



ENGINEERING STANDARDS

Material Specification Adhesives

9986228

Adhesive, Two-Part, Urethane, FRP-SMC, Cartridge Use Only

1 Scope

This specification covers the mixture of a two-part adhesive for primerless bonding of fiber reinforced plastic panels (FRP or SMC) to FRP, primed steel or primed aluminum.

1.1 The adhesive system is comprised of a resin component 9986131 and a hardener component 9982227. The mixture of 9986131 and 9982227 is identified as 9986228.

1.2 This system must be capable of being dispensed in cartridges (Service Kits). It shall be compatible with production 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 D3418
ASTM D638	ASTM D4065
ASTM D790	ASTM D4092
ASTM D792	ASTM D4339
ASTM D1144	ASTM E831
ASTM D1338	SAE J243
ASTM D2240	SAE J1756

2.2 GM Standards/Specifications.

9986131	GM9828P
9986227	GMW3001or GM1003M
GM3629M	GMW3059
GM3653M	GMW3116

3 Requirements

3.1 Mixed Adhesive. Material conditioned using potential storage conditions must be capable of passing all the requirements of this specification.

3.2 Mix Ratio. The ratio of 9986131 to 9982227 is 1 to 1 by volume (1 to 1.07 by weight) and shall be capable of being varied $\pm 5\%$ and meet all the requirements of this specification.

3.3 Color. The two 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.

3.4 Nonsmoking (GM9828P). The adhesive shall not smoke up to 177°C and shall not be classified greater than a slight smoker at 200°C.

3.5 Material Properties – Uncured Adhesive. See Table 1.

3.6 Material Properties – Cured Adhesive. See Table 2.

3.7 Adhesive Properties. Test specimens, prepared as specified in the designated procedures, must meet the requirements of the following specifications.

3.7.1 GM3629M. Adhesion Performance Requirements for Bonding Exterior Sheet Molding Compounds (SMC).

3.7.2 Sample preparation. See GM3653M for procedure.

3.7.3 This procedure must be repeated for each bonding system under consideration for the application.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 All materials supplied to this specification must comply with the requirements of GMW3001, **Rules and Regulations for Material Specifications.**

5.2 All materials supplied to this specification must comply with the requirements of GMW3059, **Restricted and Reportable Substances for Parts.**

6 Approved Sources

Engineering qualification of an approved source is required for this specification. Only sources listed in the GM Materials File (i.e., MATSPC) under this specification number have been qualified by engineering as meeting the requirements of this specification.

7 Coding System

This material specification shall be referenced in other documents, drawings, VTS, CTS, etc. as follows:

Material per 9986228

8 Release and Revisions

8.1 Release.

This material specification originated in March 2003 and was approved by The Structural Adhesives Specialist Team in April 2003. It was first published in June 2003.

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	Material must be homogeneous and free of lumps or air bubbles.	
Sag Resistance	<5 mm	SAE J243, ADS-10, °C
Working Life	30 minutes, min	ASTM D1338, Method A, 23°C, dew point >10°C, 10 mm dia bead
Moisture Resistance (Working Life at dew points up to 26°C)	N/A	ASTM D1338
Time to Handling Strength	~ 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
VOC	0%	