WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16948

Polyamide 6 - Heat Stabilized, Impact Modified, UV Stabilized

1 Scope

1.1 Material Description. This standard covers properties of various types of heat stabilized, impact modified, ultraviolet (UV) stabilized polyamide 6 (nylon 6) which are used in injected form for molded components.

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

1.3 Typical Applications. Typical applications include the following: interior components.

1.4 Remarks. The specification is classified by level of impact modifiers; additional types may be added as necessary:

- **T1:** High Impact modified.

2 References

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

2.1 External Standards/Specifications.

ASTM D3763	ISO 188	ISO 1874-2	ISO 11359-2
ASTM D6869	ISO 294	ISO 3146	ISO 11469
ASTM E831	ISO 294-3/4	ISO 3795	ISO 15512
ISO 75	ISO 527	ISO 6603-1/2	SAE J1545
ISO 179/1eA	ISO 1183	ISO 11357-3	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW3417	GMW14334
GMW3059	GMW3232	GMW14162	GMW14335
GMW3205	GMW3235		

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013, **General Requirements for Handling of Technical Terms of Delivery for Plastics.**

3.1 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2. 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, per ISO 1874-2, specimens shall be sealed in moisture-proof containers and stored at 22 °C ± 3 °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 °C ± 3 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

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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. The values specified in Table 2 shall be met by four typical interior colors for approval to the specification and by test specimens in specific colors as required during color development.

3.3 Compound Properties. See Tables 1 and 2. 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 °C, 23 °C, 100 °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)

			High Impact Grade, T1
Property [Note 1]	**Standard**	**Units**	**Value**
Density	ISO 1183	g/cm^3	Target Range 1.05 to 1.09
Moisture Content	GMW14335 or ISO 15512, Method A or B	%	≤0.2
Tensile Modulus	ISO 527	MPa	1200 to 2450
Stress at Yield	ISO 527	MPa	39 to 55
Stress at Yield after Heat Aging	ISO 188 ISO 527 1000 h at 110 °C	% Retention	≥75
Notched Charpy Impact Strength at +23 °C at -30 °C	ISO 179/1eA	kJ/m^2	 ≥45 ≥7
Notched Charpy Impact Strength after Heat Aging	ISO 188 ISO 179/1eA 1000 h at 90 °C	% Retention	≥75
Multiaxial Impact – Interior at +23 °C at Low Temperature	ASTM D3763 6.6 m/s	J at Maximum Load 30/30 Ductile at RT 30/30 Ductile at LT	 ≥22 ≥25 (0 °C)
Multiaxial Impact – Interior or Exterior at +23 °C at Low Temperature	ISO 6603-1/2 4.4 m/s	J at Maximum Load 30/30 Ductile at RT 24/30 Ductile at LT	 Report Report
Melting Temperature	ISO 3146 or ISO 11357-3	°C	Target Range 215 to 225
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥50
Fogging – Gravimetric	GMW3235-B-Y2-T2	mg	≤2

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