



Polyester Sheet Molding Compound – Low Density 35% Glass Fiber and Glass Sphere Reinforced

1 Scope

1.1 Material Description. This specification covers the properties of an unsaturated polyester low-density sheet molding compound (SMC) that is reinforced with hollow glass spheres and 25 mm glass fibers that are randomly oriented.

1.2 Symbols. >UP-35GF<.

1.3 Applicability. Typical application includes non-class A closure panels.

2 References

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

2.1 External Standards/Specifications.

ASTM D638	ISO 178	ISO 527-1/2	ISO 2577
ASTM D790	ISO 180/U	ISO 1172	ISO 6603-2
ISO 62	ISO 527	ISO 1183	ISO 11359-2

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW15921	GMW16853
GMW3221	GMW14444	GMW16172	

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 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.

3.3 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.

3.4 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.

3.4.1 Properties shall be determined using test specimens router cut from compression molded SMC 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 this certifiable data package. The length and width of the test mold, as well as the gate configuration, shall be included in the certification package. Plaques shall be 2.5 mm $\pm$ 0.1 mm thick. Weight variation between plaques shall not exceed $\pm$ 3.0%.

3.4.2 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 one pit maximum per 625 mm². Surfaces shall also be free of external mold release. (Mold and scrap a minimum of three (3) plaques after using external mold release.)

3.4.3 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 Table 1.

3.4.4 Tests shall be conducted 40 h minimum after molding and immediately following a conditioning period of 24 h minimum at $+22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ and $50 \pm 5\%$ Relative Humidity (RH) unless otherwise specified. All testing shall be done on unannealed samples.

3.5 Compound Properties.

Table 1: Compound Properties

Properties	Test Values	Test Methods
Glass Fiber Reinforcement	34% - 44%	ISO 1172
Moisture Absorption	0.8% maximum	ISO 62, Method 1
Density	1.20% – 1.45%	ISO 1183, Method A
Flexural Modulus At $+22\text{ }^{\circ}\text{C}$ 0.5 mm deflection 2.5 mm deflection	6500 MPa 5800 MPa	ISO 178, Method 1, three-point loading 1.3 mm/minute, 70 mm span 25 mm wide specimen, secant calculations at 0.5 mm and 2.5 mm deflection
Flexural Strength	106 MPa minimum	ISO 178, Method 1
Tensile Modulus	7400 MPa minimum	ISO 527
Tensile Strength at Break	57 MPa minimum	ISO 527
Poisons' Ratio	Report	ISO 527-1/2
Unnotched Izod Impact	650 J/m	ISO 180/U
Multiaxial Instrumented Impact Maximum load Deflection to Maximum Load Energy to Maximum Load	1800 N minimum 6.5 mm maximum 3.5 J minimum	ISO 6603-2, speed of testing 2.2 m/s
Coefficient of Linear Thermal Expansion (CLTE)	Report values for flow and cross flow directions	ISO 11359-2, mean secant value of the temperature range $-30\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$
Mold Shrinkage	Report	ISO 2577
Knit Line Flexural Strength	15 MPa minimum	ASTM D790, Method 1 1.3 mm/minute, 50 mm span, 25 mm wide specimen. Cut specimen per Appendix A, Figure A1.
Knit Line Tensile Strength	14.5 MPa minimum	ASTM D638, Type I Bar, 5 mm/minute. Cut specimen per Appendix A, Figure A1.

3.5.1 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