



Expanding, Reinforcing Structural Foam, Preformed, Body Shop

1 Scope

This standard covers the requirements of body shop applied structural foams used for structural reinforcement of body cavities and other areas where structural reinforcement is required and secondary for Noise, Vibration and Harshness (NVH) reduction. These materials impart structural integrity to the parts with which they come in contact, but shall not be considered a main structural component. The structural foam part is installed in the body shop, and expands to fill the cavity when processed through Electrodeposition Priming Operation (ELPO) bake ovens. These materials may be die cut, preformed, or molded.

1.1 Material Description. Materials approved to this standard may be either tacky or non-tacky. The materials must have suitable fasteners or maintain sufficient green strength to production substrates until they are fully expanded (cured). The materials must not accelerate corrosion of the substrate with which they come in contact.

1.1.1 Tacky (T). Tacky foam materials may be formed into parts which are applied directly to oily metal. They must remain in position in the uncured state up to and throughout the pretreatment, ELPO and baking process.

1.1.2 Non-tacky. Non-tacky foam materials generally require a carrier or fastener to hold them in place in the uncured state, up to and throughout the pretreatment, ELPO and baking process. Parts made from these materials have an optimum design for corrosion avoidance when they allow sufficient clearance between the uncured part and the adjacent metal to enable electrocoat coverage behind the part.

1.1.3 Material Types. Material types are defined by compressive modulus at target bake conditions defined in Table 3.

- **Type 1:** < 250 MPa
- **Type 2:** 250 MPa to 450 MPa
- **Type 3:** 450 MPa to 700 MPa
- **Type 4:** 700 MPa to 900 MPa
- **Type 5:** > 900 MPa

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include structural reinforcement of body cavities (i.e., pillars, rails) and other areas where lightweight structural reinforcement is desired.

1.4 Remarks. These materials are not intended to be weldable, fuel resistant, or applied in the paint shop.

2 References

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

2.1 External Standards/Specifications.

ASTM D638	ASTM D1875	ISO 527-1/2	ISO 4587
ASTM D1621	ASTM D5026		

2.2 GM Standards/Specifications.

9986321	GMW3059	GMW14729	GMW15735
GMW2	GMW3205	GMW15192	GMW16152
GMW8	GMW3221	GMW15416	GMW16700
GMW11	GMW3286	GMW15477	GMW16853
GMW3008	GMW14124	GMW15481	
GMW3011	GMW14270	GMW15634	
GMW3025	GMW14706	GMW15635	

2.3 Additional References.

ELPO Quality List (Provided by the Global Paint and Polymers Team)

3 Requirements

3.1 Requirements on Test Specimens. Test specimens shall be conditioned per GMW3221 Code B, unless otherwise specified in the respective test procedure.

3.1.1 Test Substrates. Testing shall be completed with the substrates in Table 1. For oily metal, use one challenging approved lubricant as specified by the approving material engineer. Degreasing and oiling according to GMW15477. Oil coating weight shall be 3 g/m² (+0 g/m²/-0.25 g/m²) for corrosion protection oils/lubricants and 1.25 g/m² (+0 g/m²/-0.25 g/m²) for drylubes. Oils shall not exceed a storage time of one (1) year and shall be stored in opaque and inert bins.

Table 1: Test Substrates

Substrate Description ^{Note 1}	
Steel Substrate	Oily Cold Rolled Steel: GMW2 M-ST-S U ^{Note 2}
Steel Substrate	Oily Electrogalvanized (EG) (GMW11): GMW2 M-ST-S EG60G60GE
Steel Substrate	Oily Hot Dipped Galvanized (HDG) (GMW8): GMW2 M-ST-S HD70G70GU
Aluminum Substrate	Oily Aluminum (Al) (GMW15192-M-Al-S)
Co-processed ELPO	Oily Cold rolled Steel (CRS) (GMW2) with Co-processed ELPO
Other Substrates	Other Substrates identified and required by the regional material engineering group or the regional material specification

Note 1: After application of the adhesive the oily metal panels shall be processed through pretreatment and Electrodeposition Primer Operation (ELPO) prior to baking and exposure according to 3.3.8.4.3 and 4.4.1. Use any GM approved pretreatment (GMW3011) and ELPO (GMW3008) at target film thickness, as specified by the approving material engineer.

Note 2: Cyclic corrosion testing according to 3.3.8.4.3 and 4.4.1 is not required with oily CRS.

3.1.2 Test Preparation. Three (3) panels per substrate per environmental condition outlined in 3.3.9 shall be made.

3.1.3 Configurations for Test Panels. If there is a conflict between GMW15477 and this standard, the requirements in this standard shall take precedence.

3.1.3.1 Tacky (T) Sealers. Uncured tacky material must adhere to oily metal vertically and must not be displaced by pretreatment, ELPO coating, or baking processes. Tacky sealers shall be tested unconstrained (all expansions), fully constrained (E0 expansion), and partially constrained (all expansions > E0) as defined in GMW15477. For > 100% expansion material to be tested in a constrained panel condition, see Table 2 for panel spacing.

3.1.3.2 Non-tacky sealers shall be tested partially constrained (all expansions > E0) as defined in GMW15477.

Table 2: Panel Spacing

Volumetric Expansion Description	Volumetric Expansion Code	Panel Spacing (t = 1 x Sealer Thickness)
Low Expansion	E50	0.5 t
Medium Expansion	E100	1 t
	E200	1.5 t
High Expansion	E300	2 t

3.1.4 Cure Schedules. All structural foam specimens to be tested shall be cured (object temperature) according to the schedules in Table 3.

Table 3: Cure Schedules

Target Temperature Bake	15 minutes at +160 °C
High Temperature (Overbake) Bake Schedule	60 minutes at +190 °C

3.2 Unexpanded (Uncured) Material Requirements.

3.2.1 Odor. The uncured structural materials must not have a toxic or noxious odor.

3.3 Expanded (Cured) Material and Performance Requirements.

3.3.1 Density (ASTM D1875). Expanded (cured) material density shall be reported and documented as part of the material approval.

3.3.2 Water Absorption (GMW16152). Material cured at the minimum and maximum bakes per Table 3 shall have water absorption as defined in Table 4.

Table 4: Water Absorption

Volumetric Expansion Description	Volumetric Expansion Code	Water Absorption (%) Maximum by Weight
Low Expansion	E50	1
Medium Expansion	E100	1
	E200	1
High Expansion	E300	2

3.3.3 Volumetric Expansion (GMW15481). Report the volumetric expansion for the material per Table 2 after each of the bakes. The volumetric expansion at the target bake shall be used to determine the approval category per Table 5.

Table 5: Volumetric Expansion

Volumetric Expansion Description	Volumetric Expansion Code	Volumetric Expansion at Target Bake Percent (%)
Low Expansion	E50 – T (Tacky) or Non-tacky	50 to 100
Medium Expansion	E100 – T (Tacky) or Non-tacky	> 100 to 200
	E200 – T (Tacky) or Non-tacky	> 200 to 300
High Expansion	E300 – T (Tacky) or Non-tacky	> 300