



Polypropylene Copolymer - Mineral Filled, Heat Resistant, Weatherable, Injection Molding

1 Scope

This standard covers the properties of talc filled, heat resistant, weatherable, injection molding grade polypropylene copolymer.

1.1 Material Description. Approved paint systems that can be used on this material are listed in the GM Approved Paint on Parts System (APOPS) database.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PP/PE-MXX<. The symbol has to be completed by the supplier according to mineral content.

1.3 Typical Applications. Typical applications include the following: air inlet panel.

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 180/A	ISO 1183	ISO 4577
ASTM E831	ISO 294	ISO 1873-2	ISO 11469
ISO 75	ISO 527-1/2	ISO 3167	SAE J1686
ISO 178	ISO 1133	ISO 3451-1	SAE J1976
ISO 179/1eA			

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14650	GMW16847
GMW3059			

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013, **General Requirements for Handling of Technical Terms of Delivery for Plastics**.

Note: The requirements to Table 1 and Table 2 shall be documented for self-certification of the product according to GMW3013. The color shall be specified on drawings, in material specifications, and otherwise.

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 and Table 2 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.

3.1.1 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2.

3.1.2 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact at their place of use.

3.2 Requirements on Materials. See Table 1 and Table 2.

3.3 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 Exterior applications shall meet the requirements according to GMW14650.

3.4 Compound Properties. The following are also required for full specification approval. The minimum number of lots per test required is one in natural: Tensile Modulus, Poissons Ratio, and Stress Strain Curve at +23 °C, +85 °C, -30 °C; Differential Scanning Calorimetry (DSC) Curve; Multiaxial Impact Curve, and Infrared Spectroscopy Curve.

Table 1: Compound Properties (Natural and Black)

Property	Standard		>PP/PE-M10<	>PP/PE-M20<
Mineral Filler	ISO 3451-1, Method A	% by mass	8 to 12	18 to 22
Density	ISO 1183, Method A	g/cm ³	0.96 to 1.0	1.02 to 1.05
Tensile Strength at Yield	ISO 527-1, ISO 527-2, specimen A, test speed 50 mm/minute	MPa	≥24	≥26
Flexural Modulus	ISO 178, 80 mm x 10 mm x 4 mm specimen, test speed 2 mm/minute, 64 mm span	MPa	1700 to 2200	2000 to 2600
Tensile Modulus	ISO 527-1/2, specimen 1A, 1 mm/minute test speed	MPa	1700 to 2200	2000 to 2800
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m ²	≥5	≥4
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m ²	≥2	≥2
Notched Charpy Impact at -40 °C	ISO 179/1eA	kJ/m ²	≥2	≥2
Notched Izod Impact at +23 °C	ISO 180/A, edgewise impact	kJ/m ²	≥5	≥4.2
Notched Izod Impact at -40 °C	ISO 180/A, edgewise impact	kJ/m ²	≥2	≥2.4
Deflection Temperature Under Load, 1.8 MPa, Method A	ISO 75 (reference SAE J1686), flatwise	°C	≥50	≥55
Shrink, 48 h after molding	ISO 294, plaque size (100 mm x 150 mm x 3 mm)	%	Target Range: 1.2 to 1.4 ^{Note 2}	Target Range: 1.1 to 1.3 ^{Note 2}
Shrink, 48 h after molding	ISO 294, plaque size (100 mm x 150 mm x 2 mm)	%	Target Range: 1.1 to 1.3 ^{Note 2}	Target Range: 1.0 to 1.2 ^{Note 2}
Coefficient of Linear Thermal Expansion (CLTE)	ASTM E831 Thermal Mechanical Analysis (TMA) from -30 °C to 110 °C	mm/mm °C	Flow: ≤90 x 10 ⁻⁶ x-flow: ≤165 x 10 ⁻⁶	Flow: ≤90 x 10 ⁻⁶ x-flow: ≤165 x 10 ⁻⁶