

AUTOMOTIVE



Ensolite® EF0

- Super soft EPDM crushed (semi-closed cell) foam
- UL 94 5VA, V-0 and HF-1 listed for flame
- Meets Toyota TSK 6505G Class 2A
- Manufactured in continuous rolls
- Excellent resistance to ozone, weathering and heat
- ASTM E-84 (25/50 Rated)

General Information

Armacell Ensolite® EF0: Armacell LLC (Mebane, NC Plant) manufactures a black, very soft, semi-open / fine cell, “crushed” EPDM, 4 - 8 lb./ft³ (64 - 128 kg/m³) density product EF0, that has typical 25% compression deflection values of 1.0 psi (6.9 kPa) max. EF0 can be graded as an ASTM D 1056-07 1A0 & SAE J-18 APR2002 1A0 cellular product with one exception to the basic requirements (Compression set at elevated temperature). EF0 meets the flame resistance requirements of FMVSS-302 at 1/8” (0.125”) (3.17 mm) and higher. EF0 is UL listed to UL94 V-0, 5VA, and HF-1 at specific thicknesses (request additional information). EF0 has been tested for flame spread & smoke developed per ASTM E84 (Results: Pass 25/50 rating). **EF0 is on the approved source list for Chrysler MSAY 430 Type 1 and Delphi SD2-207 (12JUN13) Par 6.13.** EF0 meets all the requirements of Toyota TSK 6505G Class 2A.

Automotive and Industrial Specifications

The following is a list of automotive and industrial specifications that Armacell Ensolite® EF0 has been tested to or can meet. Additional specifications are listed that have a few exceptions. Feel free to suggest other automotive, military or industrial specifications, and a full review will be made.

Source	Specification	Armacell Ensolite® EF0	Comments
ASTM	ASTM D1056-07	1A0	Additional (optional) suffixes can be added. Exception to elevated temp compression set
ASTM	ASTM D 925	Pass, No migration staining	Method B
ASTM	ASTM D 1149	Pass	Ozone resistance
ASTM	ASTM D 1171	Pass	Ozone resistance
Chrysler	Chrysler MSZ-75 J18	1A0	Additional (optional) suffixes can be added. Exception to elevated temp compression set
Chrysler	Chrysler MS JP9-4	Meets at thicknesses of 0.125” (1/8”) (3.1mm) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
Chrysler	Chrysler MSAY 430	Type 1	On the approved source list
Chrysler	Chrysler MSAY 528	Type A	Deviation to closed cell requirement: EF0 is a semi-open-cell soft foam
Chrysler	Chrysler MSAY 550	Grade A	Exception: elongation

Automotive and Industrial Specifications (continued)

Source	Specification	Armacell Ensolite® EF0	Comments
Delphi	Delphi SD2-207	Par 6.13	On the approved source list
Federal	FMVSS-302	Meets at thicknesses of 0.125" (1/8") (3.1mm) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses. See note 2
FORD	FORD WSB-M3G212A	Pass	Request additional information about multiple exceptions
FORD	FORD WSB-M3G102-B2	Pass	Multiple exceptions related to test method. Request additional information
GM	GM 6086-M	Type IA	Exception: EF0 is a semi-open cell soft foam and will typically test below 0.7 psi CD at 50% deflection. See note 1. Tested with added skin as per ASTM D1056 open cell requirement
GM	GM 6090-M	(B4A) Meets at thicknesses of 0.125" (1/8") (3.1mm) and higher	Flame resistance tested per GM 9070-P (horizontal burn rate)
GM	GMN11101	Ultra Soft	CD tested at 50% deflection. See note 1. Tested with added skin per ASTM D1056 open cell requirement
GM	GMN11106	Type IAA	CD tested at 50% deflection. See note 2. Tested with added skin as per ASTM D1056 open cell requirement
GM	GMW15473	Class I Type I	CD tested at 50% deflection. See note 1. Exception: fogging. Request more information for additional exceptions. Water absorption tested with added skin as per ASTM D1056 open cell requirement
Hyundai	Hyundai MS260-13	Pass	Additional (optional) suffixes can be added
SAE	SAE J 18 APR2002	1A0	Additional (optional) suffixes can be added. Exception to elevated temp compression set
SAE	SAE J 369	Meets at thicknesses of 0.125" (1/8") (3.1mm) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
SAE	SAE J 1351	Pass, rating 2	Odor specification
Toyota	TSM 0500G	Meets at thicknesses of 0.125" (1/8") (3.1mm) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
Toyota	TSK 6505G	2A1 / 2A2 (Class 2A)	No exceptions
UL	UL 94 5VA	5VA UL listed at 4.29mm-4.64mm	Flame resistance specification. (UL file # QMFZ2.E55798)
UL	UL 94 V-0	V-0 UL listed at 3.14mm-3.41mm	Flame resistance specification. (UL file # QMFZ2.E55798)
UL	UL 94 HF-1	HF-1 UL listed at 3.37mm-3.65mm	Flame resistance specification. (UL file # QMFZ2.E55798)

Note 1: For all GM 6086-M, GMN11101, GMN11106 and GMW15473 callouts, Armacell Ensolite® certifies to the "basic" requirements only. Request additional information for each product. Providing application (interior, exterior or under-hood) and part thickness is helpful.

