GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16826

Polyolefin Alloy - 1700 MPa Flexural Modulus, High Flow, Low Density

1 Scope

1.1 Material Description. This standard covers the properties of a nominal 1700 MPa flexural modulus polyolefin alloy, high flow, low density, pellet form, black colored 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-M12<.

1.3 Applicability. Typical applications include the following: fully painted bumper fascias and rocker moldings.

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 178	ISO 1133	ISO 11359
ASTM D3763	ISO 179/1eA	ISO 1183	ISO 11469
ASTM E228	ISO 294-1/2/3/4	ISO 1873-2	
ASTM E831	ISO 306	ISO 3167	
ISO 75-1/2/3	ISO 527-1/2	ISO 3451-1	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14797	GMW16172
GMW3059	GMW14270		

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 A, thickness 4 mm, for tensile and flexural properties.

All tests shall be performed on specimens for 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. 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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3.1.1 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact at their place of use.

3.1.2 Requirements on Materials. See Table 1. A minimum of six (6) lots shall be tested to Table 1. The following are also required for full specification approval (the minimum number of lots per test required is one (1)):

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

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

Note: The requirements to Table 1 shall be documented for self-certification of the product according to GMW3013. The color shall be black if not otherwise specified on drawings, etc.

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

3.4 Additional Testing Requirements. Materials approved to this specification will be required to have basic material properties generated so warp analysis modeling can be conducted. See GM engineer for details.

3.5 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)

Properties	Standard	Unit	T1	T2
Mineral Filler Content (Ash)	ISO 3451-1, Method A at +600 °C	% by mass	10 to 14	
Density	ISO 1183, Method A	g/cm³	0.94 to 0.99	
Melt Flow Rate (MFR) 230/2.16	ISO 1133	g/10 minutes	21 to 33	33 to 38
Melt Volume-Flow Rate (MVR) 230/2.16	ISO 1133	cm³/10 minutes	26 to 34	35 to 45
Flexural Modulus	ISO 178, 80 mm × 10 mm × 4 mm specimen, 2 mm/minute test speed, 64 mm support span	MPa	1550 to 1850	
Tensile Modulus	ISO 527-1/2, specimen 1A, 1 mm/minute test speed	MPa	1550 to 1850	
Tensile Stress at Yield	ISO 527-1/2, specimen 1A, 50 mm/minute test speed	MPa	≥ 13	
Multiaxial Impact Strength at +23 °C	ASTM D3763. Specimen to be either square 100 × 100 mm, or circle 100 mm diameter minimum. Sample thickness to be 3.2 mm. Impact velocity is 2.2 m/s.	J at maximum load	≥ 15 All failures must be ductile	
Multiaxial Impact Strength at -30 °C	ASTM D3763. Specimen to be either square 100 × 100 mm, or circle 100 mm diameter minimum. Sample thickness to be 3.2 mm. impact velocity 2.2 m/s.	J at maximum load	≥ 15 All failures must be ductile	
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m²	≥ 50	
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m²	≥ 5	
Vicat Softening Temperature (VST)/A/50	ISO 306	°C	≥ +120	
Heat Deflection Temperature (HDT), Method A	ISO 75-1, ISO 75-2, ISO 75-3	°C	≥ +50	
Thermal Oxidative Stability	ASTM D3012 500 h at 150 °C	Not applicable	No visible indication of local	

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