



Polypropylene Homopolymer - Glass Fiber Reinforced, Chemically Coupled, High Heat Resistant, Copper Deactivated, Injection Molding

1 Scope

1.1 Material Description. This standard covers the properties of a glass filled, chemically coupled, high heat resistant, copper deactivated, 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 Blades and Shrouds.

1.4 Remarks. The specification is classification according to following types: The tensile modulus, and tensile strength and elongation at higher temperature:

- **T1:** High tensile modulus and strength, and a low elongation at higher temperature, Crystalline Polypropylene Homopolymer (PP) with 25% Glass Fiber (GF) for Radiator Fan Blades and Fan Shrouds application.
- **T2:** Normal tensile and strength, and a higher elongation at higher temperature, Polypropylene Homopolymer with 30% Glass Fiber for Fan Shrouds application.
- **T3:** Very high tensile modulus and strength, and a low elongation at higher temperature, High Crystalline High Performance Polypropylene Homopolymer with 30% Glass Fiber for Radiator Fan Blades and Fan Shrouds application.

2 References

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

2.1 External Standards/Specifications.

ISO 75	ISO 294-4	ISO 1183	ISO 3451-1
ISO 179/1eA	ISO 527-1/2	ISO 1873-2	ISO 11359-1/2
ISO 188	ISO 1133	ISO 3167	ISO 11469
ISO 294			

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221
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2.3 Additional References.

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

3 Requirements

3.1 Requirements on Test Specimens. Important physical, mechanical and thermal properties that characterize the material are summarized in charts. The color shall be specified on drawings, in material specifications and otherwise.

Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 1873-2.

All test specimens shall be brought to equilibrium in standard conditions for temperature and moisture and tested in that state as defined in GMW3221, Code A, unless the test method indicates that standard conditioning is not required. Condition specimens for a minimum of 24 h prior to testing or until moisture equilibrium is reached. If specimens are tested outside the conditioned environment, they shall be tested within 10 minutes of removal.

Test specimens in natural, black, or in a standard sampled color must meet the minimum values specified in the property tables if natural or black are not available. 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 Compound Properties (Natural and Black). See Table 1. The following are also required for full standard approval. The minimum number of lots per test required is one in natural: Poisson's Ratio, Coefficient of Linear Thermal Expansion (CLTE), Mold Shrinkage, Stress/Strain Curve at multiple temperatures (for example -30 °C, 23 °C, 90 °C and 120 °C), Viscosity Number and Differential Scanning Calorimetry (DSC) Curve. See GMW3013 for the test procedures and parameters.

Table 1: Compound Properties (Natural and Black)

Property	Standard	Units	Types and Requirements		
			T1	T2	T3
ISO Symbol	ISO 11469	-	>PP-GF25<	>PP-GF30<	>PP-GF30<
Glass Filler	ISO 3451-1, Method A	% by mass	23 to 27	28 to 32	28 to 32
Density	ISO 1183, Method A	g/cm ³	Target Range 1.0.08 to 1.12	Target Range 1.10 to 1.15	Target Range 1.10 to 1.15
Melt Flow Rate MFR 230/2.16	ISO 1133	g/10 minute	3 to 12	3 to 12	7 to 17
Melt Volume Flow Rate MVR 230/2.16	ISO 1133	cm ³ /10 minutes	To be reported	To be reported	To be reported
Tensile Modulus	ISO 527-1/2, ISO 3167, 4 mm thick Type A bar, 1 mm/minute	MPa	5200 to 7000	4000 to 5800	7200 to 8800
Tensile Strength at Break at 23 °C	ISO 527-1, ISO 527-2, specimen A, test speed 5 mm/minute	MPa	≥75	≥70	≥100
Tensile Strength at Break at 120 °C			≥25	≥20	≥30
Tensile Elongation at Break at 23 °C	ISO 527-1, ISO 527-2, specimen A, test speed 5 mm/minute	%	≥2	≥2	≥2
Tensile Elongation at Break at 120 °C			≤14	≤ 25	≤14
Tensile Strength at Break After Heat Aging	ISO 527-1/2, Test speed 5 mm/minute; Heat Age per ISO 188, 1500 h at 140 °C	% Retention	≥85	≥85	≥85
Tensile Strength at Break After Exposure to Copper	Test per paragraph 3.3 ISO 527-1/2, Test speed 5 mm/minute	% Retention	≥85	≥85	≥85

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