

AUTOMOTIVE



## Monarch® #5031

- UL94 HF-1 listed for flame
- UL50E (periodic and continuous compression), UL508 and UL48 listed for gaskets and seals (recent upgrade)
- Widely used general purpose EPDM / CR / SBR blend, an industry standard
- ASTM D 1056-07 2A1 grade closed cell material
- Fine cell – manufactured in blocks (buns)

Monarch®

### General Info

**Armacell Monarch® #5031:** Armacell LLC (Spencer, WV Plant) manufactures a black, closed cell,  $6 \pm 2 \text{ lb./ft}^3$  ( $96 \pm 32 \text{ kg/m}^3$ ) density, general purpose, EPDM/Neoprene/SBR blended rubber product #5031, that meets all the physical property requirements of ASTM D 1056-07 2A1 and SAE J-18 APR2002 2A1. #5031 incorporates flame retardants, meets the requirements of FMVSS-302 at 2.5 mm (0.098”) and higher and is listed with UL to UL 94 HF-1 (UL file# QMFZ2.E55798). #5031 is manufactured with non-staining oils and anti-oxidants. #5031 is also listed with UL to UL 50E (periodic and continuous compression), UL 48 and UL 508 (UL file# JMLU2.MH25062). This product is also available in gray (#5931 - UL 50E / 48 / 508 listed but not UL 94 listed).

### Bun Size Information

Product	Bun Size (Inches)			Bun Size (mm)			Color
	W	L	T	W	L	T	
5031	42	72	2.0	1067	1829	50.8	Black
5031	54	80	2.0	1372	2032	50.8	Black
5031	40	80	2.5	1016	2032	63.5	Black
5031	42	72	2.5	1067	1829	63.5	Black

# Automotive and Industrial Specifications

The following is a list of automotive and industrial specifications that Armacell Monarch® #5031 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 Monarch® #5031	Comments
ASTM	ASTM D 1056-07	2A1	Additional (optional) suffixes can be added
ASTM	ASTM G 21-09	Pass, rating 0	Fungus resistance test method
ASTM	ASTM D 925	Pass, no migration staining	Method B
ASTM	ASTM D 518 Method A	Pass (no cracks)	This is a test method. Outdoor ozone / 2000 hours
ASTM	ASTM D 1149	Pass, no cracking, rating 0	Ozone resistance
ASTM	ASTM D 1171	Pass, no cracking, rating 0	Ozone resistance
ASTM	ASTM D 6576-07	Type II grade A, B & C condition soft	Formerly MILR6130-C
ASTM	ASTM E 162	Meets	Flame resistance - radiant heat
BEHR	BEHR 30.42.08	Meets with exceptions	Exceptions: fluid immersion and elongation
Bombardier	Bombardier SMP 205	Pass with multiple exceptions	Expanded rubber closed cell
CAL	CAL 117	Pass	Flame resistance
Caterpillar	1E0720	1E0720D (soft)	Exception to compression set
Caterpillar	1E1576	D (soft)	No exceptions
Chrysler	Chrysler MSZ-75 J18	2A1	Additional (optional) suffixes can be added
Chrysler	Chrysler MS JP9-4	Meets at thicknesses of 2.5mm (.098") and higher	Flame resistance (horizontal burn rate)
Delphi	SD2-207	Paragraph 6.1	See note 4. On approved source list
Federal	FMVSS-302	Meets at thicknesses of 2.5mm (.098") and higher	Flame resistance (horizontal burn rate). See note 3
FORD	FORD ESB M9 P1-A	Pass	Ozone specification
FORD	FORD WSK M2D 419-A	Type 2	See note 2
GM	GM 6086-M	Type II	CD tested at 50% deflection. See note 1
GM	GM 6090-M	(B4A) Meets at thicknesses of 2.5mm (.098") and higher	Flame resistance tested per GM 9070-P. (horizontal burn rate)
GM	GME 60-251	2A2U; pass, grade 0	Ozone resistance
GM	GM 9308P	Pass	Stress resistance of plastics
GM	GM 9305P	Request test report	Fogging
GM	GMN11106	Type II	CD tested at 50% deflection. See note 1
GM	GMW15473	Class I Type IV	CD tested at 50% deflection. See note 1. (Some exceptions for compatibility [staining] and corrosion with the cycle test)
ISO	ISO 6916	2A1	Exception to compression set
Military	MIL STD 810C / 508	Data available	Fungus resistance
Military	ASTM D 6576-07	Type II grade A, B & C condition soft	Formerly MILR6130-C
Mitsubishi	ES-X 60410	Meets at 0.100" (2.54 mm) and above	Flame specification
Mitsubishi	ES-X 60154	ER C1, F1 (EPDM / CR / SBR blend)	Compression deflection (hardness) is stated on the drawing
SAE	SAE J18 APR2002	2A1	Additional (optional) suffixes can be added
SAE	SAE J 1960	Request data	Xenon weathering (2481 kJ/m2 exposure)
SAE	SAE J369	Meets at thicknesses of 2.5mm (.098") and higher	Flame resistance (horizontal burn rate)
SAE	SAE J 1351	Rating 2	Odor test method
Toyota	TSM 1501G	2A1	Exception to compression set
Toyota	TSM 0500G	Meets at thicknesses of 2.5mm (.098") and higher	Flame resistance (horizontal burn rate)
UL	UL 94 HF-1	HF-1 listed at 1.5mm (.059") and higher	Flame resistance specification. (UL file # QMFZ2.E55798)

# Automotive and Industrial Specifications

Source	Specification	Armacell Monarch® #5031	Comments
UL	UL 48 / UL 50E / UL 508	Suitable for UL 48, UL 50E (periodic and continuous compression), UL 508 in all colors	Gasket and seals / UL listed. (UL file # JMLU2.MH25062)
Visteon	VEF 4VH-80A100-AA	Pass	Biocide performance specification
Volvo	Volvo STD 5031.1	Meets at thicknesses of 0.125" (1/8") (3.1mm) and higher	Meets the horizontal burn requirements listed on Volvo STD 5031.1 This test has slightly different requirements than those of FMVSS-302

Note 1: For all GM 6086-M, GMN11106 & GMW15473 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.

