



Polypropylene Copolymer – Glass Fiber Reinforced, Chemically Coupled, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of injection moldable, glass fiber reinforced, chemically coupled, heat stabilized polypropylene copolymer.

1.2 Symbols. The material abbreviations according to ISO 11469 are shown in Table 1.

1.3 Typical Applications. Typical applications include the following: fan shrouds, under hood parts, cladding supports, brackets.

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 1183	ISO 11359-1/2
ISO 75-1	ISO 179/1eU	ISO 1873-2	ISO 11469
ISO 75-2	ISO 188	ISO 3167	
ISO 75-3	ISO 294	ISO 3451-1	
ISO 178	ISO 527-1/2	ISO 4577	

2.2 GM Standards/Specifications.

GMW3013	GMW3205	GMW3232
GMW3059	GMW3221	GMW3235

2.3 Additional References.

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

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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

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

Note: For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

3.2 Requirements on Test Specimens.

3.2.1 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. 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.

3.2.2 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. In addition, test specified at temperatures below or above 23 °C $\pm$ 3 °C shall be conducted at the specific temperature using specimens conditioned at specified temperature for 4 h minimum.

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

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

3.4 Compound Properties. See Table 1. The following are also required for full specification approval.

- The minimum number of lots per test required is one (1) in natural.
- Tensile Modulus, Poisson's Ratio, Stress Strain Curve at +23 °C, +85 °C, -30 °C.

3.5 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications.

Table 1: Compound Properties (Black or Natural)

Property	Test Method	Units	Nominal Glass Fiber Filler Percentage					
			5%	10%	20%	30%	40%	50%
ISO Symbol	ISO 11469	-	>PP/PE-GF05<	>PP/PE-GF10<	>PP/PE-GF20<	>PP/PE-GF30<	>PP/PE-GF40<	>PP/PE-GF50<
Ash	ISO 3451-1, Method A, at +600 °C	% by mass	5 $\pm$ 1	10 $\pm$ 2	20 $\pm$ 2	30 $\pm$ 2	40 $\pm$ 2	50 $\pm$ 2
Density	ISO 1183, Method A	g/cm ³	Target Range 0.94 $\pm$ 0.02	Target Range 0.97 $\pm$ 0.02	Target Range 1.05 $\pm$ 0.02	Target Range 1.14 $\pm$ 0.02	Target Range 1.22 $\pm$ 0.02	Target Range 1.33 $\pm$ 0.02
Melt Flow Rate MFR230/2.16	Report Results	g/10 minutes	Report Results	Report Results	Report Results	Report Results	Report Results	Report Results
Melt Volume Flow Rate MVR230/2.16	Report Results	cm ³ /10 minutes	Report Results	Report Results	Report Results	Report Results	Report Results	Report Results
Tensile Modulus	ISO 527-1/2 ISO 3167, 4 mm thick, Type A bar 1 mm/minute	MPa	1600 to 2600	2400 to 3600	4000 to 5200	5800 to 7200	8000 to 9200	9400 to 11 000
Tensile Modulus at 85 °C	ISO 527-1/2 ISO 3167, 4 mm thick, Type A bar 1 mm/minute	MPa	Report Results	Report Results	Report Results	Report Results	Report Results	Report Results
Tensile Strength at Break	ISO 527-1/2, specimen 1A, 5 mm/minute	MPa	$\geq$ 25	$\geq$ 40	$\geq$ 50	$\geq$ 65	$\geq$ 75	$\geq$ 85
Tensile Strength at Break after Heat Aging Note 1	ISO 527-1/2, specimen 1A, 5 mm/minute	% Retention	$\geq$ 85					
Flexural Modulus	ISO 178, 2 mm/minute	MPa	1400 to 2500	2200 to 3400	3400 to 4800	5400 to 6600	6800 to 8000	8600 to 11 000

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