



Polyester Sheet Molding Compound – Conductive, 30% Glass Reinforced

1 Scope

1.1 Material Description. This specification covers the properties of conductive low profile unsaturated polyester Sheet Molding Compound (SMC) that is reinforced with 30% chopped glass fibers that are 25 mm long and randomly oriented.

1.2 Symbols. The material abbreviation per ISO 11469 is > UP-GF30 <. The symbol shall be completed by the supplier according to the Glass Fiber (GF) content of the material.

1.3 Applicability. Typical applications include the following: inner panels for body panels.

1.4 Remarks. The classification into groups is according to the different ranges of GF content.

2 References

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

2.1 External Standards/Specifications.

ASTM D257	ISO 62	ISO 527-1	ISO 2577
ASTM D2584	ISO 178	ISO 1172	ISO 11469
IEC 60093	ISO 180	ISO 1183-1	

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW15921	GMW16853
GMW3221	GMW14444	GMW16172	

2.3 Additional References.

- Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

3 Requirements

3.1 Requirements on Test Specimens. 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.

3.1.1 Properties shall be determined using test specimens which are router cut from compression molded test plaques. Plaques shall be molded using the mold temperatures, mold pressure and a cure cycle that will be used to mold production parts. Each material vendor shall define these molding conditions in his certifiable data package. Plaques shall be 2.5 mm $\pm$ 0.1 mm thick. Weight variation between plaques shall not exceed $\pm$ 3.0%.

3.1.2 Raw materials used for compounding shall be within their vendor defined shelf life. Plaques shall be molded 7 days maximum after compounding. Plaques shall be uniform in appearance and free from blisters, pregels, knit lines, cracks, and surface contamination. Porosity shall be one (1) 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.)

3.1.3 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 (see Table 1).

3.1.4 Tests shall be conducted 40 h minimum after molding and immediately following a conditioning period of 24 h minimum at $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $50 \pm 5\%$ Relative Humidity (RH) unless otherwise specified. All testing shall be done on unannealed samples.

3.1.5 Requirements on Test Specimens. Reference GMW3221 Code A.

3.2 Compound Properties.

3.2.1 Compound Properties (Natural, Gray, and Black). See Table 1.

Table 1: Compound Properties (Natural, Grey, and Black)

Properties	Test Values	Test Methods
Glass Fiber Reinforcement	28% to 35%	Thermogravimetric Analysis (TGA) ASTM D2584, ISO 1172
Moisture Absorption	< 0.80	ISO 62 Method I
Specific Gravity	< 1.75	ISO 1183-1 Method A
Flexural Modulus at +22 °C at 0.5 mm deflection at 2.5 mm deflection Flexural Modulus at +150 °C at 0.5 mm deflection at 2.5 mm deflection	6700 MPa Minimum 5100 MPa Minimum 2700 MPa Minimum 750 MPa Minimum	ISO 178 80 mm × 25 mm × 2.5 mm specimen 40 mm span, 2 mm/minute secant calculation
Flexural Strength	150 MPa Minimum	ISO 178 Method 1
Tensile Strength at Break	55 MPa Minimum	ISO 527-1, Type IB specimen 5mm/minute
Tensile Modulus	7300 MPa Minimum	ISO 527-1 chord modulus between 0.05% and 0.25% strain
Unnotched Izod Impact	80 KJ/m ² Minimum	ISO 180, Type 1U specimen size 63.5 mm × 12.7 mm × 2.5 mm ± 0.2 mm
Mold Shrinkage ^{Note 1}	-0.045 to -0.110	ISO 2577
Core Conductivity	210 V Maximum Flat Test Panels	ASTM D257/IEC 60093

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

3.2.2 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 molder's laboratory before release for production. Test results shall be maintained by the molder and be available for GM review.