



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 or Electrodeposition (ELPO) oven.

Note: Due to new Electrocoat oven design, “2 step”, an additional lower temperature hold is required. Temperature and time could impact the performance of preformed body shop expandable sealers; therefore, in addition to the testing completed in this specification (specifically see 3.2.1), all preformed body shop sealers need to be tested at the target plant and in target locations of a vehicle to verify proper expansion and performance prior to launch.

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. The parts 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 sealer materials in place in the uncured state, up to and throughout the pretreatment and electrocoat processes. Parts made from these materials must allow sufficient clearance between the uncured part and the adjacent metal to enable electrocoat coverage behind the part and therefore prevent corrosion.

1.2 Symbols. Not applicable.

1.3 Applicability. 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

IATF 16949

ISO 1183-1

ISO 10365

2.2 GM Standards/Specifications.

GMW2	GMW3205	GMW15477	GMW16584
GMW8	GMW14124	GMW15481	GMW16656
GMW11	GMW14270	GMW15634	GMW16700
GMW3008	GMW14706	GMW15635	GMW17056
GMW3011	GMW14729	GMW15735	GMW17405
GMW3016	GMW14872	GMW16152	
GMW3059	GMW15192	GMW16546	

2.3 Additional References. None.

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 1183-1 (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 °C ± 5 °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 7 days at (23 °C ± 5 °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 7 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 six (6). The test sample shall be baked at target bake per Table 1, then conditioned for 7 days at (23 °C ± 5 °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 ^{Note 1}

Category		Time at Metal Temperature			
Electrocoat Minimum		15 minutes at 160 °C			
Electrocoat Target		20 minutes at 165 °C			
Electrocoat Maximum		60 minutes at 190 °C			
Full System Bake Schedule – Used only for testing Volumetric Expansion Range (See 3.2.3.2):					
Low Bake	Electrocoat	Low Limit (Minimum) 15 minutes at 160 °C (320 °F)		High Limit (Maximum) 60 minutes at 190°C (374 °F)	
	Primer/ Sealer Bake	Low Limit (Minimum) 15 minutes at 125 °C (257 °F)		High Limit (Maximum) 90 minutes at 158 °C (316 °F)	
	Topcoat Bake	Target (Nominal) (WB or SB + 1K) 20 minutes at 130 °C (266 °F)	Target (Nominal) (WB + 2K) 20 minutes at 121 °C (250 °F)	Target (Nominal) (WB or SB + 1K) 20 minutes at 130 °C (266 °F)	Target (Nominal) (WB + 2K) 20 minutes at 121 °C (250 °F)
High and Powder Bake	Electrocoat	Low Limit (Minimum) 15 minutes at 160 °C (320 °F)		High Limit (Maximum) 60 minutes at 190°C (374 °F)	
	Primer/ Sealer Bake	Low Limit (Minimum) 15 minutes at 158 °C (316 °F)		High Limit (Maximum) 60 minutes at 190 °C (374 °F)	
	Topcoat Bake	Target (Nominal) (WB or SB + 1K) 20 minutes at 130 °C (266 °F)	Target (Nominal) (WB + 2K) 20 minutes at 121 °C (250 °F)	Target (Nominal) (WB or SB + 1K) 20 minutes at 130 °C (266 °F)	Target (Nominal) (WB + 2K) 20 minutes at 121 °C (250 °F)
Three (3)-Wet Bake	Electrocoat	Low Limit (Minimum) 15 minutes at 160 °C (320 °F)		High Limit (Maximum) 60 minutes at 190°C (374 °F)	
	Sealer Bake	Low Limit (Minimum) 10 minutes at 140 °C (284 °F)		High Limit (Maximum) 20 minutes at 163 °C (325 °F)	
	Topcoat Bake	Low Limit (Minimum) 15 minutes at 130 °C (266 °F)		High Limit (Maximum) 80 minutes at 140 °C (284 °F)	

Note 1: Plus (+), One-Component (1K), Two-Component (2K), Basecoat (BC), Basecoat-Primer (BCP), Clearcoat (CC), Solventborne (SB), Waterborne (WB).

3.2 Performance Requirements.

3.2.1 New “2-step” Electrocoat Oven Bake Cycle. Run testing on the baffle/tape material according to the new “2-Step Electrocoat Bake Cycle” listed below. This test is to verify that the material will expand and perform according to the requirements needed per the vehicle design.

3.2.1.1 Two 2-Step Electrocoat Bake Cycle:

- Start oven set temperature to 72.2 °C (162 °F)
- After oven reaches 72.2 °C (162 °F), place your part (Baffle/tape) into oven
- Wait 11 minutes (7 minutes ramp + 4 minutes hold)
- Raise oven temperature to 100 °C (212 °F)
- Wait 7 minutes (ramp)
- Raise oven temperature to 149 °C (300 °F)
- Wait 7 minutes (ramp)
- Raise oven temperature to 177 °C (350 °F)
- Wait 17 minutes (7 minutes ramp + 10 minutes hold) = 17 minutes
- Total time = 42 minutes
- Evaluate and Document Results:** Ensure that all preformed sealer properties are achieved.

3.2.2 Tackiness. Prepare oiled Hot Dipped Galvanized (HDG) metal panels per GMW15477, using two (2) of the lubricants specified by the GM Materials Engineer. Press a piece of material (25 mm × 25 mm × 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.

3.2.3 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.

3.2.3.1 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.

3.2.3.2 Volumetric Expansion Range. The volumetric expansion range shall be calculated using a tolerance of ± 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 (4) points: minimum time/minimum temperature, minimum time/maximum temperature, maximum time/minimum temperature, and maximum time/maximum 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	> 700 to 900
High Expansion	E900 – T (Tacky) or Non-tacky	> 900