



Sealer, Global, Pumpable, High Appearance Paintable - Generic Qualification

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

This specification details the requirements of a high appearance paintable, normal weight, sealer. The material is applied in paint shop after the E-Coat bake before primer surface and must be capable of being either manually or robotically applied. The material is intended to seal interior and exterior body joints against water, dust, air intrusion and corrosion. The material must be compatible with primer surface and topcoat systems.

1.1 Material Description. The material must be a smooth and homogeneous mixture free of air, lumps, unmixed particles or foreign materials.

1.1.1 The material must be capable of being dispensed with approved and validated production displacement pumping and application equipment including: Single point streaming, ribbon tip (flat stream) and automated hem sealing.

1.1.2 It must not have a noxious or toxic odor in either the uncured or cured state.

1.1.3 In addition, the material must not adversely affect those personnel handling it.

1.1.4 The material must adhere to all approved production E-Coats. It must not have corrosion causing ingredients.

1.2 Symbols. Not applicable.

1.3 Applicability. Sealing of exterior high appearance joints, such as decklid upper gutters and swing metal hem flanges, in paint shop after the E-Coat oven but before primer surface application.

2 References

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

2.1 External Standards/Specifications.

ASTM D412	ASTM D2369	ISO 3219	SAE J1864
ASTM D1475	DIN 53203	ISO/TS 16949	
ASTM D2196	EPA Method 24	SAE J1524	

2.2 GM Standards/Specifications.

9986260	GMW3022	GMW14124	L 000 0597
9986261	GMW3025	GMW14829	
9986262	GMW3059	GMW15481	
GMW3016	GMW3205	GMW15634	
GMW3019	GMW3235	GMW16701	

2.3 Additional References.

- Z4 DIN (cup and spindle).
- Material submission book.

3 Requirements

3.1 Requirements on Test Specimens. Not applicable.

3.1.1 Requirements on Delivery.

3.1.1.1 Specific Gravity (ASTM D1475). Typically, 1.4 ± 0.2 .

3.1.2 Odor (GMW3205 – A - 1). Prepare a **cured film** of sealer that is $3 \text{ mm} \pm 0.5 \text{ mm}$ thick baked at the appropriate nominal bake conditions in Table 4. Cut test specimens from this cured film of material, then condition for 7 days at $23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ before initiating test procedure. Evaluate using the Wet Condition – Coding A and Volume Ratio Coding 5 from Table 1 of GMW3205. The material shall have a tolerable or better odor; minimum rating of 6.

3.1.3 Fogging (GMW3235–A–Y3–T2–90% Minimum). Prepare a **cured film** of sealer that is $3 \text{ mm} \pm 0.5 \text{ mm}$ thick baked at the appropriate nominal bake conditions in Table 4. Cut test specimens from this cured film of material, then condition for 7 days at $23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ before initiating test procedure. Evaluate using Photometric Method – Method A of GMW3235.

3.1.4 Volatile and Semi-Volatile Organic Compounds (SVOC) from Interior Materials (GMW15634). Prepare a **cured film** of sealer that is $3 \text{ mm} \pm 0.5 \text{ mm}$ thick baked at the appropriate nominal bake conditions in Table 4. Cut test specimens from this cured film of material, then condition for 7 days at $23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ before initiating test procedure. After this conditioning, packaging is done as described for other test materials. Evaluate SVOC using 60 minutes at $120 \text{ }^{\circ}\text{C}$ per 4.2.2.1 of GMW15634.

3.1.5 Volatile Organic Compound (VOC) Determination (Environmental Protection Agency (EPA) Method 24 Section 2.2 using ASTM D2369 Procedure B). Target is 35.9 kg/m^3 (0.3 lb/gal) or less. However, the final VOC of the product, including all weights, calculations and runs are to be identified and reported as data in the submission book.

3.1.5.1 Condensing Volatiles Test (GMW3016). Three percent (3%) maximum allowed when baked as follows and tested according to GMW3016:

- High Bake materials 20 minutes at $165 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$.
- Low Bake materials 20 minutes at $130 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$.

3.1.6 Viscosity. The viscosity shall be determined using the Pressflow and Brookfield methods.

3.1.6.1 Pressflow Viscosity (SAE J1524).

- Orifice: 1.32 mm (0.052 in).
- Pressure: 414 kPa (60 psi).
- Sample weight: 20 g.
- Test temperature is $25 \text{ }^{\circ}\text{C} \pm 0.5 \text{ }^{\circ}\text{C}$.

The viscosity requirements are as follows:

- Key Product Characteristic (KPC) requirement at 72 h from batch manufacture, the viscosity shall be $60 \text{ s} \pm 5 \text{ s}$.

In addition, when stored in proper conditions, the rate at which the viscosity increases with age **should not exceed the** following guidelines:

- Viscosity at 30 days $\leq$ 72 h value + 20%.
- Viscosity at 60 days $\leq$ 72 h value + 40%.
- Viscosity at 90 days $\leq$ 72 h value + 60%.

3.1.6.1.1 In no case should the material viscosity exceed 100 s at the end of the 90 day shelf life of the material.

3.1.6.1.2 The initial and aging viscosity data shall be provided in both numerical and graphed format in the material submission book.

3.1.6.2 Brookfield Viscosity (ASTM D2196).

- Spindle: Number 7.
- Rotational speed: 20 rpm.
- Take viscosity reading after 1 minute.
- Test temperature is $25 \text{ }^{\circ}\text{C} \pm 0.5 \text{ }^{\circ}\text{C}$.

