GM WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16336

Polyolefin Alloy, 20% Mineral Filled, 1800 MPa Flexural Modulus

1 Scope

1.1 Material Description. This specification covers the properties of a 20% nominal mineral filled, 1800 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.

1.1.1 Additional Characteristics. Materials certified to this material specification may have additional characteristics, e.g., paintable, elastomer modified, etc. Possible additional characteristics are defined in GMW3013.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PP+EPDM-M20<.

1.3 Applicability. Typical applications include injection molded bumper energy absorbers, and fully painted exterior trim components.

2 References

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

2.1 External Standards/Specifications.

ASTM D3763	ISO 75-3	ISO 527-1/2	ISO 11359
ASTM E228	ISO 178	ISO 1133	ISO 11469
ASTM E831	ISO 179	ISO 1183	
ISO 75-1	ISO 294	ISO 3451-1	
ISO 75-2	ISO 306	ISO 6603-2/40/20/C/4.4	

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221

3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013. Important physical, mechanical, and thermal properties that characterize the material are summarized in Table 1. The color shall be specified on drawings and otherwise.

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Compound Properties. 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
- Multiaxial Impact Curve

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

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Table 1: Compound Properties (Black or Natural)

Properties	Standard	Unit	Values
Mineral Filler (Ash)	ISO 3451-1, Method A at 600 °C	% by mass	17 to 28
Density	ISO 1183, Method A	g/cm³	1.02 to 1.1
Melt Flow Rate (MFR) 230/2.16	ISO 1133	g/10 minutes	18 to 26
Melt Volume Rate (MVR) 230/2.16	ISO 1133	cm³/10 Minutes	24 to 28
Flexural Modulus	ISO 178, 80 mm × 10 mm × 4 mm specimen, 2 mm/minute test speed, 64 mm support span	MPa	1550 to 2050
Tensile Modulus	ISO 527-1/2, specimen 1A, 1 mm/minute test speed	MPa	1950 to 2250
Tensile Stress at Yield	ISO 527-1/2, specimen 1A, 50 mm/minute test speed	MPa	≥ 19
Multiaxial Impact Strength at 23 °C ± 2 °C	ASTM D3763, specimen C, 2.2 m/s impact velocity	J at maximum load	≥ 15 All failures must be ductile
Multiaxial Impact Strength at -15 °C ± 2 °C	ASTM D3763, specimen C, 2.2 m/s impact velocity	J at maximum load	≥ 15 All failures must be ductile
Multiaxial Impact Strength at 23 °C ± 2 °C	ISO 6603-2/40/20/C/4.4. Sample to be either square 60 mm × 60 mm minimum, or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm.	J	≥ 7 All failures must be ductile (Type YD or YS only)
Multiaxial Impact Strength at 0 °C ± 2 °C (or lowest temperature at which only type YD or YS failures are observed)	ISO 6603-2/40/20/C/4.4. Sample to be either square 60 mm × 60 mm minimum, or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm.	J	≥ 7 All failures must be ductile (Type YD or YS only) Report Test Temperature.
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m²	≥ 20
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m²	≥ 4
Vicat Softening Temperature VST/A/50	ISO 306	°C	≥ 130

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