GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15740

Polyolefin Alloy – 2500 MPa Flexural Modulus, 33% Mineral Filled

1 Scope

1.1 Material Description. This standard covers the properties of a 2500 MPa nominal flexural modulus polyolefin alloy, pellet form, injection molding compound. For the purpose of this specification, polyolefin alloy is defined as an alloy of polypropylene plastic and Ethylene Propylene (EP) or Ethylene Propylene Diene Monomer (EPDM) rubber.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PP+EPDM-M33<.

1.3 Applicability. Typical applications include painted grilles, fascia brackets.

1.4 Remarks. 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.

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 178	ISO 527-1/2	ISO 11359
ASTM D3763	ISO 179-1/1eA	ISO 1133	ISO 11469
ISO 75-1	ISO 294	ISO 1183	ISO 19069-2
ISO 75-2	ISO 306	ISO 3167	
ISO 75-3	ISO 527-1A	ISO 3451-1	

2.2 GM Standards/Specifications.

GMW3013	GMW14270	GMW14797
GMW3059	GMW14444	GMW16172
GMW3221	GMW14650	GMW16853

2.3 Additional References.

Thermoplastic Polyolefin (TPO) Certification Template available at GM SupplyPower under "Collaborate", "Document Library" (https://gmsupplypower.covisint.com/web/portal/home).

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 19069-2. Test methods and specimen dimensions are also to be in accordance with ISO 19069-2 with the following additions: use ISO 3167, Type 1A, thickness 4 mm, for tensile and flexural properties.

All tests shall be performed on specimen 40 h minimum after molding and immediately following a conditioning period of 24 h minimum in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. All tests shall be performed on unannealed specimens.

The values specified in Table 1 shall be met by test specimens in natural or black.

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 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media contacted at the place of use.

3.4 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1.

Note: For each product the requirements to Table 1 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

3.5 Compound Properties. See Table 1. The following are also required for full specification approval (the minimum number of lots per test required is one):

- Poisson's Ratio
- Stress vs. Strain Curve at 23 °C, -30 °C, and +85 °C
- Multiaxial Impact Curves

See the Thermoplastic Polyolefin (TPO) Certification Template available at GM SupplyPower under "Collaborate", "Document Library" (https://gmsupplypower.covisint.com/web/portal/home) for the test procedures.

3.6 Performance Requirements. Performance requirements, e.g., flammability, fogging or resistance to odor shall be specified on part drawings or in component specifications.

All finished parts for interior applications shall meet the requirements according to GMW14444. All finished parts for exterior applications shall meet the requirements according to GMW14650.

3.7 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.

Table 1: Compound Properties (Black or Natural)

Properties	Standard	Unit	Values
Mineral Filler (Ash)	ISO 3451-1, Method A at 600 °C	% by mass	30 to 37
Density	ISO 1183, Method A	g/cm^3	1.12 to 1.19
Melt Flow Rate (MFR) 230/2.16	ISO 1133	g/10 minutes	11 to 18
Melt Volume Flow Rate (MVR) 230/2.16	ISO 1133	cm^3/10 minutes	Report results
Flexural Modulus	ISO 178, 2 mm/minute test speed	MPa	2100 to 3050
Tensile Modulus	ISO 527-1/2, Specimen 1A, 1 mm/minute test speed	MPa	Report results
Tensile Stress at Yield	ISO 527-1/2, Specimen 1A, 50 mm/minute test speed	MPa	≥ 17
Multiaxial Impact Strength at 23 °C ± 2 °C	ASTM D3763 Specimen to be either square 100 mm × 100 mm, or circle 100 mm diameter minimum. Sample thickness to be 3.2 mm. 2.2 m/s impact velocity	J at maximum load	≥ 15 All failures must be ductile
Multiaxial Impact Strength at -10 °C ± 2 °C	ASTM D3763 Specimen to be either square 100 mm × 100 mm, or circle 100 mm diameter minimum. Sample thickness to be 3.2 mm. 2.2 m/s impact velocity	J at maximum load	≥ 20 All failures must be ductile
Notched Charpy Impact at +23 °C	ISO 179-1/1eA	kJ/m^2	Report result

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