GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW8693

Polyamide 66 - Mineral Filled, Heat Stabilized

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose/Material Description. This specification covers the properties of mineral filled, heat stabilized polyamide 66 (nylon 66), which are used in injected or extruded form for molded components.

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

1.3 Applicability. Cylinder head covers, shift cable components.

1.4 Remarks. The classification into groups is according to the different ranges of mineral content. Additional mineral ranges will be added as necessary.

2 References

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

2.1 External Standards/Specifications.

ISO 75-2	ISO 527-1	ISO 3451	ISO 15512
ISO 179-1/1eA	ISO 527-2	ISO 3795	ISO 16396-2
ISO 188	ISO 1183	ISO 11357-3	
ISO 294	ISO 3146	ISO 11469	

2.2 GM Standards/Specifications.

GMW3013	GMW3232	GMW14444	GMW16853
GMW3059	GMW3235	GMW14797	
GMW3205	GMW14270	GMW15634	
GMW3221	GMW14335	GMW16172	

2.3 Additional References.

Plastic Submission Template

3 Requirements

3.1 Requirements on Test Specimens. Materials approved to this specification shall meet the requirements of GMW3013.

Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 16396-2. Test methods and specimen dimensions are also to be in accordance with ISO 16396-2.

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 Method B, or GMW14335). Immediately after molding, per ISO 16396-2, specimens shall be sealed in moisture-proof containers and stored at 23 °C ± 2 °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 23 °C ± 2 °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 1 shall be met by four typical interior colors (black, gray, tan/neutral, and either red or blue) for approval to the specification and by test specimens in specific colors as required during color development. These test specimens may be produced using generic colorants in the four colors or by specific colors required by a GM program. See the Polyamide tab on the Plastic Submission Template (contact specification owning group named in Section 6 for access) and GMW3013 for test details and parameters.

3.2 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.

3.3 Compound Properties (Natural, Black and Integrally Colored). See Table 1. The following are also required for full approval. The minimum number of lots per test required is one unless otherwise specified. See the Polyamide tab on the Plastic Submission Template (contact specification owning group named in Section 6 for access) and GMW3013 for test details and parameters.

- Poisson's Ratio
- Stress/strain data points and curves at the following temperatures: -30 °C, +23 °C, +85 °C, +110 °C, +125 °C

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Coefficient of Linear Thermal Expansion (CLTE) data

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Differential Scanning Calorimetry (DSC) curve
- Fourier Transform Infrared (FTIR) spectroscopy curve
- Mold shrinkage

3.4 Initial Source Approval. No shipments shall be made by any supplier until representative initial production samples have been approved by the appropriate Materials Engineering department(s) as meeting the requirements of this specification.

3.5 Requirements on Parts. Parts of this material type shall have a water content at delivery, when tested per GMW14335 or ISO 15512, Method A or Method B, 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.

3.6 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from these materials shall be resistant to the media contacted, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at the places of use.

3.7 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.

3.8 Paintability. Plastics used for painted applications are required to meet Paint Performance Requirements for New Plastic Materials per GMW16172. Additionally, painted plastic parts are required to meet Painted Plastic Parts Performance Requirements per GMW14797.

3.9 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

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