

AUTOMOTIVE



## Ensolite® MLC-Black

- UL 50E (periodic and continuous compression) listed for gaskets and seals (recent upgrade)
- UL 94 HF-1 and HBF listed for flame
- ASTM D 1056-07 2A1 / 2C1 grade product
- ASTM D 6576-07 Type II, Grades A & B, Condition Soft material
- Vinyl Nitrile (PVC / NBR) blended, closed cell rubber material manufactured in continuous rolls

### General Information

**Armacell Ensolite® MLC-Black:** Armacell LLC (Conover, NC Plant) manufactures a black, continuous (sheets / rolls), closed cell, 3.5 - 5.5 lb./ft<sup>3</sup> (56 - 88 kg/m<sup>3</sup>) density, Vinyl Nitrile (PVC/ NBR) blended rubber product MLC-Black, that meets all the physical property requirements of ASTM D 1056-07 2A1 / 2C1 and SAE J-18 APR2002 2A1 / 2C1. MLC-Black meets the burn rate requirements of FMVSS-302 at approx 1.75 mm (0.069”) and higher. MLC- Black is formally listed with UL and meets the flame resistance requirements of UL 94 HBF at 6.6 mm (0.260”) and higher and UL 94HF-1 at 2.9 - 6.6 mm (0.114 - 0.260”) (UL File#: QMFZ2.E55798). MLC-Black is listed with UL to UL 50E (periodic and continuous compression) (UL File # JMST2. MH10189). MLC-Black is listed on the following approved source lists: GMW15473 Class II Type IV (MATSPC), Chrysler MSAY 516 Type 1, and Caterpillar 1E0707E. Standard roll width(s): 56” or 60”.

### Automotive and Industrial Specifications

The following is a list of automotive and industrial specifications that Armacell Ensolite® MLC-Black 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	MLC-Black	Comments
ASTM	ASTM D1056-07	2A1 / 2C1	Additional (optional) suffixes can be added
ASTM	ASTM G21-09	Pass, rating 0	Fungus resistance test method
ASTM	ASTM D 1171	Pass	Ozone resistance test method
ASTM	ASTM D 6576-07	Type II, Grades A & B, Condition Soft	Formerly MILR6130-C
CAL	CAL 117	Pass	Flame resistance
Caterpillar	1E0707	1E0707E	MLC-Black is on the approved source list for 1E0707
Chrysler	Chrysler MSZ-75 J18	2A1 / 2C1	Additional (optional) suffixes can be added
Chrysler	Chrysler MS JP9-4	Meets at thicknesses of 1.75mm (0.069”) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
Chrysler	Chrysler MSAY 516	Type 1	On approved source list
Federal	FMVSS-302	Meets at thicknesses of 1.75mm (0.069”) and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses. See note 1
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

## Automotive and Industrial Specifications (continued)

Source	Specification	MLC-Black	Comments
GM	GM 6090-M	(B4A) Meets at thicknesses of 1.75mm (0.069") and higher	Flame resistance tested per GM 9070-P (horizontal burn rate)
GM	GMN11106	Type II	CD tested at 50% deflection. See note 3
GM	GMW15473	Class II Type IV	CD tested at 50% deflection. See note 3. On approved source list.
ISO	ISO 6916	2A1 / 2C1 / 2B1	No exceptions
Military	ASTM D 6576-07	Type II, Grades A & B, Condition Soft	Formerly MILR6130-C
SAE	SAE J18 APR2002	2A1 / 2C1	Additional (optional) suffixes can be added
SAE	SAE J369	Meets at thicknesses of 1.75mm (0.069") and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
SAE	SAE J 1351	Pass, rating 2	Odor specification
Toyota	TSM 1501G	2A1 / 2C1 / 2B1	No exceptions
Toyota	TSM 0500G	Meets at thicknesses of 1.75mm (0.069") and higher	Flame resistance (horizontal burn rate). Request additional information about thinner thicknesses
UL	UL 94 HF-1	HF-1 UL listed at 2.9 mm-6.6 mm (0.114" - 0.260")	Flame resistance specification. (UL file# QMFZ2.E55798)
UL	UL 94 HBF	HBF UL listed at 6.6 mm (0.260") and higher	Flame resistance specification. (UL file# QMFZ2.E55798)
UL	UL 50E	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 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
0.25	1/4	6.35	0.240 - 0.285	6.10 - 7.24	50	240	1.27	73.15	S1S
0.375	3/8	9.53	0.338 - 0.413	8.59 - 10.50	60	240	1.52	73.15	S1S
0.50	1/2	12.70	0.440 - 0.560	11.18 - 14.22	60	150	1.52	45.72	S1S
0.75	3/4	19.05	0.690 - 0.810	17.53 - 20.57	56	75	1.42	22.86	S1S, L
0.98		25.00	0.886 - 1.082	22.50 - 27.48	56	75	1.42	22.86	S2S
1.00	1	25.40	1.000 - 1.200	25.40 - 30.50	60	100	1.52	30.48	S2S
1.00	1	25.40	1.000 - 1.200	25.40 - 30.48	60	150	1.52	45.72	S1S
1.25	1-1/4	31.75	1.250 - 1.450	31.75 - 36.83	56	150	1.42	45.72	S1S
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	54	75	1.37	22.86	S2S
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	56	75	1.42	22.86	S2S
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	56	100	1.42	30.48	S2S
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	60	50	1.52	15.24	S2S, L
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	60	100	1.52	30.48	S2S, NS
1.50	1-1/2	38.10	1.50 - 1.70	38.10 - 43.18	64	75	1.63	22.86	S2S

