



Polyurethane Foam for Back Foaming

1 Scope

1.1 Material Description. Elastic two component system for the manufacturing of open cell, half rigid polyurethane (PUR) foam.

1.1.1 Description of System.

- A-Component: Polyol component ready for processing in which the ageing and hydrolysis stabilizer is totally dissolved with amine free activators and foaming agent.
- B-Component: Diphenylmethandiisocyanate (MDI) and higher condensed isocyanates.

1.2 Symbols. Not applicable.

1.3 Typical Applications. For back foaming of deep drawn foils, e.g., instrument panel.

1.3.1 Type 1. Type 1 has a defined density of $125 \pm 15 \text{ kg/m}^3$.

1.3.2 Type 2. For Type 2, the density is specified per approved material on the engineering drawing/in the math data. The density shall not deviate more than $\pm 5\%$ from the originally approved material.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM 925D	FMVSS 302	ISO 1798	ISO 3386-1
ASTM D3574-J	ISO 105-A02	ISO 1856-A	ISO 8067
CMVSS 302	ISO 845	ISO 1923	

2.2 GM Standards/Specifications.

GMW3059	GMW3232	GMW4659	GMW14357
GMW3205	GMW3235	GMW6992	GMW14363
GMW3221	GMW3259	GMW8081	GMW15634

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

3.1 General. The components manufactured from this foam must be homogeneous with regard to their foam structure, cell size, mechanical properties and surface condition.

3.1.1 The components shall be free from cracks, hard areas, blisters, unfoamed areas (voids) and other defects which could adversely affect the serviceability.

3.1.2 Foam reinforcement shall be securely bound to the foam and shall show no voids or cracks around them. Over the cross section, the foam shall show a uniform structure.

3.2 Test Piece and Number. If it is not possible to take test pieces from the part, then suitable plates shall be manufactured for the test (taken from equal manufacturing process, recipe of foam and density). The test piece shall be taken without skin and in rising direction of foam.

3.2.1 Aged Test Pieces. The foam is aged as a block (taken from equal manufacturing process, recipe of foam and density). After ageing, the test piece shall be taken from the aged foam block without skin and in rising direction of the foam.

3.2.2 Test Piece for Indentation Hardness. The indentation hardness test piece shall be taken from a foam block with skin. The same foam block shall be tested as received and after ageing.

3.3. Conditioning. Immediately prior to test, all test pieces shall be pre dried at $+70\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ and conditioned. The pre-drying period shall be $\geq 16\text{ h}$ for tests conducted after humidity aging to ASTM D3574-J/GMW14357 and shall be $\geq 3\text{ h}$ for other tests. Following pre-drying, all test pieces shall be conditioned to GMW3221, Code A.

3.4 Required Performance Values. All requirements listed in Table 1 shall be fulfilled by the delivered foam and shall be documented by the supplier in the Foam Certification Data Form (see Appendix A).

3.5 Basic Foam Physical Properties. All requirements listed in Table 2 shall be fulfilled by the delivered foam and shall be documented by the supplier in the Foam Certification Data Form (see Appendix A). Values indicated with "TBD" (To be Determined) shall be documented and may be noted on the drawing/in the math data for production quality check purposes. Values indicated with "N/A" (Not Applicable) are not required. Documentation of additional properties may be required by the approving region.

Table 1: Required Performance Values for Documentation

Performance	Test Method	Specified Value
Fogging	GMW3235 Method B-Y1-T1 (gravimetric, $\geq 1\text{ day}$ pre-drying, $+90\text{ }^{\circ}\text{C}$ test temperature)	$\leq 2\text{ mg}$
Flammability	GMW3232	Must comply to FMVSS 302 and CMVSS 302 B maximum less than 100 mm/minute
Interior Emissions	GMW15634/GMW8081 (relative emission)	<1.0
Resistance to Odor	GMW3205	
	Wet condition (Code A)	Rating 6 minimum
	Dry condition (Code B)	Rating 6 minimum
Steam Autoclav		
	PUR Foam-Polyether: 5 h, $+120\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ GMW14357 (ASTM D3574-J2 or GMW14357)	No visible degradation, specified values per Table 2
	PUR-Foam Polyester: 3 h, $+105\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ GMW14357 (ASTM D3574-J1 or GMW14357)	No visible degradation, specified values per Table 2
Mildew	GMW3259	No mildew.
Compatibility ^{Note 1}	GMW4659 or ASTM 925D, Method A, as specified by Materials Engineer	
	Color Stability of the Cover Layer Color Change Shade Change (if cover layer is leather or plastic roll goods only)	Visual Evaluation to GMW6992: No color change, slight darkening permissible. Grayscale to ISO 105-A02 Rating ≥ 3
	Other Changes	No adverse changes of shape, surface as the physical and chemical properties

Note 1: Foam shall meet compatibility in the production intended composite. The test pieces shall be sewn or welded (dependent on use), using production techniques, to all possible combinations of composite materials taken at the same time from production to form a test pack. Note, for any changes in the quality of any of the composite materials, compatibility tests shall be repeated. At the discretion of the approving GM Engineer, foam material may be tested to standard composite materials for initial foam approval, e.g., a standard vinyl. Nevertheless, final foam approval shall be achieved in the production intended composite.

Table 2: Basic Foam Physical Properties

Property	Test Method	Unit	Type	
			1	2
Density	ISO 845 ^{Note 1}	kg/m ³	125 ± 15	Report
Tensile Strength	ISO 1798	kPa		
	As-received condition		≥400	≥82
	After Heat Ageing, 500 h at +120 °C		≥360	≥82
	After Steam Autoclav (see Table 1)		≥320	Report
Elongation	ISO 1798	%		
	As-received condition		≥80	≥50
	After Heat Ageing, 500 h at +120 °C		≥80	Report
	After Steam Autoclav (see Table 1)		≥80	Report
Tear Strength	ISO 8067	N m		
	As-received condition		≥600	≥130
	After Heat Ageing, 500 h at +120 °C		≥600	Report
	After Steam Autoclav (see Table 1)		≥600	Report
Compression Force Deflection	ISO 3386-1 ^{Note 1}			
	As-received condition	kPa	50 ± 5	Report
	Maximum Change after Heat Ageing, 500 h at +120 °C	%	≥30	Report
	Maximum Change after Steam Autoclav (see Table 1)	%	≤50	≤50
Compression Set, 50%	ISO 1856-A	%	Report	Report
Indentation Hardness at Constant Force	GMW14363 but preload 5 N, primary load 100 N			
	As-received condition	mm	9 ± 1	Report
	Maximum Change after Heat Ageing, 500 h at +120 °C	%	≤30	Report
	Maximum Change after Steam Autoclav (see Table 1)	%	≤50	Report

Note 1: Determination of linear dimensions per ISO 1923. But compressive force of foot is 500 Pa, 0.5 kPa ± 5% and a 50 ± 0.1 mm diameter pressure. All readings should be taken after the pressure foot has been in contact with the material for at least 5 s.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.