev C	Part Numbers GAP105K14-18	Approved source list
ISO	ISO 6916	2A1 / 2C1	Exception to compression set
Military	ASTM D 6576-13	Type II, Grades A & B, Condition Soft	Formerly MIL-R-6130-C
SAE	SAE J18 APR2002	2A1 / 2C1	Additional (optional) suffixes can be added
SAE	SAE J369	Meets at most thicknesses	Flame resistance (horizontal burn rate)
SAE	SAE J 1351	Rating 2	Odor test method
Toyota	TSM 1501G	2A1 / 2C1	Exception to compression set
Toyota	TSM 0500G	Meets at most thicknesses	Flame resistance (horizontal burn rate)
UL	UL94 V-0	V-0 UL Listed at 11.7 mm and higher	Vertical Flame resistance specification. (UL file# QMFZ2.E55798)
UL	UL94 HF-1	HF-1 UL Listed at 1.3 mm	Horizontal Flame resistance specification. (UL file# QMFZ2.E55798)
UL	UL50	Suitable as gasket material for UL 50 and UL 50E (continuous and periodic compression) enclosures	Request additional information about UL enclosure types. (UL file# JMST2.MH10189)

Note 1: A number of horizontal burn tests can also be listed (GM 6090, BMW, Volvo etc.). Request additional information.

Note 2: For all Ford WSK M2D419A callouts, request full information for each product due to some possible exceptions (example: non-standard staining requirements)

Note 3: For all GM 6086-M, GMN 11106 & GMW 15473 callouts, Armacell (Monarch®) certifies to the "basic" requirements only. Request additional information for each product. Providing application (interior, exterior or under-hood) and part thickness is helpful.

Data Sheet:			
Physical Properties	Unit	Test Method	Typical Result
Density	kg/m ³	ASTM D 1056	48 - 88
	lb/ft ³	ASTM D 1056	3.0 - 5.5
Hardness, Durometer Shore 00		ASTM D 2240	40 ± 10
Compression Deflection (25%)	kPa	ASTM D 1056	13.8 - 34.5
	psi	ASTM D 1056	2.0 - 5.0
50% Compression Set (Room temp)	%	ASTM D 1056	≤ 40%
Tensile Strength	kPa	ASTM D 412 (Die A)	345 minimum
	psi	ASTM D 412 (Die A)	50 minimum
Tear Strength	kN/m	ASTM D 624 (Die C)	1.6
	lb/in	ASTM D 624 (Die C)	9
Elongation	%	ASTM D 412 (Die A)	100 minimum
Service Temperature (1)			
Low	°F (°C)	ASTM D 1056	-40°F (-40°C)
High Continuous	°F (°C)		---
High Intermittent (2)	°F (°C)		200 °F (93.3°C)
Water Absorption			
Maximum Weight Change	%	ASTM D 1056	≤ 10%
Fluid Immersion (7 days at 23°C [73.4°F])			
ASTM Ref. Fuel B, Weight Change (%)	%	ASTM D 1056	≤ 250%
Accelerated Aging (7 days at 70°C [158°F])			
Flexibility (180° bend without cracking)			Pass
Appearance change			None
Change in Compression Deflection	%	ASTM D 1056	± 30%
Combustion Characteristics (3)		Thicknesses	Comments
FMVSS-302			Pass at most thicknesses
FAR 25.853		Contact Armacell technical service department	
UL94			
V-0 / V-1		0.461" (11.7 mm) & higher	Listed, UL file# QMFZ2.E55798
HF-1 / HBF		0.051" (1.3 mm) & higher	Listed, UL file# QMFZ2.E55798

(1) This recommendation is based on polymer type only. For specific application requirements please contact technical service.

(2) This temperature is the maximum allowable for intermittent exposure only. For continuous use temperature please contact technical service.

(3) Flammability - This item and any corresponding data refer to typical performance in the specific test indicated and should not be construed to imply this material's behavior in other fire conditions.

NBR - Acrylonitrile Butadiene Rubber

PVC - Polyvinyl Chloride

CR - Chloroprene (Neoprene)

ASTM D 1056 designation: 2A1 / 2C1

SAE J 18 APR2002 designation: 2A1 / 2C1

ASTM D 6576: Type II, Grades A & B, Condition Soft

UL Listed to UL 50E (UL file# JMST2.MH10189)

IV1 is on the approved source list for Chrysler MSAY 516 (Type 1)

UL File Number for Armacell (Ensolute®) IV1

UL File Number: QMFZ2.E55798

Plastics – Component (UL 94)

		Min.	Flame	H	H	RTI		H	D		
		Thk	Class	W	A	Elec	Mech	V	4	C	
Material Dsg	Color	mm	Class	I	I		Imp	Str	T	9	T
									R <td>5</td> <td>I</td>	5	I

Nitrile Rubber/Polyvinylchloride/Neoprene (NBR/PVC/CR), closed-cell foam, "Ensolute", furnished as profiles, tubes or sheets.

IV1(n)	BK	1.3	HF-1	-	-	50	-	50	-	-	-
		11.7	V-0	-	-	50	-	50			
		12.5	V-0	-	-	50	-	50			
		12.5	HF-1	-	-	50	-	50			

(n) - Density range 0.063 - 0.074 g/cc w/o skin and 0.077 - 0.156 g/cc w/skin

UL File Number for Armacell (Ensolute®) IV1

UL File Number: JMST2.MH10189

IV1, IV2, IVC	Closed cellular PVC/NBR/CR gasket material	Types "IV1", "IV2", "IVC". Suitable as a gasket material for UL 50 enclosure types 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 12, 12K and 13. [UL50E [Continuous and Periodic Compression]]
UL 50E	Tensile strength and elongation after heat aging 168 h (7 d) at 158°F (70°C)	75% of original for tensile strength 60% of original for elongation
UL 50E	Oil immersion / oil aging (IRM # 903), % volume change after 70 h @ room temperature	Shall not swell more than 25% or shrink more than 1% of original volume
UL 157	Tensile strength and elongation after heat aging 70 h at 212°F (100°C)	60% of original (For both tensile and elongation)

UL Yellow Card Listing Verification On-line

To obtain verification on-line:

1. www.ul.com - THEN
2. Click on "On-Line Certifications Directory" in gray area at bottom of web page THEN
3. Click on "Company Name" in the general search area - THEN
4. Type in "Armacell" - & click "SEARCH"
5. 10 (Ten) Armacell file numbers come up (2 for Armacell Germany, 1 for Armacell Middle East, 1 for Armacell Thailand)
6. Click on QMFZ2.E55798 for Armacell (Ensolute®), (ArmaSport®) & (Monarch®) products [Flame/UL94]
7. Click on JMLU2.MH25062 for Armacell (Monarch®) products listed to JMLU2 [Gaskets & Seals]
8. Click on JMST2.MH10189 or JMST2.MH30018 for Armacell (Ensolute®) and or (Monarch®) products listed to JMST2 [Gasket Materials]
9. Click on OPET2.MQ1977 for Armacell (ArmaSport®) products listed to Lifesaving Equipment, Marine - Component

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