

POLYESTER SMC — LOW PROFILE, 27.5% GLASS REINFORCED

GMP.UP.003

1 SCOPE. This specification covers the properties of a low profile unsaturated polyester sheet molding compound that is reinforced with 27.5% chopped glass fibers that are 25 mm long and randomly oriented. This material can be coated in the molding press to seal porosity (IMC), bonded, and painted.

1.1 PAINTABILITY. Follow paint testing procedures listed in the GM APOPS Approval process for exterior applications (column for "new plastic"). Approved painting materials that can be used on the SMC substrate are listed in the GM MATSPEC Data Base. Use paint materials approved as follows:

1.1.1 Primer per 9984143.

1.1.2 Primer surfacer per 9984830 (if required at target plant).

1.1.3 Topcoat per 9984065.

1.1.4 Paint panels both with and without molded coating per 9984823.

1.2 BONDABILITY. The material must meet the bondability requirements of GM3629M using both urethane adhesive that has been approved to 9985786, and an epoxy that has been approved to 9985600.

1.3 APPLICATIONS. Typical applications include the following: Exterior and interior body panels.

2 REFERENCED STANDARDS.

GM3629M	9984830	ASTM D790
GM9077P	9985600	ASTM D792
9984065	9985786	ASTM D2584
9984143	ASTM D570	ASTM D4812
9984823	ASTM D638	

3 TEST PROCEDURES. Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions should be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processes, and/or handling the materials required by this specification.

3.1 Properties shall be determined using test specimens router cut from compression molded test plaques. Plaques shall be molded using the mold temperatures, mold pressure and cure cycle that will be used to mold production parts. Each material vendor shall define these molding conditions in his certifiable data package. The length and width of the test mold, as well as the charge pattern, shall be as shown in Figure 1. Plaques shall be 2.5 ± 0.1 mm thick. Weight variation between plaques shall not exceed $\pm 3.0\%$.

3.2 Raw materials used for compounding shall be within their vendor defined shelf life. Plaques shall be molded 7 days max after compounding. Plaques shall be uniform in appearance and free from blisters, pregels, knit lines, cracks, and surface

contamination. Porosity shall be 1 pit max per 625 mm². Surfaces shall also be free of external mold release. (Mold and scrap a minimum of 3 plaques after using external mold release.)

3.3 An equal number of specimens shall be cut from both the longitudinal and transverse plaque directions for each mechanical property. The specimens shall be tested and the results averaged. The average value is the material property value. This value is compared to the required value shown in the Compound Properties table(s).

3.4 Tests shall be conducted 40 h min after molding and immediately following a conditioning period of 24 h min @ $22 \pm 3^\circ\text{C}$ and $50 \pm 5\%$ RH unless otherwise specified. All testing shall be done on unannealed samples.

4 COMPOUND PROPERTIES.

4.1 COMPOUND PROPERTIES (NATURAL, GRAY AND BLACK). See Table 1.

4.2 CONSTITUENT MATERIALS. Individual specifications for the materials which constitute the SMC molding compound shall be established by the molder. Incoming materials shall be approved to those specifications by the molders laboratory before release for production. Test results shall be maintained by the molder and be available for General Motors review.

5 SUGGESTED COMPOUND VERIFICATION.

Inherent compound properties and test procedures that may be used to identify this material are listed below. The test value and test procedure requirements are identical to those listed in Section 4, Compound Properties.

Filler Content
Glass Fiber Content
Infrared Characterization Scan
Specific Gravity

6 COMPOUND AND SOURCE APPROVAL.

Each vehicle group and component division will have its own approved compound list derived from the corporate plastics file. No shipment shall be made by a new source until a sample of the compound manufactured at a production facility has been approved by the appropriate vehicle group and/or component division. Shipment receipt and certification requirements will vary among receiving locations.

6.1 A completed copy of the GM Material Safety Data Sheet (available from a GM laboratory or engineering department) must be submitted with any new submissions or when a composition change has occurred.

7 IDENTIFICATION. The molding compound shall be identified by the specification code, the manufacturer's identification code and lot number, along with any additional vehicle group and component division requirements.

GENERAL MOTORS ENGINEERING STANDARDS

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8 INSPECTION AND REJECTION. The purchaser reserves the right to sample incoming shipments even though it is the responsibility of the supplier to meet the requirements stated without dependence upon the purchaser's inspection. The supplier (whether prime contractor or subcontractor) will forfeit qualification if a change is made in material, processing methods, testing methods, or location of manufacture without prior written request to and subsequent approval from the purchaser.

9 GENERAL INFORMATION. This standard was originated by the Plastics Committee in June 1988. The latest revisions include:

Rev	Date	Description	Div
A	1/91	Upgrade to current template	PL
B	11/93	Update paint, bond requirements. Revise flexural and tensile modulus values	

TABLE 1 — COMPOUND PROPERTIES (NATURAL, GRAY AND BLACK)

Properties	Test Values	Test Methods
Glass Fiber Reinforcement	25 – 30%	TGA, GM9077P or ASTM D2584
Moisture Absorption	0.8% max	ASTM D570
Specific Gravity	2.0 max	ASTM D792
Flexural Modulus @ +22°C 0.5 mm deflection 2.5 mm deflection @ +150°C 0.5 mm deflection 2.5 mm deflection	7900 MPa min 6200 MPa min 3500 MPa min 2600 MPa min	ASTM D790, Method I, 1.3 mm/minute, 50 mm span, 25 mm wide specimen, secant calculations at 0.5 and 2.5 mm deflection
Flexural Strength	120 MPa min	ASTM D790, Method I, 1.3 mm/minute, 50 mm span, 25 mm wide specimen,
Tensile Strength At Break	58 MPa min	ASTM D638, Type I bar, 5 mm/minute
Tensile Modulus	8600 MPa min	ASTM D638, Type I bar, 5 mm/minute
Unnotched Izod Impact	890 J/m min	ASTM D4812
Mold Shrinkage (See NOTE 1)	0.00065 ± 0.00015 mm/mm	Measure on test plaques 250 mm min long x 250 mm min wide. Average the shrinkage from both length and width directions.

NOTE 1: This property assures reproducible mold shrinkage, but does not indicate the shrinkage to be used to cut tools for production parts.