



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

1 Scope

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

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

1.3 Applicability. Typical applications include heating, ventilation, air conditioning (HVAC) vanes and seat components.

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

2 References

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

2.1 External Standards/Specifications.

ASTM E831	ISO 294-1	ISO 1183	ISO 11357-3
ISO 75-2	ISO 294-3/4	ISO 3146	ISO 11359-2
ISO 179/1eA	ISO 527	ISO 3451	ISO 11469
ISO 188	ISO 527-1/2	ISO 3795	ISO 20028-2

2.2 GM Standards/Specifications.

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

2.3 Additional References.

- GM Material Property Database (GMMPD) tab on the Plastic Submission Template
- Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

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 20028-2. 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 other than $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ 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 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 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1. The color shall be specified on relevant drawings, in relevant material specifications and otherwise.

3.4 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 (1) lot in natural:

3.4.1 Interior emissions report per GMW16853.

3.4.2 Poisson's ratio.

3.4.3 Stress strain curve at multiple temperatures: -30 °C, +23 °C, +85 °C, +110 °C, +150 °C (see the GM Material Property Database (GMMPD) tab on the plastic submission template for the test parameters).

3.4.4 Coefficient of linear thermal expansion (CLTE) data (see the GMMPD tab on the plastic submission template for the test parameters).

3.4.5 Differential scanning calorimetry (DSC) Curve.

3.4.6 Fourier transform infrared spectroscopy (FTIR) Curve.

3.4.7 Mold shrinkage.

3.4.8 See the polyester tab on the plastic submission template for the test procedures.

3.5 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media the part is in contact with at place of use.

3.6 Performance Requirements. Performance requirements shall be specified on relevant part drawings or in relevant component specifications.

3.6.1 All finished parts for interior applications shall meet the requirements specified in GMW14444.

3.7 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

Table 1: Compound Properties (Natural and Black)

Property	Standard	Units	Nominal Glass/Mineral Content	
			GF25-M5	GF33-M7
ISO Symbol	ISO 11469	Not applicable	>PBT+PET-(GF25+MD5)<	>PBT+PET-(GF33+MD7)<
Density	ISO 1183	g/cm ³	Target Range 1.52 to 1.59	Target Range 1.61 to 1.67
Ash	ISO 3451	% by mass	30 ± 2	40 ± 3
Tensile Modulus	ISO 527-1/2	MPa	7800 to 11 000	11 400 to 15 000
Tensile Stress at Break	ISO 527-1/2	MPa	≥109	≥110
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m ²	≥4.0 Report value	≥2.0 Report value
Tensile Strength at break after Heat Aging ^{Note 1}	ISO 527-1/2 ISO 188 1000 h at +140 °C	% Retention	≥75	≥75
Notched Charpy Impact Strength after Heat Aging ^{Note 1}	ISO 179/1eA ISO 188 1000 h at +140 °C	% Retention	≥ 75	≥ 75
Melting Temperature	ISO 3146 or ISO 11357-3	°C	214 to 231	200 to 230

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