

## ADHESIVE, TWO-PART, URETHANE, FRP - SMC

9986130

**1 SCOPE.** This specification covers the mixture of a two-part adhesive for primerless bonding of fiber reinforcement plastic panels (FRP or SMC) to FRP primed or primed aluminum.

1.1 The adhesive system is comprised of a resin component 9986073 and a hardener component 9986129. The mixture of 9986073 and 9986129 is identified as 9986130.

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

**2 REFERENCED STANDARDS.**

|           |            |            |
|-----------|------------|------------|
| GM1003M   | ASTM D638  | ASTM D4065 |
| GM3629M   | ASTM D790  | ASTM D4092 |
| GM3653M   | ASTM D792  | ASTM D4339 |
| GM9828P   | ASTM D1144 | ASTM E831  |
| 9986073   | ASTM D1338 | SAE J243   |
| 9986129   | ASTM D2240 | SAE J1756  |
| ASTM D570 | ASTM D3418 |            |

**3 REQUIREMENTS.**

3.1 Materials supplied to this specification shall meet the requirements of GM1003M.

3.2 MIXED ADHESIVE. Material conditioned using potential storage conditions must be capable of passing all the requirements of this specification.

3.3 MIX RATIO. The ratio of 9986073 to 9986129 is 3.5 to 1 by volume (4 to 1 by weight) and shall be capable of being varied  $\pm 5\%$  and meet all the requirements of this specification.

3.4 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.

3.5 NONSMOKING (GM9828P). The adhesive shall not smoke up to 177°C and shall not be classified greater than a slight smoker @ 200°C.

3.6 MATERIAL PROPERTIES - UNCURED ADHESIVE. See Table 1.

TABLE 1

| 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, 23°C                                      |
| Working Life                                                | 60 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                                   | 300 minutes                                                                      | ASTM D1144, 23°C                                            |
| Time to Peak Exotherm                                       | No peak observed @ 23°C                                                          | ASTM D3418, DSC Method                                      |
| Cure Time, 23°C                                             | 24 h                                                                             | ASTM D1144                                                  |
| VOC                                                         | 0%                                                                               | TBD                                                         |



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3.7 MATERIAL PROPERTIES - CURED ADHESIVE  
See Table 2.

**TABLE 2**

| Properties                       | Values                                   | Test Methods                                                                    |
|----------------------------------|------------------------------------------|---------------------------------------------------------------------------------|
| Density                          | 1.19 kg/L                                | ASTM D792,                                                                      |
| Hardness                         | Shore D: 55 nominal                      | ASTM D2240, Method A                                                            |
| Glass Transition                 | -46°C                                    | ASTM D3418                                                                      |
| Coefficient of Thermal Expansion | 198 $\mu\text{m}/\text{m}^\circ\text{C}$ | ASTM E831                                                                       |
| Moisture Absorption              | 1%                                       | ASTM D570                                                                       |
| Elongation                       | 38.4%                                    | ASTM D638                                                                       |
| Tensile Strength                 | 20 000 kPa nominal                       | ASTM D638                                                                       |
| Flexural Strength                | 15 600 kPa nominal                       | ASTM D790                                                                       |
| Flexural Modulus                 | 372 000 kPa nominal                      | ASTM D790                                                                       |
| Poisson's Ratio                  | 0.40 nominal                             | ASTM D638                                                                       |
| Young's Modulus                  | 372 000 kPa nominal                      | ASTM D638                                                                       |
| Bondline Readthrough             | No unacceptable bondline readthrough     |                                                                                 |
| Shrinkage                        | < 1%                                     |                                                                                 |
| Fogging                          | None                                     | SAE J1756 (Photometric Method, bath temperature 85°C, cooling temperature 38°C) |
| Shear Modulus                    | N/A                                      | ASTM D4065, ASTM D4092                                                          |

**4 ADHESIVE PROPERTIES.** Test specimens, prepared as specified in the designated procedures, must meet the requirements of the following specifications.

4.1 GM3629M, ADHESION PERFORMANCE REQUIREMENTS FOR BONDING EXTERIOR SHEET MOLDING COMPOUNDS (SMC).

4.2 SAMPLE PREPARATION. See GM3653M for procedures.

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

**5 OTHER TESTS MAY BE REQUIRED TO VALIDATE THE SPECIFIC APPLICATION.**

**6 GENERAL INFORMATION.** This standard was originated by MCD in February 1996 and approved by the Adhesives TDG in November 1996.