



Structural Sheet Molding Compound, Mid-Density

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose/Material Description. This material specification covers a mid-density sheet molding compound (SMC) material that has both glass fibers and glass spheres for reinforcement.

1.2 Symbols. The material abbreviation per ISO 11469 is >UP-GF55<, see 7.2 for details. The symbol shall be completed by the supplier according to the glass content of the material.

1.3 Applicability. Used for upper structure components and panels.

1.4 Remarks. The material must meet the bondability requirements of GMW15921, and exterior surfaces must meet the paint and surface quality requirements of GMW16172.

2 References

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

2.1 External Standards/Specifications.

ASTM D696	ASTM D6641	ISO 527-5	ISO 6603-2
ASTM D3410	ASTM E831	ISO 1172	ISO 11359-2
ASTM D3518	ISO 62	ISO 1183	ISO 11469
ASTM D4255	ISO 178	ISO 2577	ISO 14126
ASTM D5379	ISO 180	ISO 3795	ISO 14129

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW15921	GMW16172
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2.3 Additional References. Not applicable.

3 Requirements

3.1 Requirements on Test Specimens.

3.1.1 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.

3.1.2 The testing shall be completed using a minimum of three (3) unique lots of material.

3.1.3 The test specimens shall be router cut from test plaques that were molded using temperatures, pressure, and cure cycles that will be used to mold production parts. The mold conditions shall be stated in the certifiable data package. The length, width, and gate configuration of the test plaque mold shall be indicated in the data package and must follow the guidelines of Figure 1 in the Appendix. The test plaque thickness shall be 2.5 mm $\pm$ 0.1 mm. Variation in weight between plaques shall not exceed $\pm$ 3.0%.

3.1.4 The raw materials and all processing steps to create the material shall be within the vendor defined shelf life. The molded plaques shall be uniform in appearance, free from any surface defects, and free of external mold release. If mold release is used, mold and scrap a minimum of three (3) plaques after using the external mold release.

3.2 Material Properties Testing.

3.2.1 Data Reporting. The material shall be tested for all properties shown in Table 1: Composite Properties. For each mechanical property, an equal number of specimens shall be cut along the longitudinal and transverse directions. The tests shall be run, and the results will be averaged. The averaged value will be the value compared to the properties set in Table 1.

3.2.2 Composite Properties. See Table 1.

Table 1: Composite Properties

Properties	Test Values	Test Methods
Glass Content	55 ± 4%	ISO 1172
Moisture Absorption	Maximum 0.50%	ISO 62, Method 1
Specific Gravity	1.45 ± 0.15	ISO 1183, Method A
Coefficient of Linear Thermal Expansion (CLTE)	$1.7 \pm 0.2 \times 10^{-5} \text{ mm/mm } ^\circ\text{C}$	ISO 11359-2, ASTM E831, or ASTM D696, mean secant value over the temperature range -30 °C to +30 °C
Flexural Modulus At 23 °C 0.5 mm deflection 2.5 mm deflection At 150 °C 0.5 mm deflection 2.5 mm deflection	Minimum 7900 MPa Minimum 6700 MPa Minimum 4600 MPa Minimum 1900 MPa	ISO 178, Method 1. Three-point loading 1.3 mm/minute, 70 mm length 10 mm wide, thickness 2.5 mm to 3.0 mm, 60 mm span, secant calculations at 0.5 mm and 2.5 mm deflection
Flexural Strength	Minimum 220 MPa	ISO 178, Method 1
Poisson's ratio	Report	ISO 527-5
Tensile Strength at Break	Minimum 110 MPa	
Tensile Modulus	Minimum 10 400 MPa	
Compression Strength	Minimum 75 MPa	ISO 14126, ASTM D6641, or ASTM D3410
Compression Modulus	Minimum 4500 MPa	
In-Plane Shear Strength	Minimum 15 MPa	ISO 14129, ASTM D5379, ASTM D4255, or ASTM D3518
Shear Modulus	Minimum 3500 MPa	
Multi Axial Instrumented Impact • Energy to Maximum Load • Total Energy	Minimum 8 J Minimum 25 J	ISO 6603-2 Speed of testing = 2.2 m/s, -30 °C
Unnotched Izod Test	Minimum 80 kJ/m ²	ISO 180
Mold Shrinkage ^{Note 1}	Report	ISO 2577
Flammability, Burn Rate	Report	ISO 3795

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

3.3 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.