GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16270

Polyamide 66 - Glass Fiber Reinforced, Heat Stabilized, Hydrolysis Resistant

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 glass fiber reinforced, heat stabilized, hydrolysis resistant Polyamide 66 (nylon 66), 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. Typical applications include: Radiator End Caps, Radiator Caps, and Coolant Inlets.

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 D6869	ISO 188	ISO 1183-1	ISO 11469
ISO 75-2	ISO 294-1	ISO 3146	ISO 15512
ISO 179-1/1eA	ISO 527-1	ISO 3451-4	ISO 16396-2
ISO 179-1/1eU	ISO 527-2	ISO 11357-3	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14335	GMW15468
GMW3059	GMW14270		

2.3 Additional References.

- Plastic Submission Template

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 294-1 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.

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, +23 °C/50% RH, after 500 h coolant exposure.

  Note: See GM Material Property Database (GMMPD) tab on Plastics Submission Template for test details (contact specification owning group named in Section 6 for access).
- Coefficient of Linear Thermal Expansion (CLTE) data.

  Note: See GMMPD tab on Plastics Submission Template for test details (contact specification owning group named in Section 6 for access).
- 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 at delivery, when tested per GMW14335 or ISO 15512, Method A or Method B, 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 this shall be specifically indicated on the part drawings.

3.6 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from these materials shall be resistant to the media contacted, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at their place of use.

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 and Black)

			Glass Fiber Reinforcement Percentage		
			25%	**30%**	**35%**
Property	**Standard**	**Units**	**Value**	**Value**	**Value**
International Organization for Standardization (ISO) Symbol	ISO 11469	None	>PA66-GF25<	>PA66-GF30<	>PA66-GF35<
Ash	ISO 3451-4	%	22 to 28	27 to 33	32 to 38
Density	ISO 1183-1	g/cm^3	Target Range 1.29 to 1.36	Target Range 1.33 to 1.39	Target Range 1.37 to 1.43
Moisture Content	GMW14335, ISO 15512	%	≤ 0.2	≤ 0.2	≤ 0.2

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