



Polypropylene - Impact Copolymer, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of medium impact Polypropylenes (PP), pellet form, injection molding compound. These materials are copolymers of polypropylene and polyethylene.

1.2 Symbols. The material abbreviation according to ISO 11469 is > PP/PE <.

1.3 Applicability. Typical applications include the following: wheelhouse liners.

2 References

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

2.1 External Standards/Specifications.

ASTM D3763	ISO 179/1eA	ISO 1133	ISO 6603-2
ASTM E228	ISO 188	ISO 1183	ISO 11359
ASTM E831	ISO 294	ISO 1873-2	ISO 11469
ISO 75	ISO 527-1/2	ISO 3167	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14093	GMW14700
GMW3059			

2.3 Additional References.

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

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 1873-2. Test procedures 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.

Test specimens in natural or black shall meet the values specified in Table 1.

3.1.1 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in charts. The color shall be specified on drawings, in material specifications and otherwise.

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

3.2 Chemical Requirements. The injection molder must use a mixing head screw (i.e., Double Wave, etc.) when color concentrate is added at the press. General purpose screws do not thoroughly mix the concentrate, so imperfections due to poorly dispersed color concentrate result in poor low temperature impact performance.

3.3 Compound Properties. See Table 1 and Table 2. The following are also required for full specification approval. The minimum number of lots per test required is one in natural: Tensile Modulus, Poisson's Ratio, Stress Strain Curve at +23 °C, +102 °C, -40 °C; Differential Scanning Calorimetry (DSC) Curve; Multiaxial Impact Curve, and Infrared Spectroscopy Curve. See the Thermoplastic Polyolefin (TPO) certification template for the test procedures.

Table 1: Compound Properties (Natural or Black)

Properties	Standard	Unit	Requirements	
			Type 1	Type 2
Deflection Temperature Under Load, 0.45 MPa	ISO 75, flatwise	°C	≥60	≥60
Density	ISO 1183, Method A	g/cm ³	0.88 to 0.91	0.88 to 0.91
Melt Flow Rate	ISO 1133, Method A	g/10 minutes	≥17 g/10 minutes ^{Note1}	≥30 g/10 minutes ^{Note1}
Melt Volume-Flow Rate (MVR) 230/2.16	ISO 1133	cm ³ /10 minutes	≥18	≥32
Tensile Modulus	ISO 527-1/2, specimen A, test speed 1 mm/minute, chord 0.05% to 0.25% strain	MPa	≥800	≥800
Tensile Strength at Yield	ISO 527-1/2, specimen A, 50 mm/minute test speed	MPa	≥17	≥17
Tensile Strength Retention after Heat Aging	ISO 188, 1000 h at 100 °C	% Retention	≥80	≥80
Multiaxial Impact Strength at +23 °C ^{Note 2}	ASTM D3763, specimen C, 2.2 m/s impact velocity. Sample thickness to be 3.2 mm ± 0.2 mm. or	J at maximum load	≥17	≥17
Multiaxial Impact Strength at -15 °C ^{Note2}	ASTM D3763, specimen C, 2.2 m/s impact velocity. Sample thickness to be 3.2 mm ± 0.2 mm.	J at maximum load	≥21 All failures must be ductile	≥21 All failures must be ductile
Multiaxial Impact Strength at +23 °C ^{Note 2}	ISO 6603-2 Specimen 60 mm diameter × 2 mm, or 60 mm × 60 mm × 2 mm Plaque, 4.4 m/s speed	J at maximum load	Report energy at maximum force at type of failure	Report energy at maximum force at type of failure
Multiaxial Impact Strength at -15 °C ^{Note 2}	ISO 6603-2 Specimen 60 mm diameter × 2 mm, or 60 mm × 60 mm × 2 mm Plaque, 4.4 m/s speed	J at maximum load	Report energy at maximum force at type of failure	Report energy at maximum force at type of failure
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m ²	≥15	≥15
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m ²	≥3	≥3
Notched Charpy Impact after Heat Aging, +23 °C	ISO 188, 1000 h at 100 °C	%	80% retention minimum	80% retention minimum

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