

AUTOMOTIVE



Ensolite® IUO

- UL 94 HF-1 listed for flame
- ASTM D 1056-07 2A1 / 2C1 / 2B1 grade product
- ASTM D 6576-07 Type II, Grades A & B, Condition Soft material
- PVC / NBR closed cell material manufactured in continuous rolls

Ensolite®

General Information

Armacell Ensolite® IUO: Armacell LLC (Conover, NC Plant) manufactures a black, continuous (rolls / sheets), closed cell, low density (2.5 - 5 lb/ft³) (40 - 80 kg/m³) PVC/NBR rubber product IUO. Armacell Ensolite® IUO meets the physical property requirements of ASTM D 1056-07 2A1 / 2C1 / 2B1 and SAE J-18 APR2002 2A1 / 2C1 / 2B1. IUO has excellent resistance to oil and fuel. IUO meets the burn rate requirements of FMVSS-302 at most thicknesses. IUO is formally listed with UL and meets the flame resistance requirements of UL94 HBF and HF-1 at 3.0 mm (0.118") and higher (UL File#: JMLU2.MH25062). Standard roll widths: 56" and 60".

Automotive and Industrial Specifications

The following is a list of automotive and industrial specifications that Armacell Ensolite® IUO 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	IUO	Comments
ASTM	ASTM D1056-07	2A1 / 2C1 / 2B1	Additional (optional) suffixes can be added
ASTM	ASTM D 925 Method B	Pass, no migration staining	This is a test method. Staining
ASTM	ASTM D 1171	Method B	Ozone resistance test method
ASTM	ASTM D 6576-07	Type II, Grades A & B, Condition Soft	Formerly MILR6130-C
Chrysler	Chrysler MSZ-75 J18	2A1 / 2C1 / 2B1	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	No exceptions
Delphi	Delphi DX200500	Type II	No exceptions. Ozone tested to ASTM D 1171 and ASTM D 1149
Federal	FMVSS-302	Meets at most thicknesses	Flame resistance (horizontal burn rate). See note 1
Federal	FAR 25.853	Pass at 1/8" and 1/4"	12 Second Vertical Burn Test. (Test report available upon request)

Automotive and Industrial Specifications (continued)

Source	Specification	IUO	Comments
GM	GM 6086-M	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	GM4486P	Pass, no cracking	Ozone Resistance
GM	GMN11106	Type II	CD tested at 50% deflection. See note 3
GM	GMW15473	Class I Type IV	CD tested at 50% deflection. See note 3 Exception to fogging
GM	GM 9128	Pass	Mildew specification
ISO	ISO 6916	2A1 / 2C1 / 2B1	Meets without exceptions if original manufactured material is $\leq 1"$. Exception to compression set if original manufactured material is $> 1"$.
Military	ASTM D 6576-07	Type II, Grades A & B, Condition Soft	Formerly MILR6130-C
SAE	SAE J18 APR2002	2A1 / 2C1 / 2B1	Additional (optional) suffixes can be added
SAE	SAE J369	Meets at most thicknesses	Flame resistance (horizontal burn rate)
SAE	SAE J 1351	Pass, Rating 2	Odor specification
Toyota	TSM 1501G	2A1 / 2C1 / 2B1	Meets without exceptions if original manufactured material is $\leq 1"$. Exception to compression set if original manufactured material is $> 1"$.
Toyota	TSM 0500G	Meets at most thicknesses	Flame resistance (horizontal burn rate)
UL	UL94 HF-1	HF-1 UL Listed at 3.0mm (0.118") and higher	Flame resistance specification. (UL file# QMFZ2.E55798)

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 M2D 419-A callouts, request full information for each product due to some exceptions with non-tested staining requirements.

Note 3: For all GM 6086-M, GMN11106 & 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.

Roll Size Information

Gauge (in)	Gauge (fraction of an inch)	Gauge (mm)	Tolerance (inches)	Tolerance (mm)	Roll Size W (in)	Roll Size L (ft)	Roll Size W (m)	Roll Size L (m)	Comments
0.125	1/8	3.18	0.094 - 0.156	2.39 - 3.96	56	200	1.42	60.96	SKO
0.250	1/4	6.35	0.219 - 0.281	5.56 - 7.14	56	200	1.42	60.96	SKO
0.275		6.99	0.247 - 0.303	6.27 - 7.70	54	201	1.37	61.26	S1S
0.375	3/8	9.53	0.328 - 0.422	8.33 - 10.72	56	100	1.42	30.48	SKO
0.375	3/8	9.53	0.328 - 0.422	8.30 - 10.70	60	100	1.52	30.48	S1S
0.375	3/8	9.53	0.328 - 0.422	8.33 - 10.72	56	150	1.42	45.72	S1S
0.433		11.00	0.433 - 0.583	11.00 - 14.30	54	75	1.37	22.86	S2S
0.500	1/2	12.70	0.437 - 0.563	11.10 - 14.30	56	100	1.42	30.48	S1S
0.500	1/2	12.70	0.437 - 0.563	11.10 - 14.30	56	100	1.42	30.48	S2S
0.750	3/4	19.05	0.750 - 0.950	19.05 - 24.13	60	100	1.52	30.48	S2S, L
0.875	7/8	22.23	0.875 - 1.025	22.20 - 26.00	56	88	1.42	26.82	S2S
1.000	1	25.40	1.000 - 1.200	25.40 - 30.48	48	100	1.22	30.48	S2S
1.000	1	25.40	1.050 - 1.200	26.67 - 30.48	56	75	1.42	22.86	S2S
1.000	1	25.40	1.000 - 1.200	25.40 - 30.48	60	100	1.52	30.48	S2S
1.180		29.97	1.180 - 1.380	29.97 - 35.05	56	75	1.42	22.86	S2S
1.500	1 1/2	38.10	1.500 - 1.700	38.10 - 43.18	56	75	1.42	22.86	S2S
1.500	1 1/2	38.10	1.500 - 1.700	38.10 - 43.18	60	50	1.52	15.24	S2S, L
2.000	2	50.80	2.000 - 2.200	50.80 - 55.88	56	75	1.42	22.86	S2S

