



Polypropylene Homopolymer - Long Glass Fiber Reinforced, Heat Stabilized, Weatherable, Chemically Coupled

1 Scope

This standard covers the properties of glass filled, heat resistant, weatherable, injection molding grade polypropylene.

1.1 Material Description. Materials certified to this material specification may have additional characteristics, e.g., paintable, elastomer modified, etc. Possible additional characteristics are defined in GMW3013.

1.2 Symbols. The material abbreviations according to ISO 11469 are shown in Tables 1 and 2.

1.3 Applicability. Typical applications include the following: sunroof wind deflectors.

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

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 179/1eA	ISO 1873-2	ISO 11359-1/2
ASTM E831	ISO 294	ISO 3167	ISO 11469
ISO 75	ISO 527-1/2	ISO 3451-1	SAE J1686
ISO 178	ISO 1183	ISO 4577	SAE J1976

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14444	GMW14650
GMW3059			

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013, General Requirements for Handling of Technical Terms of Delivery for Plastics.

3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 1873-2. Test methods and specimen dimensions are also to be in accordance with ISO 1873-2 with the following additions: Use ISO 3167, Type A, thickness 4 mm, for tensile and flexural properties.

All tests shall be performed on specimens 40 h minimum after molding and immediately following a conditioning period of 24 h minimum in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. All tests shall be performed on unannealed specimens.

The values specified in Table 1 and Table 2 shall be met by test specimens in natural or black. For colored grades where other pigment and additive systems (e.g., stabilizer) are used, the impact values shall not decrease more than 10% from the specified minimum value.

3.1.1 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact at their place of use.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2.

Note: The requirements to Table 1 and Table 2 shall be documented for self-certification of the product according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

3.3 Requirements on Materials. See Table 1 and Table 2.

3.4 Performance Requirements. Performance requirements, e.g., flammability, fogging or resistance to odor shall be specified on part drawings or in component specifications.

All finished parts for Interior applications shall meet the requirements according to GMW14444.

All finished parts for Exterior applications shall meet the requirements according to GMW14650.

3.5 Compound Properties. The following are also required for full specification approval. The minimum number of lots per test required is one in natural: tensile modulus, Poisson's ratio, stress strain curve at +23 °C, +85 °C, -30 °C; Differential Scanning Calorimetry (DSC) and Thermo Gravimetric Analysis (TGA) curves.

Table 1: Compound Properties (Natural and Black)

Property	Standard	Unit	Glass Fiber Reinforcement Percentage Range		
			30	40	50
ISO Symbol	ISO 11469	-	>PP - GF30<	>PP - GF40<	>PP - GF50<
Ash	ISO 3451-1, Method A	% by mass	30 ± 3	40 ± 3	50 ± 3
Density	ISO 1183, Method A	g/cm ³	Target Range 1.11 to 1.15	Target Range 1.19 to 1.26	Target Range 1.25 to 1.37
Average Glass Fiber Length		mm	Target Range: 10 to 13		
Tensile Strength at Break	ISO 527-1, ISO 527-2, specimen A, test speed 5 mm/minute	MPa	≥ 90	≥ 100	≥ 105
Flexural Modulus	ISO 178, 80 mm x 10 mm x 4 mm specimen, test speed 2 mm/minute, 64 mm span	MPa	5800 to 7400	7600 to 9500	9500 to 11 500
Tensile Modulus	ISO 527-1/2, specimen 1A, 1 mm/minute test speed	MPa	6700 to 7700	8600 to 9900	10 000 to 14 000
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m ²	≥ 2	≥ 15	≥ 25
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m ²	≥ 12	≥ 15	≥ 25
Deflection Temperature under Load, 1820 kPa, Method A	ISO 75 (refer to SAE J1686), flatwise	°C	≥ 150	≥ 155	≥ 155
Shrink, 48 h after Molding, Longitudinal	ISO 294, plaque size (100 mm x 150 mm x 3 mm)	%	Target Range: 0.39 ± 0.05 Note 1	Target Range: 0.29 ± 0.05 Note 1	Target Range: 0.24 ± 0.05 Note 1
Shrink, 48 h after Molding, Transverse	ISO 294, plaque size (100 mm x 150 mm x 3 mm)	%	Target Range: 0.64 ± 0.1 Note 1	Target Range: 0.68 ± 0.1 Note 1	Target Range: 0.39 ± 0.05 Note 1
Coefficient of Linear Thermal Expansion (CLTE), Longitudinal	ISO 11359-1/2, ASTM E831 Thermal Mechanical Analysis (TMA) from -30 °C to 110 °C	10 ⁻⁶ mm/mm °C	≤ 28.1	≤ 22.2	≤ 15.6