



Adhesives, Two-Part, Urethane, Fiber Reinforced Plastic/Sheet Molding Compound (FRP/SMC)

1 Scope

1.1 Material Description. This specification describes the mixture of a two-part adhesive for primerless bonding of fiber reinforced plastic (FRP) panels or sheet molding compound (SMC) to FRP, primed steel or primed aluminum. The adhesive system is comprised of a resin component 9986131 and a hardener component 9986222. The mixture of 9986131 and 9986222 is identified as 9986223.

1.2 Symbols. Not applicable.

1.3 Applicability. The mixture of the hardener component 9986222 with the resin component 9986131 when mixed in the correct ratio will result in an adhesive that is suitable for bonding composite vehicle structures.

1.4 Remarks. This system must be capable of being metered, mixed, and dispensed with current production equipment. It shall be compatible with production paint systems, including paint, and cannot be adversely affected by paint oven temperatures reaching 130 °C.

2 References

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

2.1 External Standards/Specifications.

ASTM D570	ASTM D1144	ASTM D3418	ASTM E831
ASTM D638	ASTM D1338	ASTM D4065	SAE J243
ASTM D790	ASTM D2240	ASTM D4092	SAE J1756
ASTM D792	ASTM D2369	ASTM D4339	

2.2 GM Standards/Specifications.

9986131	GMW14270	GMW15735	GMW16185
9986222	GMW14444	GMW15921	GMW16853
GMW3059			

2.3 Additional References. None.

3 Requirements

3.1 Material Properties: Uncured Adhesive. See Table 1.

3.2 Visible Striations. The two (2) components shall be in contrasting colors. The colors shall be so picked that, in instances of improper mixing, color striations shall be visible in the dispensed bead.

3.3 Restricted and Reportable Substances. All materials supplied to this standard must comply with GMW3059, Restricted and Reportable Substances, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

Table 1: Material Properties: Uncured Adhesive

Properties	Values	Test Methods
Odor	The material shall not have a noxious odor in either cured or uncured condition.	ASTM D4339
Homogeneity	Materials must be homogeneous and free of lumps or air bubbles.	Visual
Sag Resistance	<5 mm	SAE J243, ADS-10
Working Time	30 minutes, minimum	ASTM D1338, Method A, 23 °C, dew point >10 °C, 10 mm diameter bead
Moisture Resistance (Working Life at dew points up to 26 °C)	Report	ASTM D1338
Time to Handling Strength	Approximately 120 minutes	ASTM D1144, 23 °C
Time to Peak Exotherm	No peak observed at 23 °C	ASTM D3418
Cure Time, 23 °C	24 h	ASTM D1144
Solids Content	100% Reactive	ASTM D2369

3.4 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.5 Additional Requirements. The manufacturer shall supply an Infra-red spectrum, a Differential Scanning Calorimetry scan and a Thermogravimetric scan of the mixed adhesive system.

3.6 Material Properties: Cured Adhesive. See Table 2.

Table 2: Material Properties: Cured Adhesive

Properties	Values	Test Methods
Density	1.26 kg/L	ASTM D792
Hardness	Shore D: 69 nominal	ASTM D2240, Method A
Glass Transition	-35 °C	ASTM D3418
Coefficient of Thermal Expansion	220 $\mu\text{m}/\text{m}/^\circ\text{C}$	ASTM E831
Moisture Absorption	0.52%	ASTM D570
Elongation	70%	ASTM D638
Tensile Strength	26 200 kPa nominal	ASTM D638
Flexural Strength	18 800 kPa nominal	ASTM D790
Flexural Modulus	765 000 kPa nominal	ASTM D790
Poisson's Ratio	0.349 nominal	ASTM D638
Young's Modulus	521 000 kPa nominal	ASTM D638
Bondline Readthrough	No unacceptable bondline readthrough	Visual