GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17249

Polycarbonate (PC) + Polybutylene Terephthalate (PBT) Glass Fiber Reinforced, Heat Stabilized, Pellet Form

1 Scope

1.1 Material Description. This specification covers the properties of a glass fiber reinforced, heat stabilized, pellet form, injection molding grade, Polycarbonate (PC) and Polybutylene Terephthalate (PBT) polyester blend.

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

1.3 Applicability. Typical applications include the following: Headlamp grille mounting panels.

1.4 Remarks. The classification into groups is according to the different ranges of glass fiber content. Additional glass 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.

ISO 75-1/2	ISO 294	ISO 1183	ISO 7792-2
ISO 179/1eA	ISO 527-1/2	ISO 3146	ISO 11357-3
ISO 188	ISO 1133	ISO 3451	ISO 11469

2.2 GM Standards/Specifications.

GMW3013	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, **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. The color shall be specified on drawings, in material specifications and otherwise.

3.2 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 7792-2. Test methods and specimen dimensions are also to be in accordance with ISO 7792-2.

Test specimens shall be conditioned in a controlled atmosphere of 22 °C ± 3 °C and 50% ± 5% Relative Humidity (RH) for at least 24 h prior to test. All tests shall be performed on unannealed specimens in a controlled atmosphere of 22 °C ± 3 °C and 50% ± 5% RH unless otherwise specified. In addition, tests specified at temperatures below or above 22 °C ± 3 °C and 50% ± 5% shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

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

3.3 Compound Properties. See Table 1. The following are also required for full standard approval. The minimum number of lots per test required for the following properties is one in natural: Poisson's Ratio,

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Coefficient of Linear Thermal Expansion (CLTE), Mold Shrinkage, Stress Strain Curve at multiple temperatures (for example -30 °C, 23 °C, and 85 °C). See GMW3013 for all test procedures and parameters.

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, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at their places of use.

Table 1: Compound Properties (Natural and Black)

Property	Standard	Unit	Nominal Glass Content 30% Value
ISO Symbol	ISO 11469		>PC+PBT-GF30<
Ash	ISO 3451	Percent (%) by mass	28 to 32
Density	ISO 1183/A	g/cm^3	1.46 to 1.53
Tensile Modulus	ISO 527-1/2	MPa	8200 to 11 000
Tensile Stress at Break	ISO 527-1/2 Test speed 5 mm/minute	MPa	≥ 95
Tensile Stress at Break after heat aging Note 1	ISO 527-1/2 ISO 188	% retention	≥ 75
Notched Charpy Impact Strength at 23 °C at -30 °C	ISO 179/1eA	kJ/m^2	 ≥ 6.1 ≥ 6.2
Notched Charpy Impact after Heat Aging Note 1	ISO 179/1eA ISO 188	% retention	≥ 75
Melting Temperature	ISO 3146 or ISO 11357-3	°C	Target Range 212 to 232
Heat Deflection Temperature under Load, 1.8 MPa	ISO 75-1/2	°C	≥ 142
Melt Mass Flow Rate (MFR)	ISO 1133 Temperature (°C) = 250 Load (kg) = 2.16	g/10 minutes	8.0 to 12.0
Melt Volume Flow Rate (MVR)	ISO 1133	cm^3/10 minutes	6.0 to 9.0

Note 1: Properties measured after heat aging 1000 h ± 5 h at 100 °C ± 3 °C according to ISO 188 Method A (air oven method). Property retention as indicated relative to unaged specimens tested concurrently. Notch Charpy specimens prior to aging.

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.

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