

AUTOMOTIVE



Ensolute® ECF-400

- Super soft EPDM crushed (semi-closed cell) foam
- UL 94 HBF listed for flame
- Excellent resistance to ozone, weathering and heat
- Manufactured in continuous rolls

Ensolute®

General Information

Armacell Ensolute® ECF-400: Armacell LLC (Conover, NC Plant) manufactures a black, very soft, semi-open cell, “crushed” EPDM, 4 - 8 lb./ft³ (64 - 128 kg/m³) density product ECF-400, that has typical 25% compression deflection values of 1.0 psi (6.9 kPa) max. ECF-400 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). ECF-400 meets the flame resistance requirements of FMVSS-302 at most thicknesses. ECF-400 is UL listed to UL 94 HBF at 1/8” (3.3 mm) and higher (UL File #: QMFZ2.E55798). ECF-400 is listed with UL to UL 50 (Gasket Materials) [UL File#: JMST2.MH30013]. ECF-400 is listed on the approved source list of Chrysler MSAY 550. Standard roll width: 54”.

Automotive and Industrial Specifications

The following is a list of automotive & industrial specifications that Armacell Ensolute® ECF-400 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 | ECF-400 | Comments |
|----------|---------------------|---------------------------|---|
| ASTM | ASTM D1056-07 | 1A0 | Additional (optional) suffixes can be added. Exception to elevated temp compression set |
| 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 most thicknesses | Flame resistance (horizontal burn rate) |
| Chrysler | Chrysler MSAY 528 | Type A | Deviation to closed cell requirement: ECF-400 is a semi-open-cell soft foam |
| Chrysler | Chrysler MSAY 550 | Forms A, B & C | Approved source list for MSAY 550 |
| Federal | FMVSS-302 | Meets at most thicknesses | Flame resistance (horizontal burn rate). See note 1 |

Automotive and Industrial Specifications (continued)

| Source | Specification | ECF-400 | Comments |
|--------|--------------------|---|--|
| 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: ECF-400 is a semi-open cell soft foam and will typically test below 0.7 psi CD at 50% deflection. See note 2. Tested with added skin as per ASTM D1056 open cell requirement |
| GM | GM 6090-M | (B4A) Meets at most thicknesses | Flame resistance tested per GM 9070-P (horizontal burn rate) |
| GM | GMN11106 | Type IAA | CD tested at 50% deflection. See note 2. Tested with added skin as per ASTM D1056 open cell requirement |
| GM | GMN11101 | Ultra Soft | 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 2. Exception: fogging. Request more information for additional exceptions. Water absorption tested with added skin as per ASTM D1056 open cell requirement |
| SAE | SAE J 18 APR2002 | 1A0 | Additional (optional) suffixes can be added. Exception to elevated temp compression set |
| SAE | SAE J 369 | Meets at most thicknesses | Flame resistance (horizontal burn rate) |
| SAE | SAE J 1351 | Pass, rating 2 | Odor specification |
| Toyota | TSM 0500G | Meets at most thicknesses | Flame resistance (horizontal burn rate) |
| Toyota | TSK 6505G | 2A1 / 2A2 | EPDM |
| UL | UL 94 HBF | HBF UL listed at 3.3mm | Flame resistance specification. (UL file# QMFZ2.E55798) |
| UL | UL 50 | Suitable as gasket material for UL 50 (continuous 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 GM 6086-M, GMN11101, GMN11106 and GMW15473 callouts, Armacell Ensolute® 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 |
|------------|-----------------------------|------------|--------------------|----------------|------------------|------------------|-----------------|-----------------|--------------|
| 0.330 | | 8.38 | 0.330 - 0.480 | 8.38 - 12.19 | 54 | 100 | 1.37 | 30.48 | skin 2 sides |
| 0.500 | 1/2 | 12.70 | 0.500 - 0.650 | 12.70 - 16.52 | 54 | 100 | 1.37 | 30.48 | |
| 0.500 | 1/2 | 12.70 | 0.440 - 0.560 | 11.18 - 14.22 | 54 | 100 | 1.37 | 30.48 | |
| 0.591 | | 15.00 | 0.530 - 0.650 | 13.46 - 16.51 | 54 | 100 | 1.37 | 30.48 | |
| 0.625 | 5/8 | 15.88 | 0.625 - 0.825 | 15.88 - 20.96 | 54 | 75 | 1.37 | 22.86 | |
| 0.625 | 5/8 | 15.88 | 0.562 - 0.825 | 14.27 - 20.96 | 54 | 100 | 1.37 | 30.48 | |
| 0.750 | 3/4 | 19.05 | 0.750 - 0.950 | 19.05 - 24.14 | 54 | 75 | 1.37 | 22.86 | |
| 0.787 | | 20.00 | 0.708 - 0.865 | 17.98 - 21.97 | 54 | 75 | 1.37 | 22.86 | |
| 1.000 | 1 | 25.40 | 1.000 - 1.200 | 25.40 - 30.49 | 54 | 50 | 1.37 | 15.24 | |
| 1.000 | 1 | 25.40 | 0.875 - 1.125 | 22.23 - 28.58 | 54 | 50 | 1.37 | 15.24 | |
| 1.181 | | 30.00 | 1.181 - 1.381 | 30.00 - 35.08 | 48 | 40 | 1.22 | 12.19 | |
| 1.181 | | 30.00 | 1.181 - 1.381 | 30.00 - 35.09 | 54 | 40 | 1.37 | 12.19 | |