SKO = Skin optional

S1S = Skin 1 side

S2S = Skin 2 sides

L = Additional lengths available



IUO Continuous Rolls/Sheets (Black)

Physical Properties	Unit	Test Method	Typical Results
Density	kg/m ³	ASTM D 1056	40 - 80
	lb/ft ³	ASTM D 1056	2.5 - 5.0
Hardness, Durometer Shore 00		ASTM D 2240	30 - 40
Compression Deflection (25%) (1)	kPa	ASTM D 1056	14 - 34
	psi	ASTM D 1056	2.0 - 5.0
50% Compression Set (Room temp)	%	ASTM D 1056	≤ 25% for gauges ≤ 1.0" ≤ 35% for gauges > 1.0"
Tensile Strength	kPa	ASTM D 412 (Die A)	276 minimum
	psi	ASTM D 412 (Die A)	40 minimum
Tear Strength	kN/m	ASTM D 624 (Die C)	0.9
	lb/in	ASTM D 624 (Die C)	5
Elongation	%	ASTM D 412 (Die A)	100 minimum
Service Temperature (1)			
Low	°F (°C)	ASTM D 746	-40 (-40)
High Continuous	°F (°C)	ASTM D 746	—
High Intermittent (2)	°F (°C)	ASTM D 746	200 (93.3)
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	≤ 100%
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			Pass at most thicknesses
FAR 25.853		1/8" (3.18 mm) & 1/4" (6.35 mm)	Pass
UL94			
HF-1		0.118" (3.0 mm) & higher	Listed, UL file # QMFZ2.E55798

ASTM D 1056 designation: 2A1 / 2C1 / 2B1
 SAE J 18 APR2002 designation: 2A1 / 2C1 / 2B1
 ASTM D 6576: Type II, Grades A & B, Condition Soft
 Standard Roll Widths: 56" or 60" (1.42 m or 1.52 m)
 Maximum Gauge: 2" (50.80 mm)

(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® IUO

UL File Number: QMFZ2.E55798
Plastics – Component [UL94]

									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

Nitrile Rubber/Polyvinylchloride (NBR/PVC), “Ensolite”, furnished as sheets.

IUO(ca)	BK	3.0	HF-1	-	-	50	-	50	-	-	-
		4.75	HF-1	-	-	50	-	50	-	-	-

(ca) - Density range 0.0504-0.0616 g/cc

UL Yellow Card Listing Verification Online

To obtain verification online:

1. www.ul.com
2. Click on “Certifications”
3. Click on “Company Name” in the general search area
4. Type in “Armacell” & click “Search”
5. 8 (Eight) Armacell file numbers come up (2 belong to Armacell Germany)
 - For Armacell Ensolite® & Monarch® products [Flame / UL94].
Click on QMFZ2.E55798
 - For Armacell Monarch® products listed to JMLU2 [Gaskets & Seals].
Click on JMLU2.MH25062
 - For Armacell Ensolite® products listed to JMST2 [Gasket Materials].
Click on JMST2.MH10189 or JMST2.MH30018

Vertical Flame / 12 Second Burn per FAR 25.853
Appendix F — Part I Test Criteria and Procedures for Showing
Compliance with Sec. 25.853 or Sec. 25.855

Armacell Ensolite® Product #	Min. Thickness	Pass / Fail	Independent Test Lab Report	Test Report ID #	Polymer	ASTM D 1056 Grade	Density lb./ft³	25% CD (psi)
IUO	1/8"	Pass	2/18/10	0140	PVC/NBR	2B1	2.5 - 5	2 - 5
IUO	1/4"	Pass	2/18/10	0141	PVC/NBR	2B1	2.5 - 5	2 - 5

ARMACELL LLC
 TEL: 1 800 866-5638
 FAX: 919 304-3847
info.us@armacell.com
www.armacell.us
 7600 Oakwood Street Extension • Mebane, NC 27302



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