



Thermoplastic Elastomer – A Blend of Polypropylene, EPR, and Elastomer for Paintable Interior Applications

1 Scope

1.1 Material Description. This specification describes paintable grades of a blend of polypropylene, Ethylene Propylene Rubber (EPR), and elastomer for injection molding compounds.

1.1.1 The classification into groups is according to the different properties as described in Table 1.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PP+EPR<.

1.3 Applicability. Typical applications include the following: Paintable airbag covers.

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 178	ISO 527-2	ISO 1873-2
ASTM D3763	ISO 179	ISO 868	ISO 4577
ASTM E831	ISO 294	ISO 1133	ISO 11359-2
ISO 6603-1/2	ISO 527-1	ISO 1183	ISO 11469

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW15634
GMW3059	GMW3232	GMW14444	GMW16172
GMW3205	GMW3235	GMW15520	GMW16853

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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

3.3 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.

All tests shall be performed on specimens 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 unpaneled specimens.

The values specified in Table 1 shall be met by test specimens in natural or black.

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

3.4 Compound Properties. Table 1 is also required for full specification approval. The minimum number of lots per test required is one (1) in natural: Poisson's Ratio, Stress-Strain Curves at multiple temperatures: +23 °C, +85 °C, -40 °C, and Multiaxial Impact Curve. See GMW3013 template for the test procedures.

3.5 Performance Requirements. Performance requirements: Written proof of successful airbag deployments (e.g., signed Analysis, Developmental, Validation Plan and Report (ADVP&R), completed test report, etc.)

All finished parts for Interior applications shall meet the requirements according to GMW14444.

Table 1: Compound Properties (Black or Natural)

Property	Standard	Units	T1 Low Melt Flow, Low Stiffness	T2 Low Melt Flow, Medium Stiffness	T3 Medium Melt Flow, Medium Stiffness	T4 Medium Melt Flow, High Stiffness	T5 High Melt Flow, Low Stiffness
Shore Hardness	ISO 868, 15 s delay	Shore D	Report Results	Report Results	Report Results	Report Results	Report Results
Density	ISO 1183/A	g/cm ³	0.87 to 0.93	0.87 to 0.93	0.87 to 0.93	0.87 to 0.93	0.87 to 0.93
Melt Flow Rate 230/2.16	ISO 1133	g/10 minutes	≤ 5	≤ 5	5 to 10	5 to 10	7 to 15
Flexural Modulus	ISO 178	MPa	200 to 300	300 to 400	300 to 400	400 to 500	180 to 300
Tensile Modulus	ISO 527-1 ISO 527-2	MPa	200 to 320	300 to 420	220 to 420	400 to 550	180 to 280
Tensile Strain at Yield	ISO 527-1 ISO 527-2	%	Report Results	Report Results	Report Results	Report Results	≥ 18
Tensile Stress at Yield	ISO 527-1 ISO 527-2	MPa	≥ 7	≥ 7	≥ 8	≥ 10	≥ 7
Tensile Strain at Yield after Heat Aging (1000 h ± 5 h at +85 °C ± 3 °C)	ISO 527-1 ISO 527-2	% Retention	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100
Tensile Stress at Yield after Heat Aging (1000 h ± 5 h at +85 °C ± 3 °C)	ISO 527-1 ISO 527-2	% Retention	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100
Multiaxial Impact at -40 °C	ISO 6603-1/2 4.4 m/s speed	J at maximum Load	≥15 100% Ductile	≥10 100% Ductile	≥10 100% Ductile	≥15 100% Ductile	≥15 100% Ductile
Multiaxial Impact at -40 °C	ASTM D3763 6.6 m/s speed	J at maximum Load	≥ 19 100% Ductile	≥ 15 100% Ductile	≥ 15 100% Ductile	≥ 20 100% Ductile	≥ 25 100% Ductile
Multiaxial Impact at -40 °C after Heat Aging (1000 h ± 5 h at +85 °C ± 3 °C)	ASTM D3763 6.6 m/s speed	% Retention	≥ 100				
Notched Charpy Impact at -40 °C	ISO 179/1eA	kJ/m ²	≥ 10	≥ 10	≥ 10	≥ 10	≥ 10
Mold Shrink, 48 h after molding, flow ^{Note 1}	ISO 294, plaque size 101.6 mm x 152 mm x 3.2 mm	%	Target Range 0.6 to 1.3	Target Range 0.6 to 1.3	Target Range 0.8 to 1.3	Target Range 0.8 to 1.3	Target Range 0.8 to 1.2
Mold Shrink, 48 h after molding, cross flow ^{Note 1}	ISO 294, plaque size 101.6 mm x 152 mm x 3.2 mm	%	Target Range 1.1 to 1.6	Target Range 1.1 to 1.6	Target Range 1.1 to 1.6	Target Range 1.0 to 1.5	Target Range 1.0 to 1.5
Mold Shrink, 48 h at 80 °C after molding, flow ^{Note 1}	ISO 294, plaque size 101.6 mm x 152 mm x 3.2 mm	%	Target Range 1.1 to 1.7	Target Range 1.1 to 1.7	Target Range 1.1 to 1.7	Target Range 1.1 to 1.7	Target Range 1.2 to 1.7
Mold Shrink, 48 h at 80 °C after molding, cross flow ^{Note 1}	ISO 294, plaque size 101.6 mm x 152 mm x 3.2 mm	%	Target Range 1.2 to 1.8	Target Range 1.2 to 1.8	Target Range 1.2 to 1.8	Target Range 1.3 to 1.9	Target Range 1.2 to 1.7