Note 2: A number of horizontal burn tests can also be listed (GM 6090, BMW, Volvo, etc.). Request additional information.

Roll Size Information

Gauge (in)	Gauge (fraction of an inch)	Gauge (mm)	Tolerance (inches)	Tolerance (mm)	Roll Size				Comments
					W (in)	L (ft)	W (m)	L (m)	
0.250	1/4	6.35	0.218 - 0.283	5.54 - 7.19	54	200	1.37	60.96	S1S NS
0.315		8.00	0.274 - 0.376	6.96 - 9.04	54	175	1.37	53.34	S2S NS
0.500	1/2	12.70	0.450 - 0.550	11.43 - 13.97	54	100	1.37	30.48	S2S NS
0.591		15.00	0.532 - 0.650	13.51 - 16.51	54	75	1.37	22.86	S2S NS
0.600	3/5	15.24	0.540 - 0.660	13.72 - 16.76	54	85	1.37	25.91	S1S NS
0.630		16.00	0.567 - 0.693	14.40 - 17.60	54	75	1.37	22.86	S2S NS
0.750	3/4	19.05	0.675 - 0.825	17.15 - 20.96	54	75	1.37	22.86	S2S NS
0.750	3/4	19.05	0.750 - 0.950	19.05 - 24.13	54	75	1.37	22.86	S2S NS
1.000	1	25.40	1.000 - 1.200	25.40 - 30.48	40	50	1.00	15.24	S2S NS
1.000	1	25.40	1.000 - 1.200	25.40 - 30.48	54	50	1.37	15.24	S2S NS
1.180		30.00	1.180 - 1.380	29.97 - 35.05	54	40	1.37	12.19	S1S NS

S1S = skin 1 side
S2S = skin 2 sides
NS = no splice



Polymer Base: EPDM

EFO Continuous Rolls/Sheets (Black)

Semi-Closed Cell / Crushed Foam

Physical Properties	Unit	Test Method	Typical Results
Density	kg/m ³	ASTM D 1056	64 - 128
	lb/ft ³	ASTM D 1056	4.0 - 8.0
Hardness, Durometer Shore 00		ASTM D 2240	5 ± 5
Compression Deflection (25%) (3/8" or 9.53 mm & higher)	kPa	ASTM D 1056	6.9 maximum
	psi	ASTM D 1056	1.0 maximum
Tensile Strength	kPa	ASTM D 412 (Die A)	69 minimum
	psi	ASTM D 412 (Die A)	10 minimum
Tear Strength	kN/m	ASTM D 624 (Die C)	0.7 Typical
	lb/in	ASTM D 624 (Die C)	4.0 Typical
Elongation	%	ASTM D 412 (Die A)	125 minimum
Service Temperature (1)			
Low	°F (°C)	ASTM D 746	-70°F (-56°C)
High Continuous	°F (°C)	ASTM D 746	—
High Intermittent (2)	°F (°C)	ASTM D 746	250°F (121°C)
Water Absorption			
Maximum Weight Change	%	ASTM D 1056	Not Applicable
Fluid Immersion (7 days at 23°C [73.4°F])			
ASTM Ref. Fuel B, Weight Change (%)	%	ASTM D 1056	Not Applicable
Accelerated Aging (7 days at 70°C [158°F])			
Flexibility (180° bend without cracking)		ASTM D 1056	Pass
Appearance change		ASTM D 1056	None
Change in Compression Deflection	%	ASTM D 1056	± 30%
Combustion Characteristics (3)		Thicknesses	Comments
FMVSS-302		0.125" (3.18 mm) & higher	Pass
UL 94			
5VA		0.169" - 0.183" (4.29 mm - 4.64 mm)	Listed, UL file # QMFZ2.E55798
V-0		0.124" - 0.134" (3.14 mm - 3.41 mm)	Listed, UL file # QMFZ2.E55798
HF-1		0.133" - 0.144" (3.37 mm - 3.65 mm)	Listed, UL file # QMFZ2.E55798

ASTM D 1056 designation: 1A0 (Exception to elevated temp compression set)
 SAE J 18 APR2002 designation: 1A0 (Exception to elevated temp compression set)
 EFO meets:
 MSAY 528, MSAY 550, Toyota TSK 6505 2A1 / 2A2
 Ford WSB-M3G212A with deviations
 GM6086M Type IA with deviations
 GMN11106 Type IAA with deviations
 GMW15473 Class I Type I with deviations
 Delphi SD2-207 Par 6.13 (Approved source list)
 EPDM = (ethylene-propylene-diene-methylene)

(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.

UL File Number for Armacell Ensolite® EFO

UL File Number: QMFZ2.E55798
Plastics – Component (UL 94)

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

Ethylene Propylene Diene Terpolymer (EPDM), “Ensolite”

EFO	BK	3.14- 3.41	V-0	-	-	50	-	50	-	-	-
		3.37-3.65	HF-1	-	-	50	-	50	-	-	-
		4.29-4.64	5VA	-	-	50	-	50	-	-	-

UL Yellow Card Listing Verification Online

To obtain verification online:

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. 9 (Nine) Armacell file numbers come up (2 for Armacell Germany, 1 for Armacell Middle East)
6. Click on **QMFZ2.E55798** for Armacell (Ensolite®) & (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 (Ensolite®) 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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