



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 Electrodeposition, Electrocoat, ELPO (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.

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	ASTM D2369	IATF 16949	SAE J1864
ASTM D1475	DIN 53203	ISO 3219	
ASTM D2196	EPA Method 24	SAE J1524	

2.2 GM Standards/Specifications.

9986260	GMW3022	GMW14270	GMW16853
9986261	GMW3025	GMW14444	GMW17405
9986262	GMW3059	GMW14829	L 000 0597
9986594	GMW3205	GMW15481	
GMW3016	GMW3235	GMW15634	
GMW3019	GMW14124	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 9. Cut test specimens from this cured film of material, then condition for 7 days at $23^\circ\text{C} \pm 5^\circ\text{C}$ 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 9. Cut test specimens from this cured film of material, then condition for 7 days at $23^\circ\text{C} \pm 5^\circ\text{C}$ 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 9. Cut test specimens from this cured film of material, then condition for 7 days at $23^\circ\text{C} \pm 5^\circ\text{C}$ before initiating test procedure. After this conditioning, packaging is done as described for other test materials. Evaluate SVOC using 60 minutes at 120°C (see 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 Material 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 $165^\circ\text{C} \pm 5^\circ\text{C}$.
- Low Bake materials 20 minutes at $130^\circ\text{C} \pm 5^\circ\text{C}$.

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

3.1.6.1 Castor-Severs (Pressflow) Viscosity (SAE J1524)

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

The viscosity requirements are shown in Table 1.

Table 1: Viscosity Requirements

Key Product Characteristic (KPC) requirement at 72 h from batch manufacture, the Castor Severs (Press-Flow) Viscosity shall be:	
9986260	55 s to 65 s
9986261	
9986262	
9986594 (Shanghai General Motors (SGM) Region)	9 s to 35 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 The 90 day Aging Castor-Severs Viscosity Requirements are shown in Table 2.

Table 2: 90 day Aging Castor-Severs Viscosity Requirements

At the end of the sealer 90 day shelf life, the sealer Castor-Severs (Press-Flow) Viscosity shall not exceed:	
9986260	104 s
9986261	
9986262	
9986594 (SGM Region)	56 s

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 °C $\pm$ 0.5 °C.

3.1.6.2.1 The 72 h Brookfield Viscosity Requirements are shown in Table 3.

Table 3: 72 h Brookfield Viscosity Requirements

Key Product Characteristic (KPC) requirement at 72 h from batch manufacture, the Brookfield Viscosity shall be:	
9986260	150 000 cps to 165 000 cps
9986261	
9986262	
9986594 (SGM Region)	55 000 cps to 140 000 cps

Note: cps = centipoise.

3.1.6.2.2 The 90 day Aging Brookfield Viscosity Requirements are shown in Table 4.

Table 4: 90 day Aging Brookfield Viscosity Requirements

At the end of the sealer 90 day shelf life, the sealer Brookfield Viscosity shall not exceed:	
9986260	190 000 cps
9986261	
9986262	
9986594 (SGM Region)	165 000 cps

3.1.6.2.3 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 (Rheometer) (ISO 3219 using Z4 DIN cup and spindle). See Table 5.

- Rotation Speed 0 1/s to 130 1/s Sample test temperature 23 °C ± 0.5 °C.

Table 5: Rotational Viscometer (Rheometer) Program

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

3.1.6.3.1 The 72 h Rotational Viscosity (Rheometer) Requirements are shown in Table 6.

Table 6: 72 h Rotational Viscosity (Rheometer) Requirements

Key Product Characteristic (KPC) requirement at 72 h from batch manufacture, the Descending Bingham Viscosity and the Yield Stress shall be as follows:		
GM Part Number	Descending Bingham Viscosity:	Yield Stress:
9986260	11 Pa s to 15 Pa s	450 Pa to 700 Pa
9986261		
9986262		
9986594 (SGM Region)	2 Pa s to 8 Pa s	250 Pa to 550 Pa

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

3.1.6.3.2.1 The 90 day and 30 day Aging Rotational Viscosity (Rheometer) Requirements are shown in Table 7.

Table 7: 90 day and 30 day Aging Rotational Viscosity (Rheometer) Requirements

Key Product Characteristic (KPC) requirement at 72 h from batch manufacture, the Descending Bingham Viscosity and the Yield Stress shall be as follows:				
GM Part Number	At Aging Time:	Relative Viscosity:	Descending Bingham Viscosity:	Yield Point:
9986260	At 90 days	Not applicable	Should not exceed 10% of 72 h data	Should not exceed 20% of 72 h data
9986261				
9986262				
9986594 (SGM Region)	At 30 days	Should not exceed 10% of 72 h data	Should not exceed 10% of 72 h data	Should not exceed 10% of 72 h data

- 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 Material submission book.

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

3.1.8 Color. White or light gray.

3.1.9 Total Volatile Organic Compounds (TVOC) from Interior Materials (TS-BD-003) for 9986594 (SGM Region). Prepare a cured film of sealer that is A4 size, 3 mm ± 0.2 mm thickness baked at the appropriate nominal bake conditions in Table 8. then condition for 7 days at 23 °C ± 5 °C before initiating test procedure. Evaluate TVOC per PATAc TS-BD-003.

3.2 Performance Requirements.

3.2.1 Adhesion (GMW3019). One (1) full set of test panels (bakes according to Table 8 and Table 9) 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 8: Bakes for Adhesion (Nominally Baked E-Coat)

Bake System	9986261 9986262	9986260	9986594 (SGM Region)
	High Bake	Low Bake	SGM – High Bake
Minimum prime/seal	15 minutes at 158 °C	15 minutes at 125 °C	15 minutes at 158 °C
Nominal prime/seal	20 minutes at 165 °C	20 minutes at 130 °C	20 minutes at 165 °C
Maximum prime/seal	90 minutes at 180 °C	90 minutes at 158 °C	60 minutes at 180 °C
Maximum powder prime/seal (9986262 only)	60 minutes at 190 °C	Not applicable	Not Applicable