



Elastomeric Polyurethane Foam, Bio-renewable and Recycled Content

1 Scope

This specification covers flexible expanded formed polyurethane (PUR) materials that have a uniform, semi-closed cell structure, with 10% to 15% bio-renewable content and 15% to 25% post automotive shredder residue. This material is formed into components for exterior, underhood and NVH applications.

1.1 Material Description. This material is an elastomeric polyurethane foam with 10% to 15% bio renewable and 15% to 25% post automotive shredder residue (recycled used car tires) content.

1.2 Symbols. >PUR 25-40<.

1.3 Applicability. Typical applications include front of dash and drain seals used in HVAC systems, air inlet panel muckets, outside rearview mirror gaskets, and other air, dust, Noise Vibration Handling (NVH) applications, and water seals where compression is required to fill or mate two or more surfaces. These materials are not intended to be used in interior applications or applications that contact refreshable air to the passenger compartment.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM D3574	ISO 34-1	ISO 1431-1	ISO 3386-1
ASTM D5590	ISO 188	ISO 1798	ISO 3865
FMVSS 302	ISO 845	ISO 1856	ISO 11469

2.2 GM Standards/Specifications.

GMW3059	GMW3232	GMW14162	GMW14444
GMW3205	GMW3235	GMW14270	GMW15634
GMW3221	GMW3259	GMW14357	GMW16853

2.3 Additional References.

- Mold species ATCC 6205, ATCC 9642 and ATCC 11797 available at; www.atcc.org
- Sabouraud Dextrose Agar (SDA) available from multiple sources

3 Requirements

3.1 Requirements on Test Specimens. All tests shall be performed with conditioning according to GMW3221, Code B.

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.3 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.4 Shelf Life. The material shall be packed to prevent permanent deformation when shipped or stored. It must meet all requirements of this specification after 6 months storage at +50 °C.

3.5 Material Properties. Material requirements are summarized in Table 1.

Table 1: Material Properties

Property	Test Method	Unit	Value
Density			
	ISO 845	kg/m ³	210 to 270
Tensile Strength			
	ISO 1798, Type 1	kPa	400 minimum
Elongation			
	ISO 1798, Type 1	%	150 minimum
Tear Strength			
	ISO 34-1, Method B, Procedure A	Nm	700 minimum
Compression Set			
	ASTM D3574 or ISO 1856, Method A 24 h (+0 h/-2 h) at +70 °C ± 2 °C , 50% compression, 30 minute to 40 minute recovery at +23 °C ± 2 °C	%	25 maximum
Compression Deflection			
At 50% Deflection	ISO 3386-1 Values shall be determined after one (1) minute of a single 50% compression on unplied material (no preflex) after being compressed at a rate of 50 mm/minute Samples shall be 50 mm × 50 mm with a minimum sample thickness of 3.2 mm. All adhesive surfaces shall be dusted with talc to prevent adhesion to the compression plates. Additionally, compression deflection curves from 0% to effective maximum compression shall be submitted for each product prior to approval.	kPa	20 minimum
Steam Autoclave			
Polyether-based Polyurethane Foams	GMW14357-E	-	No visible degradation
Polyester-based Polyurethane Foams	GMW14357-D	-	No visible degradation
Heat Aging/Dimensional Stability			
Short Term: 168 h	ISO 188, Method B, 168 h (+0 h/-2 h) at +125 °C ± 3 °C Test sample is molded specimen, 150 mm × 150 mm × 25.4 mm. Measure and record the length, width, and height before heat aging (L _i , W _i and H _i) and measure and record the length, width, and height after heat aging (L _f , W _f and H _f). Calculate the percentage change in each dimension of the sample block. % Change In Length = ((L _f - L _i)/L _i) × 100% % Change In Width = ((W _f - W _i)/W _i) × 100% % Change In Height = ((H _f - H _i)/H _i) × 100%	% % %	5 maximum 5 maximum 5 maximum

Property	Test Method	Unit	Value
Long Term: 1000 h	ISO 188, Method B, 1000 h (+0 h/-2 h) at +100 °C ± 3 °C Test sample is molded specimen, 150 mm × 150 mm × 25.4 mm. Measure and record the length, width, and height before heat aging (L_i , W_i and H_i) and measure and record the length, width, and height after heat aging (L_f , W_f and H_f). Calculate the percentage change in each dimension of the sample block. % Change In Length = $((L_f - L_i)/L_i) \times 100\%$ % Change In Width = $((W_f - W_i)/W_i) \times 100\%$ % Change In Height = $((H_f - H_i)/H_i) \times 100\%$	% % %	5 maximum 5 maximum 5 maximum
Long Term: 2000 h	ISO 188, Method B, 2000 h (+0 h/-2 h) at +80 °C ± 3 °C Test sample is molded specimen, 150 mm × 150 mm × 25.4 mm. Measure and record the length, width, and height before heat aging (L_i , W_i and H_i) and measure and record the length, width, and height after heat aging (L_f , W_f and H_f). Calculate the percentage change in each dimension of the sample block. % Change In Length = $((L_f - L_i)/L_i) \times 100\%$ % Change In Width = $((W_f - W_i)/W_i) \times 100\%$ % Change In Height = $((H_f - H_i)/H_i) \times 100\%$	% % %	5 maximum 5 maximum 5 maximum
Water Absorption			
	Test sample is molded specimen, 150 mm × 150 mm × 25.4 mm. Weigh sample and record initial weight, W_i (g). Immerse in distilled water at +23 °C ± 3 °C, 50 mm below the surface of the water, for 1 h. Remove the specimen, blot dry, and weigh and record final weight, W_f (g). Calculate the absolute volume of water absorbed (V_{H_2O}) by the test sample: $W_f - W_i = W_{H_2O}(g)$ $W_{H_2O}(g) = V_{H_2O}(cc)$ $V_{H_2O} \leq$	cm ³	118
Ozone Resistance			
	ISO 1431-1; 100 pphm ± 10 pphm for 72 h (+0 h/-2 h) at +40 °C ± 2 °C Remove samples from chamber and wrap around a 25 mm diameter mandrel		No cracking or other indication of material breakdown