GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17062

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 Polyamide 66 (Nylon 66) materials 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 Applicability. Cam covers, fans, and fan shrouds.

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 E831	ISO 294	ISO 1183	ISO 16396-2
ISO 75-2	ISO 294-3/4	ISO 3146	ISO 15512
ISO 179-1/1eA	ISO 527	ISO 3451	
ISO 179-1/1eU	ISO 527-1	ISO 11359-2	
ISO 188	ISO 527-2	ISO 11469	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW15634
GMW3059	GMW3235	GMW14335	GMW16853
GMW3205	GMW8751	GMW14444	

3 Requirements

3.1 Requirements on Test Specimens. Materials approved to this specification shall meet the requirements of GMW3013.

Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 16396-2. Test methods and specimen dimensions are also to be in accordance with ISO 16396-2. Test methods and specimen dimensions are also to be in accordance with ISO 16396-2.

All values indicated herein are based on material considered to be in the dry-as-molded state with moisture content of 0.2% maximum, ISO 15512 Method A or Method B, or GMW14335. Immediately after molding, per ISO 16396-2, specimens shall be sealed in moisture-proof containers and stored at 23 °C ± 2 °C for at least 24 h. 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 23 °C ± 2 °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. See the Polyamide tab on the Plastics Submission Template and GMW3013 for test details and parameters.

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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 Compound Properties (Natural and Black). See Table 1. The following are also required for full approval. The minimum number of lots per test required is one unless otherwise specified. See the Polyamide tab on the Plastics Submission Template and GMW3013 for test details and parameters.

- Poisson's Ratio
- Stress/strain data points and curves at the following temperatures: -30 °C, +23 °C, +85 °C, +110 °C, +125 °C, +150 °C, +170 °C

Note: See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.

- Coefficient of Linear Thermal Expansion (CLTE) data

Note: See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.

- Differential Scanning Calorimetry (DSC) curve
- Fourier Transform Infrared (FTIR) spectroscopy curve
- Mold shrinkage

3.4 Initial Source Approval. No shipments shall be made by any supplier until representative initial production samples have been approved by the appropriate Materials Engineering department(s) as meeting the requirements of this specification.

3.5 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.

3.6 Performance Requirements. Performance requirements, e.g., flammability, fogging or resistance to odor, shall be specified on part drawings or in component specifications. All parts manufactured from molding compounds shall be resistant to the media contacted, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols at the places of use.

3.7 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.

3.8 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 and Black)

Property [Note 1]	**Standard**	**Unit**	**GF25-M15**	**M30-GF10**
			Range	**Range**
International Organization for Standardization (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 18 000	900 to 14 300
Stress at Break	ISO 527-1, ISO 527-2	MPa	≥ 140	≥ 145

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