GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16874

PBT+PET - Glass Fiber/Mineral Reinforced, Weatherable, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of injection moldable, weatherable, heat stabilized polybutylene terephthalate (PBT) and polyethylene terephthalate (PET) with glass and mineral filler.

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

1.3 Applicability. Typical applications include windshield wiper airfoil.

1.4 Remarks. The classification into groups is according to the different ranges of glass fiber/mineral content. Additional glass/mineral ranges will be added as they become necessary.

2 References

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

2.1 External Standards/Specifications.

ASTM E831	ISO 294-3/4	ISO 3451	ISO 11469
ISO 75-2	ISO 527-1/2	ISO 7792-2	SAE J1545
ISO 179/1eA	ISO 1183	ISO 11357-3	SAE J1976
ISO 294-1	ISO 3146	ISO 11359-2	

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221	GMW14650

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.

3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294-1 with the conditions for injection molding from ISO 7792-2. All tests shall be performed on unannealed specimens in a controlled atmosphere per GMW3221, Code A unless otherwise specified. In addition, tests specified at temperatures below or above 22 °C ± 3 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

The minimum values specified in the property tables must be met by test specimens in natural, black, or in a standard sampled color if natural or black are not available.

3.2 Compound Properties (Natural, Black and Integrally Colored). See Table 1 and Table 2. The following are also required for full standard approval. The minimum number of lots per test required is one in natural: Poisson's Ratio, Coefficient of Linear Thermal Expansion (CLTE), mold shrinkage, stress strain curve at multiple temperatures (-30 °C, 23 °C, +85 °C). See GMW3013 for the test procedures.

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

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Table 1: Compound Properties (Natural and Black)

			Nominal Glass/Mineral Content
Property	**Standard**	**Units**	**GF25-M5**
ISO Symbol	ISO 11469		>PBT+PET-(GF25+MD5)<
Density	ISO 1183	g/cm^3	Target Range 1.52 to 1.59
Ash	ISO 3451	% by Mass	30 ± 2
Tensile Modulus	ISO 527-1/2	MPa	7800 to 11 000
Stress at Break	ISO 527-1/2	MPa	≥109
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m^2	≥4.0 Report Value
Tensile Strength at break after 1000 h 140 °C	ISO 527-1/2	% Retention	75
Notched Charpy Impact Strength after 1000 h 140 °C	ISO 179/1eA 1000 h at 140 °C	% Retention	75
Melting Temperature	ISO 3146 or ISO 11357-3	°C	214 to 231
Heat Deflection Temperature under Load at 1.82 MPa	ISO 75-2	°C	≥190
Coefficient of Linear Thermal Expansion (for reference only) Parallel to Flow Perpendicular to Flow	ASTM E831 or ISO 11359-2, Thermomechanical Analysis (TMA) mean secant value over the temperature range -30 °C to +160 °C	10^{-6} mm/mm/°C	Report
Mold Shrinkage after 48 h at 23 °C (for information only) Parallel to Flow Perpendicular to Flow	ISO 294-3/4	%	0.20 to 0.50 0.60 to 0.80

Table 2: Compound Properties (Integrally Colored)

			Nominal Glass/Mineral Content
Property	**Standard**	**Units**	**GF25-M5**
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m^2	≥1.5 Report Value
Colorfastness to Light – Exterior Color Change Color Change	GMW14650 Class 3 SAE J1545	-	No objectionable defects allowed. ΔE ≤ 3.0
Natural Weathering, Two years exposure in Arizona and Florida Color Change	SAE J1976, Procedure A SAE J1545	-	No objectionable defects allowed. ΔE ≤ 3.0

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