



Polyamide 66 - 100% Post-Consumer Recycled Carpet Fiber, Mineral Filled/Glass Fiber Reinforced, Heat Stabilized

1 Scope

1.1 Material Description. This standard describes material types of mineral filled/glass fiber reinforced, heat stabilized 100% Post-Consumer Recycled (PCR) carpet materials polyamide 66 (nylon 66) which are used in injected form for molded components.

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

1.3 Typical Applications. Cam Covers, Fans/Shroud.

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

1.4.1 Virgin Material Comparison. Reference GMW8751 with similar percent of glass and mineral.

2 References

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

2.1 External Standards/Specifications.

ASTM D6869	ISO 188	ISO 1183	ISO 3451
ASTM E831	ISO 294	ISO 1874-2	ISO 11359-2
ISO 75-2	ISO 294-3/4	ISO 3146	ISO 11469
ISO 179/1eA	ISO 527-1	ISO 3167	ISO 15512
ISO 179/1eU	ISO 527-2		

2.2 GM Standards/Specifications.

GMW3013	GMW3205	GMW3235	GMW14335
GMW3059	GMW3221	GMW8751	

2.3 Additional References.

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

3 Requirements

Materials approved to this standard 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 1874-2. Test methods and specimen dimensions are also to be in accordance with ISO 1874-2 with the following additions: use ISO 3167, Type A, thickness 4 mm, for tensile and flexural properties.

Test values indicated in Table 1 are based on material with moisture content of 0.2% maximum (dry as molded) as tested per ASTM D6869, GMW14335, or ISO 15512, Method A or B. Immediately after molding, per ISO 1874-2, specimens shall be sealed in moisture-proof containers and stored at $+22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ for 24 h minimum. All tests shall be performed on unannealed specimens immediately after their removal from the containers in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. In addition, tests specified at temperatures below or above $+22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

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.

3.3 Requirements on Parts. Parts of this material type shall have a water content, when tested per GMW14335, at delivery of at least:

- 1.5% by mass for material types reinforced up to 20% by mass.
- 1.0% by mass for material types reinforced over 20% by mass.

Deviations from these requirements shall be specifically indicated on the part drawings.

3.4 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols at their places of use.

3.5 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, Stress Strain Curve at multiple temperatures. (For example -30 °C, +23 °C, +120 °C.) See GMW3013 for all test procedures and parameters.

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

Table 1: Compound Properties (Natural and Black)

Property ^{Note 1}	Standard	Unit	GF25-M15	M30-GF10
			Range	Range
ISO Symbol	-	-	>PA66-(GF25+MD15)<	>PA66-(MD30+GF10)<
Ash	ISO 3451 +950 °C	% by mass	35 to 44	35 to 44
Density	ISO 1183	g/cm ³	Target Range 1.4 to 1.5	Target Range 1.4 to 1.5
Tensile Modulus	ISO 527-1 ISO 527-2	MPa	10 000 to 18 500	9000 to 14 300
Stress at Break	ISO 527-1 ISO 527-2	MPa	>140	>145
Stress at Break at +22 °C After Heat Aging ^{Note 2}	ISO 527-1 ISO 527-2	% Retention	≥75	≥75
Strain at Break	ISO 527-1 ISO 527-2	%	>1.6	>1.4
Charpy Impact Strength	ISO 179/1eU			
at +22 °C	-	kJ/m ²	>34	>25
at -30 °C	-	kJ/m ²	> 0	>20
Charpy Notched Impact Strength	ISO 179/1eA			
at +22 °C	-	kJ/m ²	> 3	>2
at -30 °C	-	kJ/m ²	> 2	>1