



Crosslinked Polyolefin Foams for Interior Trim Applications

1 Scope

1.1 Material Description. This standard specifies the requirements for flexible, physically or chemically crosslinked polyolefin foams used in interior trim applications. The foam is physically crosslinked by ionizing radiation such as electron beams, alpha rays, beta rays and gamma rays or chemically crosslinked by compounds such as organosilanes, organic peroxides and azo compounds.

1.2 Symbols. >PP-X-E<, >PP+PE-X-E<, or >PE-X-E<.

1.3 Applicability. Typical applications are thermoplastic olefin (TPO) and plastic rolled good bi-laminates and interior trim for comfort, padding, vibration damping, or noise isolation.

Note: For polyolefin foams for general applications, see GMW15063. For polyurethane (PUR) foams for trim pads, see GMW15058. For polyurethane foams for general applications, see GMW14196 and GMW15061.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM D412	ISO 105-A02	ISO 1798	ISO 7500-1
ASTM D925	ISO 844	ISO 1856-C	ISO 8067
FMVSS 302	ISO 845	ISO 1923	ISO 23529

2.2 GM Standards/Specifications.

GMW3059	GMW3259	GMW14270	GMW15063
GMW3205	GMW4217	GMW14357	GMW15634
GMW3221	GMW4659	GMW14444	GMW16853
GMW3232	GMW6992	GMW15058	
GMW3235	GMW14196	GMW15061	

2.3 Additional References.

Bostik, Inc. Kit 7132K two-component adhesive available at www.bostik.com/smart-adhesives/lead-technologies/epoxy-adhesive

3 Requirements

3.1 Requirements on Test Specimens. All test pieces shall be conditioned to GMW3221, Code B.

3.1.1 General. The foam shall be uniform in structure and mechanical properties. Unfoamed areas (voids or abnormally large cells) are not permissible. The foam structure may be closed cell, partially closed/partially open cell or open cell morphology. The foam may have a skin on one (1) or both surfaces. Once the foam has been released, a substantial change of the formulation or structure which could adversely affect the subsequent processing or serviceability is not permissible unless this change has been previously tested and released by Global Materials Engineering.

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 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 specification data submission.

3.4 Basic Foam Physical Properties. The nominal thickness, overall density, tensile strength at +150 °C, elongation at +150 °C and thermal stability at +120 °C for a foam type suitable for positive (male) vacuum forming, negative (female) vacuum forming, press bond, compression molding and non-thermoforming processes listed in Table 2 (see **Notes** in Table 2 for exceptions) shall be fulfilled by the foam and shall be documented by the supplier in the specification data submission.

The nominal thickness, overall density, shear strength at +150 °C, elongation at +15 °C, and thermal stability at +140 °C for a foam type suitable for low pressure molding (LPM) processes listed in Table 3 shall be fulfilled by the foam and shall be documented by the supplier in the specification data submission.

All physical property testing indicated in Table 4 shall be performed on as-received foam. Foam containing natural content shall also be steam autoclaved to GMW14357, Code E (+120 °C $\pm$ 3 °C, 5 h $\pm$ 5%) followed by physical property testing indicated in Table 4. The physical properties indicated in Table 4 shall be documented in the specification data submission and may be noted on the drawing/in the math data for production quality check purposes. Documentation of additional properties may be required by the approving region.

Table 1: Required Performance Values for Documentation

Property	Test Method	Unit	Value
Flammability ^{Note 1}			
	Must comply with FMVSS 302 per GMW3232	mm/minute	≤ 100
Volatility of Organic Constituents (Fogging)			
	GMW3235. Method B-Y1-T1	mg	≤ 2
Interior Emissions			
	GMW15634 Volatile Organic Compound (VOC) Semi Volatile Organic Compound (SVOC)		To Be Reported To Be Reported
Resistance to Mildew Growth ^{Note 2}			
	GMW3259		No mildew
Odor			
	GMW3205, Wet condition (Code A) GMW3205, Wet condition (Code B)		≥ 6 rating ≥ 6 rating
Resistance to Staining (Color Stability) of the Cover Layer ^{Note 3}			
	ASTM D925, Method A (contact stain) or GMW4659 Visual Inspection		Report changes to the cover layer (dull or shiny appearance, graininess, etc.) as compared to the cover layer in as received condition
	Color change (visual evaluation to GMW6992)		No color change, slight darken permissible
	Shade change (if cover layer is leather or plastic roll good only) Grayscale to ISO 105-A02		Rating ≥ 3
	Other changes		Report changes (mold growth, shrinkage, etc.) which could adversely affect serviceability

Note 1: Testing may be performed at part, laminate, or foam level. Parts or laminates that meet the FMVSS 302 definition of a composite shall be certified at the composite level rather than the foam level (see 7.1, **Certification**).

Note 2: Required only if natural content is present in the foam.

Note 3: Foam shall meet compatibility with the production intended composite. The test pieces shall be sewn or bonded (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 a standard composite materials for initial foam approval (e.g., a standard vinyl, a standard Thermoplastic Olefin). Nevertheless, final foam approval shall be achieved with the production intent composite.