GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16211

Polypropylene Homopolymer - Glass Fiber Reinforced, Chemically Coupled, Higher Crystallinity, High Heat Resistant, Injection Moldable

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 standard covers the properties of a Glass Fiber (GF) reinforced, chemically coupled, high heat resistant, injection molding grade polypropylene homopolymer.

1.2 Symbols. The material abbreviation according to ISO 11469 is shown in Table 1.

1.3 Applicability. Typical applications include the following: Radiator fan shrouds, brackets and sunroof frames.

1.4 Remarks. The types in this specification are classified based on specific physical properties, including, tensile modulus, tensile strength, and elongation at higher temperature, as follows:

- **T1:** Typical tensile modulus and tensile strength for 30% glass fiber reinforced Polypropylene (PP) homopolymer with standard crystallinity for radiator fan blades and fan shrouds application.
- **T2:** High tensile modulus, tensile strength and high crystalline, polypropylene homopolymer with 30% GF for fan shrouds application.
- **T3:** Very high tensile modulus, tensile strength, and high crystalline, high performance polypropylene homopolymer with 45% GF for brackets and sunroof frames.
- **T4:** Very high tensile modulus, tensile strength, and high crystalline, high performance polypropylene homopolymer with 60% GF for brackets.

2 References

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

2.1 External Standards/Specifications.

ASTM D301	ISO 294	ISO 527-1/2	ISO 3795
ISO 75	ISO 294-4	ISO 1133	ISO 11359-1/2
ISO 179-1/1eA	ISO 527-1	ISO 1183	ISO 11469
ISO 188	ISO 527-2	ISO 3451-1	ISO 19069-2

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW15634
GMW3059	GMW3232	GMW14444	GMW15725
GMW3205	GMW3235	GMW14650	GMW16853

2.3 Additional References.

Plastic Submission Template

3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013.

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3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294, using the injection molding conditions specified in ISO 19069-2. Test methods and specimen dimensions are also to be in accordance with ISO 19069-2 with the following additions:

- 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 shall be met by test specimens in natural, black or in a standard sampled color if natural or black are not available.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1. The color shall be specified on drawings, in material specifications and otherwise.

Note: For each product, the requirements to Table 1 shall be documented by Plastic Certification Template. The color shall be specified on drawings, in material specifications and otherwise.

3.3 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.

3.4 Chemical Requirements. All parts manufactured from these materials shall be resistant to the media contacted at the place of use.

3.5 Compound Properties. See Table 1. The following are also required for full specification approval. The minimum number of lots per test required is one in natural:

- Interior Emissions report per GMW16853.
- Poisson's Ratio.
- Stress Strain Curve at multiple temperatures: -30 °C, +23 °C, +85 °C, +110 °C. See GMMPD tab on Plastic Submission Template for test parameters (contact specification owning group named in Section 6 for access).
- Coefficient of Linear Thermal Expansion (CLTE) data. See GMMPD tab on Plastic Submission Template for test parameters (contact specification owning group named in Section 6 for access).
- Differential Scanning Calorimetry (DSC) Curve.
- Fourier Transform Infrared (FTIR) Spectroscopy Curve.
- Mold Shrinkage.

See the Polypropylene tab on the Plastic Submission Template for the test procedures (contact specification owning group named in Section 6 for access).

3.6 Performance Requirements. Performance requirements 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.
- All finished parts for underhood applications shall meet the requirements according to GMW15725.

3.7 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.

Table 1: Compound Properties (Natural or Black)

Properties	Standard	Unit	Types and Requirements			
			T1	T2	T3	T4
International Organization for Standardization (ISO) Symbol	ISO 11469	-	>PP-GF30<	>PP-GF30<	>PP-GF45<	>PP-GF60<

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