



Polyamide 6 - Heat Stabilized, Extrusion Grade

1 Scope

1.1 Material Description. This specification describes heat stabilized, extrusion grade, low caprolactam polyamide 6 (nylon 6).

1.2 Symbols. The material abbreviation according to ISO 11469 is >PA6<.

1.3 Applicability. Windshield wiper fluid tubing.

2 References

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

2.1 External Standards/Specifications.

ASTM E831	ISO 294	ISO 1874-2	ISO 11359-2
ISO 75-2	ISO 527	ISO 3146	ISO 11469
ISO 179/1eA	ISO 1183	ISO 11357-3	ISO 15512
ISO 188			

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221	GMW14335
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3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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 (ISO 15512 Method A or B, or GMW14335). 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 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 $22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ 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.

3.3 Compound Properties. See Table 1. The following are also required for full standard approval. The minimum number of lots per test required for the following properties is one in natural: Poisson's Ratio, Coefficient of Linear Thermal Expansion (CLTE), Mold Shrinkage, Stress Strain Curve at multiple temperatures (for example $-30\text{ }^{\circ}\text{C}$, $23\text{ }^{\circ}\text{C}$, $85\text{ }^{\circ}\text{C}$). See GMW3013 for all test procedures and parameters.

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

Table 1: Compound Properties (Natural and Black)

Property	Standard	Unit	Value
ISO Symbol	ISO 11469	-	>PA6<
Caprolactam Content	-	%	≤ 1.0
Density	ISO 1183	g/cm ³	Target Range 1.04 to 1.11
Moisture Content	ISO 15512, Method A or B or GMW14335	%	≤ 0.2
Tensile Modulus	ISO 527	MPa	1700 to 2000
Tensile Stress at Yield	ISO 527	MPa	≥ 28
Tensile Stress at Yield after Heat Aging, 1000 h at 110 °C	ISO 527 ISO 188	% retention	≥ 75
Strain at Yield	ISO 527	%	≥ 2.0
Notched Charpy Impact Strength At +22 °C At -30 °C	ISO 179/1eA	kJ/m ²	≥ 65 ≥ 10
Notched Charpy Impact Strength: after Heat Aging, 1000 h at 110 °C, Notch Specimens Prior to Aging	ISO 179/1eA ISO 188	% retention	≥ 75
Melting Temperature:	ISO 3146 or ISO 11357-3	°C	Target Range 210 to 225
Heat Deflection Temperature Under Load: 1.8 MPa	ISO 75-2	°C	≥ 42
Coefficient of Linear Thermal Expansion (CLTE): Parallel to Flow Perpendicular to Flow	ASTM E831 or ISO 11359-2, Thermal Mechanical Analysis (TMA), Mean secant value over the temperature range -30 °C to +160 °C	10 ⁻⁶ mm/mm/°C	≤ 120 ≤ 220

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.