GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16035

Polyamide 66 - Glass Fiber Reinforced, Heat Stabilized, UV Stabilized

1 Scope

1.1 Material Description. This standard covers the properties of various types of glass fiber reinforced, heat stabilized, ultraviolet (UV) stabilized 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 Applicability. Typical applications include Dome Lamp Housings, Integrally Colored Fasteners, and Seatbelt Components.

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 294	ISO 3146	ISO 11469
ISO 75	ISO 527	ISO 3451	ISO 15512
ISO 179/1eA	ISO 1183	ISO 3795	SAE J1885
ISO 188	ISO 1874-2	ISO 11357-3	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW3417	GMW14335
GMW3059	GMW3232	GMW14162	GMW15634
GMW3205	GMW3235	GMW14334	GMW16853

3 Requirements

3.1 Requirements on Delivery. 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 1874-2.

3.1.1 All values indicated herein are based on material considered to be in the dry-as-molded state with moisture content of 0.2% maximum (ASTM D6869, ISO 15512 Method A or Method B, or GMW14335). Immediately after molding, specimens shall be sealed in moisture proof containers and stored at 22 °C ± 3 °C for at least 24 h prior to test as specified in ISO 1874-2.

3.1.1.1 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 °C ± 3 °C, shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum. The minimum values specified in the property tables must be met by test specimens in natural, black, or in a standard sampled color if natural or black are not available.

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3.1.2 Compound Properties (Natural, Black, and Integrally Colored). See Table 1 and Table 2. The following are also required for full standard approval.

- The minimum number of lots per test required is one (1) 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, + 140 °C).
- Shear Modulus Curve.
- Differential Scanning Calorimetry (DSC) Curve.
- Infrared Spectroscopy Curve.

See GMW3013 for the test procedures.

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

Table 1: Compound Properties (Natural and Black)

			Glass Fiber Reinforcement Percentage				
			15%	**20%**	**25%**	**30%**	**35%**
Property	**Standard**	**Units**	**Value**	**Value**	**Value**	**Value**	**Value**
ISO Symbol	ISO 11469		>PA66-GF15<	>PA66-GF20<	>PA66-GF25<	>PA66-GF30<	>PA66-GF35<
Ash	ISO 3451	%	13 to 17	17 to 23	22 to 28	27 to 33	32 to 38
Density	ISO 1183	g/cm^3	Target Range 1.20 to 1.26	Target Range 1.24 to 1.30	Target Range 1.29 to 1.36	Target Range 1.33 to 1.39	Target Range 1.37 to 1.43
Tensile Modulus	ISO 527 5 mm/minute	MPa	5000 to 7000	6000 to 8000	7000 to 10000	8600 to 11600	9700 to 13300
Tensile Stress at Break	ISO 527 5 mm/minute	MPa	≥ 100	≥ 115	≥ 140	≥ 148	≥ 155
Stress at Break after Heat Aging Note 1	ISO 188 ISO 527 1000 h at +140 °C	% Retention	≥ 75				
Moisture Content	ISO 15512 Method A or Method B or GMW14335	%	≤ 0.2				

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