GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16528

Polypropylene Homopolymer – Talc Filled, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of talc filled, heat stabilized, injection moldable polypropylene homopolymer.

1.2 Symbols. The material abbreviations according to ISO 11469 are shown in Table 1.

1.3 Applicability. Typical applications include brackets.

1.4 Remarks. The classification into groups is according to the different ranges of talc content.

2 References

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

2.1 External Standards/Specifications.

ASTM D3012	ISO 188	ISO 1133	ISO 4577
ISO 75-1	ISO 294	ISO 1183	ISO 11359-1
ISO 75-2	ISO 294-4	ISO 1873-2	ISO 11359-2
ISO 75-3	ISO 527-1	ISO 3167	ISO 11469
ISO 179/1eU	ISO 527-2	ISO 3451-1	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW16853
GMW3059	GMW3232	GMW14444	
GMW3205	GMW3235	GMW15634	

3 Requirements

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

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

Note: For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013.

3.2 Requirements on Test Specimens.

3.2.1 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.

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

3.2.3 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 unannealed specimens.

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3.2.4 The values specified in Table 1 shall be met by test specimens in natural or black. For integrally colored grades where other additive systems (e.g., stabilizer) are used, the impact values shall not decrease more than 10% from the specified minimum value.

3.3 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. See Table 1. The following are also required for full specification approval.

- The minimum number of lots per test required is one in (1) natural:
- Tensile Modulus, Poisson's Ratio, Stress Strain Curve at +23 °C, +85 °C, -30 °C.

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

Table 1: Compound Properties (Black or Natural)

Property	Test Method	Units	Types and Requirements			
ISO Symbol	ISO 11469	-	>PP-TD10<	>PP-TD20<	>PP-TD30<	>PP-TD40<
Ash	ISO 3451-1, Method A, at +600 °C	% by mass	10 ± 2	20 ± 2	30 ± 3	40 ± 3
Density	ISO 1183, Method A	g/cm³	Target range 0.99 ± 0.02	Target range 1.04 ± 0.02	Target range 1.14 ± 0.02	Target Range 1.25 ± 0.02
Melt Flow Rate MFR230/2.16	ISO 1133	g/10 minutes	Target Range 5 to 18	Target Range 5 to 18	Target Range 5 to 18	Target Range 5 to 18
Melt Volume Flow Rate MVR230/2.16	ISO 1133	cm³/10 minutes	Target Range 5 to 15	Target Range 5 to 15	Target Range 5 to 15	Target Range 5 to 15
Tensile Modulus	ISO 527-1, ISO 527-2, Specimen 1A, 1 mm/minute test speed	MPa	≥ 1800	≥ 2300	≥ 2600	≥ 3000
Tensile Strength at Yield	ISO 527-1, ISO 527-2 Specimen 1A, 5 mm/minute test speed	MPa	≥ 24	≥ 26	≥ 26	≥ 26
Tensile Strength at Yield After Heat aging Note 1	ISO 527-1, ISO 527-2, Specimen 1A, 5 mm/minute test speed	% Retention	≥ 75			
Charpy Impact Strength at +23 °C	ISO 179/1eU	kJ/m²	≥ 30	≥ 30	≥ 24	≥ 18
Charpy Impact Strength at +23 °C after heat aging Note 1	ISO 179/1eU	% Retention	≥ 75			
Heat Deflection Temp., 0.45 MPa Method A	ISO 75-1, ISO 75-2, ISO 75-3, flatwise	°C	≥ 110	≥ 120	≥ 125	≥ 130

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