GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17438

Polyamide 66 + Polyphenylene Ether (PPE) – Heat Stabilized, Blend

1 Scope

1.1 Material Description. This specification covers the properties of heat stabilized, pelletized, injection molding grades of Polyamide 66 and Polyphenylene Ether (PPE) blend.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PA66+PPE<.

1.3 Applicability. Typical applications include the following:

- T1: General Purpose – Wheel Trim
- T2: Higher Impact, Higher Heat Aging Temperature- Hinge Covers, Wheel Trim

2 References

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

2.1 External Standards/Specifications.

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

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14335
GMW3059	GMW14270	

3 Requirements

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 1874-1.

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, specimens shall be sealed in moisture-proof containers and stored at +23 °C ± 2 °C for at least 24 h prior to test as specified in ISO 1874-2. 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 minimum values specified in the property tables must be met by test specimens in natural, black, or in a standard sampled color if natural or black are not available.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in charts. The color shall be specified on drawings, in material specifications and otherwise.

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3.3 Compound Properties (Natural and Black). See Table 1. The following are also required for full standard approval. The minimum number of lots per test required is one (1) in natural:

- Poisson's Ratio
- Electronic Stress/Strain Curve at multiple temperatures, (for example: -30 °C, +23 °C, +85 °C),
- Coefficient of Linear Thermal Expansion (CLTE)
- Mold Shrinkage

See GMW3013 for all test procedures and parameters.

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

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)

			T1	T2
Property	**Standard**	**Units**	**Range**	**Range**
Density	ISO 1183	g/cm^3	Target Range 1.05 to 1.15	
Moisture Content	ISO 15512 or GMW14335	%	≤ 0.2	
Tensile Modulus	ISO 527-1, ISO 527-2 1 mm/minute	MPa	2300 to 2625	1980 to 2625
Tensile Stress at Yield	ISO 527-1, ISO 527-2 50 mm/minute	MPa	≥ 60	≥ 50
Tensile Elongation at Yield	ISO 527-1, ISO 527-2 50 mm/minute	%	≥ 3.0	≥ 3.0
Tensile Stress at Yield after Heat Aging	ISO 188 ISO 527-1, ISO 527-2 1000 h at 80 °C	% Retention	≥ 90	
Notched Charpy Impact Strength at +23 °C at -30 °C	ISO 179/1eA	kJ/m^2	≥ 6 ≥ 4.5	≥ 15 ≥ 3.5
Notched Charpy Impact Strength after Heat Aging	ISO 188 ISO 179/1eA 1000 h at 80 °C	% Retention	≥ 60	≥ 70
Melting Temperature	ISO 3146 or ISO 11357-3	°C	Target Range 245 to 265	
Heat Deflection Temperature under Load 0.45 MPa	ISO 75	°C	≥ 160	≥ 145
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥ 103	≥ 103
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 1.2 to 1.4 1.2 to 1.4	Target Range 0.9 to 2.3 0.8 to 2.2

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