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

Note 4: See QMPL-3621 revision 10. Effective date June 5, 2007.



Polymer Base: Neoprene, EPDM, SBR Blend

**F-05031 (Black)**

Physical Properties	Unit	Test Method	Typical Results
Density	kg/m <sup>3</sup>	ASTM D 1056	96 ± 32
	lb/ft <sup>3</sup>	ASTM D 1056	6 ± 2
Hardness, Durometer Shore 00		ASTM D 2240	45 ± 5
Compression Deflection (25%)	kPa	ASTM D 1056	24 ± 10
	psi	ASTM D 1056	3.5 ± 1.5
Compression Set (Room temp)	%	ASTM D 1056	≤ 40%
Tensile Strength	kPa	ASTM D 412 (Die A)	520
	psi	ASTM D 412 (Die A)	75
Tear Strength	kN/m	ASTM D 624 (Die C)	1.7
	lb/in	ASTM D 624 (Die C)	9.6
Elongation	%	ASTM D 412 (Die A)	125%
Resilience	%	ASTM D 2632	35%
<b>Service Temperature</b>			
Low	°F (°C)	ASTM D 746	-40°F (-40°C)
High Continuous	°F (°C)	ASTM D 746	200 °F (93.3°C)
High Intermittent	°F (°C)	ASTM D 746	250°F (121.1°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	Not Applicable
<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</b>		<b>Thicknesses</b>	<b>Comments</b>
FMVSS-302		.098" (2.5 mm) & higher	Pass
UL 94			
HF-1		.059" (1.5 mm) & higher	Listed, UL file # QMFZ2.E55798

ASTM D 1056 designation: 2A1  
 SAE J 18 APR2002 designation: 2A1  
 ASTM D 6576: Type II, Grades A, B & C, Condition Soft  
 Additionally UL Listed to: UL 48, UL 50E, and UL 508 (UL file# JMLU2.MH25062)  
 EPDM = (ethylene-propylene-diene-methylene)  
 SBR = styrene-butadiene rubber  
 Neoprene = polychloroprene (CR = chloroprene rubber)

## UL File Number for Armacell Monarch® #5031

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

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

Neoprene/Ethylene Propylene/Styrene Butadiene (CBR/EPR/SB), foamed, furnished as blocks, buns.

F-005031 (h)	BK	1.5	HF-1	-	-	50	-	50	-	-	-
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(h) – Density range 0.080 – 0.144 g/cc

## Closed cell EPDM/Neoprene/SBR blend

UL File number for Armacell Monarch® #5031, #5032, #5013, #5055 & #5955

UL File Number: JMLU2.MH25062 Gaskets and Seals – Component

Mtl Dsg	Max Serv Temp	Min Serv Temp	Density pcf	Tnsl Str	Elong	Max Comp Set	Nom Thkns Range In.	Use (1)
F-005X13	60°C	-40°C	11.4	155	140	25.4	—	(2,3)
F-005X31	60°C	-40°C	6.8	95	135	35.5	—	(2,3)
F-005X32	60°C	-40°C	6.7	85	105	34.2	—	(2,3)
F-005055	60°C	-40°C	9.54	160	116	18.6	—	(2)
F-005955	60°C	-40°C	9.54	160	116	18.6	—	(2)

(1) See explanation of end-use environments in guide for this category.

(2) Also suitable for use in UL48, **UL50E** (continuous and periodic compression), UL508.

(3) X - Represents numbers 0 thru 9 for colors.

UL Spec	Test Method	Requirements
UL48	Tensile strength or elongation characteristics after 70 hours at 100°C for a 60°C maximum service temperature	60% of original (For both tensile and elongation)
UL48	(OR) Heat aging 70 hours in an air oven at a temperature of 100 ± 2°C	No visible evidence of deterioration such as cracking after flexing, softening, or hardening after exposure
UL50E	Tensile strength and elongation after heat aging 168 h (7 d) @ 158°F (70°C)	75% of original for tensile strength 60% of original for elongation
UL50E	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
UL157	Tensile strength and elongation after heat aging 70 h @ 212°F (100°C)	60% of original (For both tensile and elongation)
UL508	Tensile strength and elongation after heat aging 70 h @ 212°F (100°C)	75% 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 *Ensolute*<sup>®</sup> & *Monarch*<sup>®</sup> products (Flame / UL94)  
**Click on QMFZ2.E55798**
  - For Armacell *Ensolute*<sup>®</sup> products listed to JMST2 (Gaskets & Seals).  
**Click on JMST2.MH30018 and JMST2.MH10189**
  - For Armacell *Monarch*<sup>®</sup> products listed to JMLU2 (Gaskets & Seals).  
**Click on JMLU2.MH25062**

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