



Sealer, Preformed, Body Shop, Expandable

1 Scope

This specification details the physical and performance requirements for preformed (non-pumpable) sealer materials that are formed into parts. The parts are installed manually in the Body Shop to seal body joints from water, dust, and air intrusion. High-expanding versions of these sealers are used in baffles, which are intended to fill cross sections in body cavities and reduce airborne noise. The sealer material will expand and cure in the Paint Shop electrocoat (ELPO) oven.

1.1 Material Description. Materials approved to this standard may be either tacky or non-tacky.

1.1.1 Tacky (T). Tacky sealer 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 and electrocoat processes.

1.1.2 Non-tacky. Non-tacky sealer materials generally require a carrier or fastener to hold them in place in the uncured state, up to and throughout the pretreatment and electrocoat processes. 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.

1.2 Symbols. Not applicable.

1.3 Typical Applications. These materials are applied manually in the Body Shop.

1.4 Remarks.

1.4.1 These materials are not intended to be weldable or fuel resistant, or applied in the Paint Shop.

1.4.2 Submission Package. A submission package must be submitted for final approval of a material to this specification. The submission package shall contain a submission letter, product data sheet, panel preparation data, test data and results, bake charts, and Production Part Approval Process (PPAP) warrant data. Test panel performance shall be photographically documented, able to be transferred electronically, and retained with the submission package.

2 References

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

2.1 External Standards/Specifications.

EPA Method 24	ISO 1183	ISO 10365	ISO/TS 16949
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2.2 GM Standards/Specifications.

GM4389M	GMW3059	GMW15477	GMW16584
GMW2	GMW3205	GMW15481	GMW16656
GMW8	GMW14124	GMW15634	GMW16700
GMW11	GMW14706	GMW15635	GMW17056
GMW3008	GMW14729	GMW15735	
GMW3011	GMW14872	GMW16152	
GMW3016	GMW15192	GMW16546	

2.3 Additional References.

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

3 Requirements

Unless otherwise specified, the following requirements must be met. All testing shall be performed with materials that are representative of production processes.

3.1 Physical Properties.

3.1.1 Specific Gravity (ISO 1183 (Density), Part 1, Method B). The specific gravity of the uncured material shall be reported. A specific gravity range will be set at the time of approval and become a requirement for the material. A typical specific gravity is 1.2 in the uncured state.

3.1.2 Odor. The material shall have a neutral odor that is not unpleasant in the uncured condition.

3.1.3 Plant Emissions Volatile Organic Compounds (VOC) (GMW3016, EPA Method 24). GMW3016 is required for all regions. EPA Method 24 is additionally required for the U.S. and Canada. VOC shall be 2% by mass, maximum. If reported VOC exceeds 2% by mass, the composition of the VOC must be declared. For the U.S., hazardous air pollutants (HAP) shall be 1% by mass, maximum, based on the Material Safety Data Sheet (MSDS) formula. Evaluate after minimum and maximum bakes per Table 1, followed by 2 h at $(23 \pm 5)^\circ\text{C}$. Specific local plant review and approval is required prior to each new plant implementation of this material.

3.1.4 Passenger Compartment Emissions.

3.1.4.1 Volatile and Semi-Volatile Organic Compounds (SVOC) from Interior Materials (GMW15634). Test sample shall be baked at target bake per Table 1 and then conditioned for seven days at $(23 \pm 5)^\circ\text{C}$ before initiating the test procedure. After this conditioning, packaging is done as described for other test materials in GMW15634. Evaluate SVOC using 60 minutes at 120°C per GMW15634.

3.1.4.2 Aldehyde and Ketone Emissions from Interior Materials (GMW15635). Test sample shall be baked at target bake per Table 1 and tested within seven days after baking.

3.1.5 Odor after Bake (GMW3205) (Complete after 3.1.4.1 and 3.1.4.2). The material shall have a tolerable odor with a minimum rating of 6. The test sample shall be baked at target bake per Table 1, then conditioned for seven days at $(23 \pm 5)^\circ\text{C}$ before initiating the test. Use test volume ratio per GMW3205, Table 1, Coding 4 (1:500 ratio), and Wet Condition, Coding A.