ECF-400 Continuous Rolls/Sheets (Black)

| 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 - 10 |
| Compression Deflection (25%) | kPa | ASTM D 1056 | 7.0 maximum |
| | psi | ASTM D 1056 | 1.0 maximum |
| 50% Compression Set (Room temp) | % | ASTM D 1056 | ≤ 35% |
| Tensile Strength | kPa | ASTM D 412 (Die A) | 103 |
| | psi | ASTM D 412 (Die A) | 15 minimum |
| Tear Strength | kN/m | ASTM D 624 (Die C) | 0.4 |
| | lb/in | ASTM D 624 (Die C) | 2 |
| Elongation | % | ASTM D 412 (Die A) | 200 minimum |
| Service Temperature (1) | | | |
| Low | °F (°C) | ASTM D 746 | -70°F (-56.7°C) |
| High Continuous | °F (°C) | ASTM D 746 | --- |
| High Intermittent (2) | °F (°C) | ASTM D 746 | 250°F (121.1°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 | | | Pass at most thicknesses |
| UL 94 | | | |
| HBF | | 0.130" (3.3 mm) & higher | 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)
 Additionally UL Listed to UL 50 (UL file# JMST2.MH10189)
 Standard Roll Widths: 54" (1.37 m)
 Maximum Gauge: 1.181" (30 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.

EPDM - ethylene-propylene-diene-methylene

UL File Number for Armacell Ensolite® ECF-400

UL File Number: QMFZ2.E55798

Plastics – Component [UL94]

| | | | | | | | | | | | |
|--------------|-------|------|-------|---|---|-------|------|-----|---|---|---|
| | | | | | | | | | H | D | |
| | | 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 |

Ethylene Propylene Diene Terpolymer (EPDM), “Ensolite”, furnished as profiles, tubes or sheets.

| | | | | | | | | | | | |
|--------------|----|-----|-----|---|---|----|---|----|---|---|---|
| ECF 400 (ba) | BK | 3.3 | HBF | - | - | 50 | - | 50 | - | - | - |
| | | 5.8 | HBF | - | - | 50 | - | 50 | - | - | - |

(ba) - Density range 0.065 - 0.077 g/cc

File Number: JMST2.MH10189

| | | |
|--------------------|--|---|
| ECF 400 ICF 400 | Open cellular Polyvinyl Chloride/ Nitrile-Butadiene Rubber/ Neoprene/ Ethylene-Propylene-Dienemethylene blend sheets | Types “ECF 400” and “ICF 400”. Suitable as a gasket material for UL 50 enclosures Types 2, 3, 3R, 3S, 4, 4X, 5, 6, 6P [UL50 (Continuous Compression)] |
|--------------------|--|---|

| UL Spec | Test Method | Requirements |
|---------|--|---|
| UL 50 | 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 |
| UL 50 | 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 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

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