GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16753

PA66 + SAN (Polyamide + Styrene Acrylonitrile) - 10% Mineral Filled, Heat Stabilized, Impact Modified

1 Scope

1.1 Material Description. This standard covers the properties of a 10% mineral filled, heat stabilized, impact modified Polyamide 66 + Styrene Acrylonitrile (PA66 + SAN) blend which is used in injected form for molded components.

1.1.1 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.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PA66+SAN-I+M10<.

1.3 Applicability. Typical applications include mirror shells.

2 References

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

2.1 External Standards/Specifications.

ASTM D6869	ISO 294-3	ISO 1874-2	ISO 11469
ISO 75	ISO 294-4	ISO 3146	ISO 15512
ISO 179/1eA	ISO 527	ISO 3451	
ISO 188	ISO 1183	ISO 11357-3	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14335	GMW16172
GMW3059	GMW14270	GMW14797	

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 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 Method B, or GMW14335). Immediately after molding, per ISO 1874-2, 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.

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.

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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. 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 (1) 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, +85 °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.

3.5 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)

Property	Standard	Units	Range
Ash	ISO 3451	% by mass	8 to 12
Density	ISO 1183	g/cm^3	Target Range 1.13 to 1.19
Moisture Content	ISO 15512 Method A or Method B, or GMW14335	%	≤ 0.2
Tensile Modulus	ISO 527 1 mm/minute	MPa	2600 to 3500
Tensile Stress at Yield	ISO 527 50 mm/minute	MPa	≥ 47
Tensile Strain at Yield	ISO 527 50 mm/minute	%	≥ 2.5
Tensile Stress at Yield after Heat Aging	ISO 188 ISO 527 1000 h at 80 °C	% Retention	≥ 75
Notched Charpy Impact Strength at +23 °C at -30 °C	ISO 179/1eA	kJ/m^2	≥ 6 ≥ 2.5
Notched Charpy Impact Strength after Heat Aging	ISO 188 ISO 179/1eA 1000 h at 80 °C	% Retention	≥ 75
Melting Temperature	ISO 3146 or ISO 11357-3	°C	Target Range 255 to 265
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥ 65
Mold Shrinkage (for reference only) after 48 h at 23 °C Parallel to Flow Perpendicular to Flow	ISO 294-3, ISO 294-4	%	Target Range 1.04 to 1.08 1.80 to 2.10

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