S1S = skin 1 side

S2S = skin 2 sides

L = additional lengths available

NS = no splice



## MLC-Black Continuous Rolls/Sheets (Black)

Physical Properties	Unit	Test Method	Typical Results
<b>Density</b>	kg/m <sup>3</sup>	ASTM D 1056	56 - 88
	lb/ft <sup>3</sup>	ASTM D 1056	3.5 - 5.5
<b>Hardness, Durometer Shore 00</b>		ASTM D 2240	20 ± 10
<b>Compression Deflection (25%)</b>	kPa	ASTM D 1056	14 - 21
	psi	ASTM D 1056	2.0 - 3.5
<b>50% Compression Set (Room temp)</b>	%	ASTM D 1056	≤ 40%
<b>Tensile Strength</b>	kPa	ASTM D 412 (Die A)	276 minimum
	psi	ASTM D 412 (Die A)	40 minimum
<b>Tear Strength</b>	kN/m	ASTM D 624 (Die C)	1.4
	lb/in	ASTM D 624 (Die C)	8
<b>Elongation</b>	%	ASTM D 412 (Die A)	100 minimum
<b>Service Temperature (1)</b>			
Low	°F (°C)	ASTM D 746	-40°F (-40°C)
High Continuous	°F (°C)	ASTM D 746	---
High Intermittent (2)	°F (°C)	ASTM D 746	200 °F (93.3°C)
<b>Water Absorption</b>			
Maximum Weight Change	%	ASTM D 1056	< 10%
<b>Fluid Immersion (7 days at 23°C [73.4°F])</b>			
ASTM Ref. Fuel B, Weight Change (%)	%	ASTM D 1056	< 250%
<b>Accelerated Aging (7 days at 70°C [158°F])</b>			
Flexibility (180° bend without cracking)		ASTM D 1056	Pass
Appearance change		ASTM D 1056	None
Change in Compression Deflection	%	ASTM D 1056	± 30%
<b>Combustion Characteristics (3)</b>		<b>Thicknesses</b>	<b>Comments</b>
FMVSS-302		0.069" (1.75 mm) & higher	Pass
UL 94			
HF-1		0.114" - 0.260" (2.9 - 6.6 mm)	Listed, UL file# QMFZ2.E55798
HBF		0.260" (6.6 mm) & higher	Listed, UL file# QMFZ2.E55798

ASTM D 1056 designation: 2A1 / 2C1  
 SAE J 18 APR2002 designation: 2A1 / 2C1  
 ASTM D 6576: Type II, Grades A & B, Condition Soft  
 Additionally UL Listed to UL 50E (UL file# JMST2.MH10189)  
 Standard Roll Widths: 56" or 60" (1.42 m or 1.52 m)  
 Maximum Gauge: 1.5" (38.1 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.

NBR – Acrylonitrile Butadiene Rubber

PVC – Polyvinyl Chloride

## UL File Number for Armacell Ensolite® MLC-Black

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

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

**Nitrile Rubber/Polyvinylchloride (NBR/PVC), flexible foam, “Ensolite”, furnished as profiles, tubes or sheets.**

<b>MLC (a)</b>	<b>BK</b>	<b>2.9 - 6.6</b>	<b>HF-1</b>	-	-	<b>50</b>	-	<b>50</b>	-	-	-
		<b>6.6</b>	<b>HBF</b>	-	-	<b>50</b>	-	<b>50</b>			

(a) - Density range 0.046 - 0.056 g/cc w/o skin and 0.057 - 0.061 g/cc w/ skin

## File Number: JMST2.MH10189

UL Spec	UL Spec	UL Spec
<b>MLC Black</b>	Closed cellular PVC/NBR gasket material	Type “MLC Black”. Suitable as a gasket material for <b>UL 50 enclosure</b> Types 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P [ <b>UL 50E (Continuous and Periodic Compression)</b> ]

UL Spec	Test Method	Requirements
<b>UL 50E</b>	Tensile strength and elongation after heat aging 168 h (7 d) at 158°F (70°C)	75% of original for tensile strength
<b>UL 50E</b>	60% of original for elongation	Shall not swell more than 25% or shrink more than 1% of original volume
<b>UL 157</b>	Oil immersion / oil aging (IRM # 903), % volume change after 70 h at room temperature	60% of original (For both tensile and elongation)

## UL Yellow Card Listing Verification Online

**To obtain verification online:**

1. [www.ul.com](http://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 Ensolite® products listed to JMST2 (Gaskets & Seals)  
**Click on JMST2.MH30018 and JMST2.MH10189**
  - For Armacell Monarch® products listed to JMLU2 (Gaskets & Seals)  
**Click on JMLU2.MH25062**

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