



Polybutylene Terephthalate – General Purpose, High Flow, Injection Moldable – Exterior Lighting Applications Only

1 Scope

This specification covers the properties of a general purpose high flow, injection moldable polybutylene terephthalate (PBT).

1.1 Material Description. Approved paint systems that can be used on this material are listed in the GM Approved Paint on Parts Systems (GM APOPS) database.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PBT<.

1.3 Typical Applications. Typical applications include the following: Headlamp bezels.

2 References

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

2.1 External Standards/Specifications.

ASTM D6869	ISO 188	ISO 1133	ISO 7792-2
ISO 75-1/2	ISO 294-1	ISO 1183	ISO 11469
ISO 179/1eA	ISO 527-1/2	ISO 1874-2	ISO 15512

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW3232	GMW14335
GMW3059			

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.

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 values indicated herein are based on material considered to be in the dry-as-molded state with moisture content of 0.02% maximum (ASTM D6869; ISO 15512, Method A or B; or GMW14335). Immediately after molding, specimens shall be sealed in moisture-proof containers and stored at 23 °C ± 2 °C for at least 24 h prior to test as specified in ISO 1874-2. All tests shall be performed on unannealed specimens immediately after their removal from the containers in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. In addition, tests specified at temperatures below or above 23 °C ± 2 °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 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1. The color shall be specified on drawings, in material specifications and otherwise.

3.3 Compound Properties. See Table 1. 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.

3.4 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from molding compounds shall be resistant to the media they contact at their places of use.

Table 1: Compound Properties (Natural and Black)

Property	Value	Standard
Density	1.23 g/cm ³ to 1.33 g/cm ³	ISO 1183, Method A
Melt Flow Rate	22 g/10 minutes minimum	ISO 1133 (250 °C, 2.16 kg)
Tensile Strength at Yield	52 MPa minimum	ISO 527-1/2, specimen A, test speed 50 mm/minute
Tensile Strength Retention after Heat Aging	75% retention minimum	ISO 188, 1000 h at 120 °C
Tensile Modulus	2000 MPa minimum	ISO 527-1/2
Notched Charpy at +23 °C ± 2 °C	2.7 kJ/m ² minimum	ISO 179/1eA, edgewise impact
Notched Charpy Impact at -40 °C ± 2 °C	2.0 kJ/m ² minimum	ISO 179/1eA, edgewise impact
Notched Charpy Impact after Heat Aging, +23 °C	75% retention minimum	ISO 188, 1000 h at 120 °C
Deflection Temperature Under Load, 1820 kPa	46 °C minimum	ISO 75-1/2, flatwise, unannealed
Flammability	≤100 mm/minute	GMW3232, Sample 355 mm ± 2 mm x 100 mm ± 2 mm x 2 mm ± 0.2 mm thick

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

If not otherwise agreed, all release tests shall be repeated and documented by the supplier prior to commencement of delivery of non-conforming bulk supplies. In individual cases, a shorter test can be agreed to between the responsible Engineering department and the supplier.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS

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