



Olefinic Thermoplastic Elastomer – Polypropylene/EP Rubber Blend, Medium Impact, Mineral Filled, Heat Stabilized, UV Stabilized

1 Scope

1.1 Material Description. Material Description. This specification describes material grades of a blend of polypropylene and EP rubber, mineral filled, heat stabilized, UV stabilized, pellet form, injection molding compounds.

1.1.1 Types. The classification into groups is according to the different properties as described in Table 1 and Table 3.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PP + E/P - MXX<.

1.3 Applicability. Typical applications include the following: Interior Trim.

2 References

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

2.1 External Standards/Specifications.

ASTM D3763	ISO 105-G02	ISO 527-1	ISO 3167
ASTM E831	ISO 178	ISO 527-2	ISO 3451/1
ISO 75-1	ISO 179/1eA	ISO 1133	ISO 4577
ISO 75-2	ISO 188	ISO 1183/A	ISO 11469
ISO 75-3	ISO 294	ISO 1873-2	ISO 11359-2

2.2 GM Standards/Specifications.

GMW3013	GMW3232	GMW14270	GMW15520
GMW3059	GMW3235	GMW14334	GMW15634
GMW3205	GMW3417	GMW14444	GMW16172
GMW3221	GMW14162	GMW14688	GMW16853

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221. 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 1A, thickness 4 mm for tensile and flexural properties.

All tests shall be performed on specimens 40 h minimum after molding and immediately following a conditioning period of 24 hours 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; the values specified in Table 2 shall be met by integrally colored test specimens. For integrally colored grades where other additive systems (e.g., stabilizer) are used, the impact values shall not decrease more than 10% from specified minimum value.

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

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

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

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

Note: For each product, the requirements to Table 1 and Table 2 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

3.5 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: Poisson's Ratio, DSC, TGA, IR, stress-strain curves at multiple temperatures: +23 °C, +85 °C, -30 °C; and multiaxial impact curves at low temperature. See GMW3013 template for the test procedures.

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

Table 1: Compound Properties (Black or Natural)

Properties	Standard	Unit	T1 Class U UV Stable Scratch Resistant	T1 Class P Paintable Version of T1 (No UV or Scratch Additives)	T2 Class U Higher Flow Lower Density UV Stable Scratch Resistant	T2 Class P Paintable Version of T2 (No UV or Scratch Additives)	T3 Class U Higher Flow UV Stable Higher Scratch Resistant	T4 Class U Higher Flow Lower Density UV Stable Higher Scratch Resistant	T4 Class P High Flow, Paintable Version of T4 (No UV or Scratch Additives)
ISO Symbol	ISO 11469	N/A	>PP+E/P-M17<	>PP+E/P-M17<	>PP+E/P-M14<	>PP+E/P-M14<	>PP+E/P-M14<	>PP+E/P-M9<	>PP+E/P-M9<
Filler Content	ISO 3451/1 Method A	%	13 to 22	13 to 22	13 to 15	13 to 15	13 to 15	8 to 10	8 to 10
Density	ISO 1183/A	g/cm ³	0.99 to 1.06	0.99 to 1.06	0.99 to 1.01	0.99 to 1.01	0.99 to 1.01	0.94 to 0.96	0.94 to 0.96

Properties	Standard	Unit	T1 Class U UV Stable Scratch Resistant	T1 Class P Paintable Version of T1 (No UV or Scratch Additives)	T2 Class U Higher Flow Lower Density UV Stable Scratch Resistant	T2 Class P Paintable Version of T2 (No UV or Scratch Additives)	T3 Class U Higher Flow UV Stable Higher Scratch Resistant	T4 Class U Higher Flow Lower Density UV Stable Higher Scratch Resistant	T4 Class P High Flow, Paintable Version of T4 (No UV or Scratch Additives)
Melt Flow Rate (MFR) 230/2.16	ISO 1133	g/10 minutes	11 to 23	11 to 23	30 to 42	30 to 42	32 to 42	32 to 42	32 to 42
Flexural Modulus	ISO 178, 2 mm/minute test speed	MPa	1500 to 1900	1500 to 1900	1600 to 1900	1600 to 1900	1600 to 1900	1600 to 1900	1600 to 1900
Tensile Modulus at +23 °C	ISO 527-1 ISO 527-2 Specimen 1A, 1 mm/minute test speed	MPa	1600 to 2000	1600 to 2000	1600 to 2000	1600 to 2000	1600 to 2000	1600 to 2000	1600 to 2000
Tensile Stress at Yield	ISO 527-1 ISO 527-2 Specimen 1A, 50 mm/minute test speed	MPa	≥ 17	≥ 17	≥ 17	≥ 17	≥ 17	≥ 17	≥ 17
Tensile Stress at Yield after Heat Aging (1000 hours ± 5 hours at +105 °C ± 3 °C) Note 1	ISO 527-1 ISO 527-2 50 mm/minute test speed	% Retenti on	≥ 100%	≥ 100%	≥ 100%	≥ 100%	≥ 100%	≥ 100%	≥ 100%
Multiaxial Impact Strength at +23 °C	ASTM D3763, Specimen C 6.6 m/second speed	J at maximu m load	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile	≥ 19 All failures must be ductile

Properties	Standard	Unit	T1 Class U UV Stable Scratch Resistant	T1 Class P Paintable Version of T1 (No UV or Scratch Additives)	T2 Class U Higher Flow Lower Density UV Stable Scratch Resistant	T2 Class P Paintable Version of T2 (No UV or Scratch Additives)	T3 Class U Higher Flow UV Stable Higher Scratch Resistant	T4 Class U Higher Flow Lower Density UV Stable Higher Scratch Resistant	T4 Class P High Flow, Paintable Version of T4 (No UV or Scratch Additives)
Notched Charpy Impact at +23 °C	ISO 179/1eA	kJ/m ²	≥ 25	≥ 25	≥ 25	≥ 25	≥ 25	≥ 25	≥ 25
Notched Charpy Impact at Cold Temperature at -30 °C	ISO 179/1eA	kJ/m ²	≥ 4	≥ 4	≥ 4	≥ 4	≥ 4	≥ 4	≥ 4
Heat Deflection Temperature Method B 0.45 MPa	ISO 75-1 ISO 75-2 ISO 75-3 flatwise	°C	≥ 85	≥ 85	90 to 105	90 to 105	90 to 105	90 to 105	90 to 105
Heat Deflection Temperature, Method A 1.8 MPa	ISO 75-1 ISO 75-2 ISO 75-3 flatwise	°C	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50
Mold Shrink, 48 hours after molding Average of flow and crossflow ^{Note 2}	ISO 294 Plaque Size 101.6 × 152 × 3. 2 mm	%	0.75 to 1.05	0.75 to 1.05	0.75 to 1.05	0.75 to 1.05	0.75 to 1.05	0.75 to 1.05	0.75 to 1.05
Mold Shrink, 48 hours at +80 °C after molding Average of flow and crossflow ^{Note 2}	ISO 294 Plaque Size 101.6 × 152 × 3. 2 mm	%	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1	0.8 to 1.1