



Polyether Ether Ketone

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose/Material Description. This standard covers the properties of general purpose, injection moldable Polyether Ether Ketone (PEEK).

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

1.3 Applicability. Typical applications include: Electrical connectors.

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 11357-3
ISO 179-1/1eA	ISO 527	ISO 3146	ISO 11469
ISO 188	ISO 527-1/2	ISO 3167	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14444	GMW16853
GMW3059	GMW14270		

2.3 Additional References.

Plastic Submission Template

3 Requirements

3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding per the resin manufacturer. Specimens shall be conditioned in accordance to GMW3221, Code A for at least 40 h prior to tests.

All tests shall be performed on unannealed specimens in a controlled atmosphere of $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ and $50\% \pm 5\%$ Relative Humidity (RH) unless otherwise specified. In addition, tests specified at temperatures below or above $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

The values specified 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.

3.2 Requirements on Delivery. Table 1 specifies the required physical, mechanical and thermal properties of the material. Materials approved to this specification shall meet the requirements of GMW3013 based template.

3.3 Compound Properties (Natural, Black and Integrally Colored). The following properties are also required for full approval. The minimum number of lots per test required is one unless otherwise specified. See the Polyamide tab on the Plastic Submission Template (contact specification owning group named in Section 6 for access) and GMW3013 for test details and parameters.

- Poisson's Ratio

- Stress/strain data points and curves at the following temperatures: -30 °C, +23 °C, +85 °C, +110 °C, +125 °C, +150 °C, +200 °C, +250 °C

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Coefficient of Linear Thermal Expansion (CLTE) data

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Differential Scanning Calorimetry (DSC) curve
- Fourier Transform Infrared (FTIR) spectroscopy curve
- Mold shrinkage

3.4 Initial Source Approval. No shipments shall be made by any supplier until representative initial production samples have been approved by the appropriate Materials Engineering department(s) as meeting the requirements of this specification.

3.5 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from these materials shall be resistant to the media contacted, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at the places of use.

3.6 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.

3.7 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	Range
Density	ISO 1183, Method A	g/cm ³	Target Range 1.27 to 1.32
Tensile Modulus	ISO 527-1/2	MPa	3500 to 4100
Tensile Stress at Yield	ISO 527-1/2	MPa	≥ 87
Stress at Yield after Heat Aging ^{Note 1}	ISO 188, ISO 527 1000 h at 300 °C	% Retention	≥ 75
Strain at Break	ISO 527-1/2	%	≥ 20
Notched Charpy Impact Strength at 23 °C and -30 °C	ISO 179-1/1eA	kJ/m ²	≥ 4.5
Notched Charpy Impact Strength after Heat Aging ^{Note 1}	ISO 188, ISO 179-1/1eA 1000 h at 300 °C	% Retention	≥ 50
Melting Temperature	ISO 3146 or ISO 11357-3	°C	Target Range 335 to 350
Heat Deflection Temperature under Load, 1.8 MPa	ISO 75-1/2	°C	≥ 145

Note 1: Specimens tested for stress at break to ISO 527 and notched Charpy impact strength to ISO 179-1/1eA at +23 °C ± 3 °C after heat aging 1000 h ± 5 h at +300 °C ± 3 °C according to ISO 188 Method A (air oven method) shall have a minimum of 75% retention for tensile strength and 50% retention for notched Charpy impact relative to unaged specimens tested concurrently. Charpy impact specimens shall be notched prior to aging.