



Polyamide 66 – Long Glass Fiber Reinforced, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of long glass fiber reinforced, heat stabilized polyamide 66 for injection molding.

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

1.3 Applicability. Typical applications include, but are not limited to, the following: pedal arms, Condenser Radiator Fan Module (CRFM) mounting brackets (metal replacement), side view mirror stays.

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 1874-2	ISO 15512
ISO 75	ISO 527	ISO 3451	
ISO 179/1eA	ISO 527-1/2	ISO 3795	
ISO 188	ISO 1183	ISO 11469	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW16853
GMW3059	GMW3232	GMW14335	
GMW3205	GMW3235	GMW15634	

3 Requirements

3.1 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.

3.2 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. 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 B, or GMW14335). Immediately after molding, specimens shall be sealed in moisture-proof containers and stored at $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for at least 24 h prior to test as specified in ISO 1874-2. 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 $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ 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.

3.2.1 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 black: Poisson's Ratio, Coefficient of Linear Thermal Expansion (CLTE), Mold Shrinkage, Stress Strain Curve at multiple temperatures ($-30\text{ }^{\circ}\text{C}$, $+23\text{ }^{\circ}\text{C}$, $+140\text{ }^{\circ}\text{C}$), Shear Modulus Curve. See GMW3013 for the test procedures.

3.3 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

Table 1: Compound Properties (Natural and Black)

			Glass Fiber Reinforcement Percentage	
			40%	60%
Property	Standard	Units	Value	Value
ISO Symbol	ISO 11469		>PA66-GF40<	>PA66-GF60<
Ash	ISO 3451	%	37 to 43	57 to 63
Density	ISO 1183	g/cm ³	Target Range 1.40 to 1.53	Target Range 1.67 to 1.73
Moisture Content	ISO 15512, Method A or B or GMW14335	%	≤ 0.2	
Tensile Modulus	ISO 527-1/2	MPa	12 500 to 15 000	19 500 to 23 000
Tensile Stress at Break	ISO 527-1/2	MPa	≥ 160	≥ 225
Tensile Stress at Break after Heat Aging ^{Note 1}	ISO 188 ISO 527	% Retention	≥ 90	
Tensile Strain at Break	ISO 527-1/2	%	≥ 1.25	≥ 1.0
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m ²	≥ 20 ≥ 18	≥ 36 ≥ 36
Notched Charpy Impact after Heat Aging ^{Note 2}	ISO 188 ISO 179/1eA	% Retention	≥ 90	
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥ 250	≥ 250
Emission Testing of Interior Materials: For initial approval, test 1 lot in black.	GMW16853	-	-	
Odor	GMW3205-B3	Rating	≥ 6	
Fogging - Gravimetric	GMW3235-B-Y2-T2	mg	Requirements see GMW16853	
Emissions	GMW15634 VOC value SVOC value	µg/g µg/g	Requirements see GMW16853 Requirements see GMW16853	
Flammability	GMW3232 or ISO 3795 All reporting must be in accordance with GMW3232	mm/minute	SE (Self-Extinguishing) or ≤ 100	

Note 1: Specimens tested for Tensile Stress at Break to ISO 527 after heat aging 1000 h ± 5 h at +140 °C ± 5 °C according to ISO 188, Method A (air oven method) shall have a minimum of 75% retention relative to unaged specimens tested concurrently.

Note 2: Specimens tested for Notched Charpy Impact per ISO 179/1eA after heat aging 1000 h ± 5 h at +140 °C ± 5 °C according to ISO 188, Method A (air-oven method) shall have a minimum of 75% retention relative to unaged specimens tested concurrently. Charpy impact specimens shall be notched prior to aging.

Note: SVOC = Semi Volatile Organic Compound, VOC = Volatile Organic Compound.