GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW8694

Polyamide 6 - Mineral Filled, Heat Stabilized

1 Scope

1.1 Material Description. This standard describes material types of mineral filled, heat stabilized polyamide 6 (nylon 6), 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. Beauty Cover, Wheel Covers, hidden Interior Parts.

1.4 Remarks. The classification into groups is according to the different ranges of mineral content.

2 References

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

2.1 External Standards/Specifications.

ASTM D6869	ASTM E831	ISO 75-1	ISO 75-2
ISO 75-3	ISO 179	ISO 294-3	ISO 294-4
ISO 527-1	ISO 527-2	ISO 960	ISO 1183
ISO 1874-2	ISO 3146	ISO 3167	ISO 3451
ISO 11359-2	ISO 11469	ISO 15512	ISO 188

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3205	GMW3221
GMW3232	GMW3235	GMW14335	GMW14444
GMW15634	GMW16853		

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 Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished according to ISO 294-3 and ISO 294-4 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 with the following additions: Use ISO 3167, Type A, thickness 4 mm, for tensile and flexural properties.

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 ± 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.

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. For colored grades where other pigment and additive systems (e.g., stabilizer) are used, the impact values shall not decrease more than 10 % from the specified minimum value.

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

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3.3 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.

3.4 Requirements on Parts. Parts of this material type shall have a water content at delivery, when tested per GMW14335 or ISO 960, Method A, 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.

3.4.1 Chemical Requirements. 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.

3.4.2 Compound Properties. See Table 1. The following are also required for full standard approval. The minimum number of lots per test required is one in natural: Stress/Strain Curve at multiple temperatures (-30 °C, +23 °C, +85 °C), Poisson's Ratio. See GMW3013 for all test procedures and parameters.

3.5 Process Requirements. Not applicable.

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

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Table 1: Compound Properties (Natural and Black)

Property [Note 1]	Standard	Unit	M30 Value	M40 Value
ISO Symbol	ISO 11469		>PA6-M30<	>PA6-M40<
Ash	ISO 3451 (+950 °C)	% by mass	27 to 33	36 to 44
Density	ISO 1183	g/cm^3	Target Range 1.30 to 1.44	Target Range 1.4 to 1.5
Moisture Content	ISO 15512 Method A or B or GMW14335	%	≤ 0.2	
Tensile Modulus	ISO 527-1 ISO 527-2	MPa	3700 to 6000	5100 to 7000
Stress at Break	ISO 527-1 ISO 527-2	MPa	≥ 70	≥ 75
Stress at Break after Heat Aging [Note 2]	ISO 527-1 ISO 527-2	% Retention	≥ 75	
Strain at Break	ISO 527-1 ISO 527-2	%	≥ 5	≥ 5
Charpy Notched Impact Strength	ISO 179/1eA			
at +23 °C		kJ/m^2	≥ 4	≥ 3
at -30 °C		kJ/m^2	≥ 3	≥ 2

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