Table 1: Bake Conditions

Category	Time at Metal Temperature
Minimum	15 minutes at 160°C
Target	20 minutes at 165°C
Maximum	60 minutes at 190°C
Full System	15 minutes at 160°C
	Cool to $(23 \pm 5)^\circ\text{C}$
	20 minutes at 177°C
	Cool to $(23 \pm 5)^\circ\text{C}$
	20 minutes at 141°C

3.2 Performance Requirements.

3.2.1 Tackiness. Prepare oiled hot dipped galvanized (HDG) metal panels per GMW15477, using two of the lubricants specified by the GM Materials Engineer. Press a piece of material (25 x 25 x 4) mm onto the oily HDG metal panel positioned vertically and hold for 2 s. When the finger is lifted, there shall be no material transfer to the skin or lifting of the sealer from the panel. Tack is either satisfactory or not satisfactory.

3.2.2 Expansion. Sealer shall display controlled expansion that is smooth and uniform after all bake conditions. Cell structure shall be closed cell, uniform, and free of large voids. Sealer shall show no loss of expansion or detrimental effects from subsequent bakes.

3.2.2.1 Volumetric Expansion (GMW15481). Report the volumetric expansion for the material after each of the bakes per Table 1. The volumetric expansion at the target bake shall be used to determine the approval category per Table 2.

3.2.2.2 Volumetric Expansion Range. The volumetric expansion range shall be calculated using a tolerance of $\pm 25\%$ based on the volumetric expansion at target bake and will become a requirement for the material. For example, if a material has an average of 120% volumetric expansion at target bake, the calculated volumetric expansion range will be (90 to 150)%. The volumetric expansion measured for the material shall be contained within that volumetric expansion range after each of the specified bake conditions (minimum, target, maximum, and full system). In addition, the volumetric expansion of the material shall be contained within the volumetric expansion range when measured at any point within the bake window defined by the following four points: minimum time/temperature, minimum time/maximum temperature, maximum time/minimum temperature, and maximum time/temperature.

Table 2: Volumetric Expansion

Volumetric Expansion Description	Volumetric Expansion Code	Volumetric Expansion at Target Bake (%)
No Expansion, or Very Low Expansion	E0 – T (Tacky) or Non-tacky	0 to 100
Low Expansion	E100 – T (Tacky) or Non-tacky	> 100 to 300
Medium Expansion	E300 – T (Tacky) or Non-tacky	> 300 to 500
	E500 – T (Tacky) or Non-tacky	> 500 to 700
	E700 – T (Tacky) or Non-tacky	> 500 to 700
High Expansion	E900 – T (Tacky) or Non-tacky	> 900

3.2.2.3 Vertical Expansion/Ramp Expansion (GMW17056). After baking a set of samples at minimum and maximum bakes per Table 1, report vertical expansion. A vertical expansion range will be established at the time of material approval and must be fulfilled by the product for all future deliveries.

3.2.2.4 Horizontal Expansion/Bridging (GMW16584). After baking a set of samples at minimum and maximum bakes per Table 1, horizontal expansion shall be reported. A horizontal expansion range will be set at the time of approval. All future product deliveries must fall within the set range.

3.3 Adhesion (ISO 10365) and Corrosion Performance (GMW14872, Underbody (UB)). Prepare test pieces/panels per GMW15477 for each of the specified bake conditions, using at least one panel per test. Include all substrates per Table 4. Prior to exposure to test environments and after specified bake conditions, test panels should be aged for 24 h at $(23 \pm 5)^\circ\text{C}$.

Note: Corrosion testing is not required with oily CRS.

3.3.1 Visually evaluate test pieces within 1 h after removal from the test environment. Remove the sealer per GMW14706 and evaluate the area beneath the entire expanded footprint of the sealer. The sealer shall display no cracking or loss of adhesion to the panel substrate. The sealer shall demonstrate a minimum of 80% cohesive separation from the substrate. If there is a constraining panel, evaluate both sealer-to-substrate interfaces. The evaluation criteria is summarized in Table 3.

3.3.2 Visually evaluate test pieces within 1 h after removal from the test environment. The metal substrate beneath the sealer shall display no white or red corrosion. Slight discoloration on the surface of the metal under the sealer may be acceptable if the discoloration does not penetrate the metal or contribute to corrosion. Slight undercutting around the perimeter of the expanded sealer is allowed on oily HDG and oily electrogalvanized (EG) substrates as long as the undercutting is uniform and not excessive. Undercutting is measured perpendicularly from the outermost edges of the expanded footprint of the sealer. In general, the maximum undercutting allowed increases slightly for higher expanding sealers. A general guideline for acceptable undercutting is approximately 1 mm for E0 sealer and approximately 5 mm for E900 sealer.