The viscosity requirements are as follows:

- Key Product Characteristic (KPC) Requirement at 72 h from batch manufacture, the viscosity shall not be < 150 000 cps or > 165 000 cps.
- 3.1.6.2.1** In addition, when stored in proper conditions, the viscosity increase with age should not exceed 190 000 cps by the end of the 90 day shelf life of the material.
- 3.1.6.2.2** The initial and aging viscosity data shall be provided in both numerical and graphed format in the material submission book.
- 3.1.6.3** Determination of the viscosity using a rotational Viscometer (ISO 3219 using Z4 DIN cup and spindle).
- Rotation Speed 0 1/s to 130 1/s Sample test temperature 23 °C ± 0.5 °C.

Table 1: Viscometer Program

Test	Time	Start Speed	End Speed
Wait Period	300 s	0 1/s	0 1/s
Ascending	120 s	0 1/s	130 1/s
Hold Cycle	180 s	130 1/s	130 1/s
Descending	120 s	130 1/s	0 1/s

3.1.6.3.1 The relative viscosity, descending Bingham viscosity and Yield Point (**all KPC requirements**) at 72 h after batch manufacture shall be as follows:

- Descending Bingham: 13 Pa ± 2 Pa
- Yield Stress: 575 Pa ± 125 Pa

3.1.6.3.2 In addition, when stored in proper conditions, the viscosity increase with age shall not exceed the following values.

- Descending Bingham (at 90 days) – variation should not exceed 10% of 72 h data.
- Yield Point (at 90 days) – variation should not exceed 20% of 72 h data.

3.1.6.3.3 The measured and calculated data, along with the curves generated shall be included as data in the submission book.

3.1.7 Particle Size (DIN 53203). 200 µm maximum.

3.1.8 Color. White or light gray.

3.2 Performance Requirements.

3.2.1 Adhesion (GMW3019). One full set of test panels (bakes according to Table 2 and Table 3) must be prepared using a major production technology from each GM approved source of electrocoat. This must also include electrocoat technologies from all GM regions globally. The electrocoat panels for this testing must be prepared and processed in an actual assembly plant.

The material must be capable of demonstrating at least a minimum of fine line cohesion performance after the first primer/sealer bake.

Table 2: Bakes for Adhesion (Nominally Baked E-Coat)

Bake System	9986261, 9986262	9986260
	High Bake	Low Bake
Minimum prime/seal	15 minutes at 158 °C	15 minutes at 125 °C
Nominal prime/seal	20 minutes at 165 °C	20 minutes at 130 °C
Maximum prime/seal	90 minutes at 180 °C	90 minutes at 158 °C
Maximum powder prime/seal (9986262 only)	60 minutes at 190 °C	Not applicable

Table 3: Bakes for Adhesion (Over Baked E-Coat)

ELPO Bake	Sealer/Primer Bake
Maximum: 60 minutes at 190 °C	Minimum for High or Low Bake Primer: 15 minutes at 158 °C or 15 minutes at 125 °C

ELPO: E-Coat, Electrodeposition, Electrocoat

3.2.1.1 The material, when baked as described above in Table 2 and Table 3, must not crack or lose adhesion to the substrate during or after exposure to the following conditions. In addition, the material must demonstrate cohesive adhesion when peeled from substrate.

3.2.1.1.1 Initial Adhesion – after cooling to ambient temperatures.

3.2.1.1.2 Exterior Cycle – (GMW14124, Cycle F) – 12 cycles.

3.2.2 Shrinkage/Expansion GMW15481. Material baked as described in 3.2.1 Table 2 (maximum bakes only) must exhibit no (0%) expansion and no shrinkage > 2%.

3.2.3 Elongation ASTM D412, Method "A" (Using Die "C" Dumbbell). Material baked as described in 3.2.1 Table 2, must not exhibit < 100% elongation. This applied to all bakes (minimum, nominal, and maximum).

3.2.4 Porosity. The material must exhibit no signs of trapped air from either an external observation or a cross sectional view after being baked according to Table 2 (maximum bakes only).

3.2.5 Degradation Resistance. Apply two (2) beads of sealer, 3 mm high x 40 mm wide x 200 mm long, to the surface of a phosphated steel panel (inspect the panel first to be sure it is free of surface corrosion). Bake the panel as follows:

- For 9986261/9986262/L 000 0597 High Bake materials: Bake 1 h at 200 °C.
- For 9986260 Low Bake materials: Bake 1 h at 150 °C.

After baking, remove panel from oven and allow it to cool to room temperature.

3.2.5.1 After Bake. Remove one (1) sealer bead from the panel and inspect the surface of the panel. There must not be any corrosion on the panel surface where the sealer previously existed.

3.2.5.2 After Humidity. Expose the panels with the remaining sealer bead to 40 °C and > 98% humidity for 240 h.

3.2.5.3 After exposure, remove the remaining sealer bead and again inspect the panel. There must be no corrosion on the panel surface where the sealer previously existed.

3.2.6 Compatibility with Associated Production Material/Process. Compatibility with plant specific materials, such as deadener/damper, anti-chip primers, primer surfacers, and topcoats, shall be evaluated before introduction to any production facilities.

If any plant specific material issues need to be addressed during the approval process, the details must be discussed and resolved between the responsible engineer and the supplier, prior to the start of testing.

3.2.7 Topcoat Compatibility GMW14829. The test panels shall be prepared according to combinations of 3.2.7.1, 3.2.7.2, 3.2.7.3 and 3.2.7.4 and baked according to the appropriate bake schedule in Table 4 (High or

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