GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15185

Polyolefin Alloy – 1000 MPa Flexural Modulus, High Flow

1 Scope

1.1 Material Description. This standard covers the properties of a 1000 MPa nominal flexural modulus polyolefin alloy, high flow, pellet form, injection molding compound. For the purpose of this standard, 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-M13<.

1.3 Typical Applications. Typical applications include the following: painted exterior trim, body side moldings, cladding.

1.4 Remarks. Regarding 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.

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 75-2	ISO 306	ISO 3167
ASTM D3763	ISO 75-3	ISO 527-1/2	ISO 3451-1
ASTM E228	ISO 178	ISO 1133	ISO 11359
ASTM E831	ISO 179/1eA	ISO 1183	ISO 11469
ISO 75-1	ISO 294	ISO 1873-2	

2.2 GM Standards/Specifications.

GMW3013	GMW14270	GMW14650	GMW16172
GMW3059	GMW14444	GMW14797	GMW16853
GMW3221			

2.3 Additional References.

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

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 1873-2. Test methods and specimen dimensions are also to be in accordance with ISO 1873-2 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.

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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.

3.3 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact at their 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 Curve

See the Thermoplastic Polyolefin (TPO) certification template 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 Content (Ash)	ISO 3451-1, Method A	% by mass	9 to 17
Density	ISO 1183, Method A	g/cm³	0.93 to 1.02
Melt Flow Rate (MFR) 230/2.16	ISO 1133	g/10 minutes	Target Range: 23 to 27 **Note 1**
Melt Volume Flow Rate (MVR) 230/2.16	ISO 1133	cm³/10 minutes	Target Range: 28 to 34 **Note 1**
Flexural Modulus	ISO 178, 80 mm × 10 mm × 4 mm specimen, 2 mm/minute test speed, 64 mm support span	MPa	900 to 1200
Tensile Modulus	ISO 527-1/2, specimen 1A, 1 mm/minute test speed	MPa	800 to 1600
Tensile Stress at Yield	ISO 527-1/2, specimen 1A, 50 mm/minute test speed	MPa	> 13
Multiaxial Impact Strength at +23 °C ± 2 °C	ASTM D3763. Specimen to be either square 100 × 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 -+30 °C ± 2 °C	ASTM D3763, specimen C, 2.2 m/s impact velocity	J at maximum load	> 15 All failures must be ductile
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m²	Report Results
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m²	Report Results

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