



Polyphenylene Sulfide – Impact Modified, Heat Stabilized, Extrusion Grade

1 Scope

1.1 Material Description. This standard covers the properties of an unfilled, heat stabilized, impact modified, Polyphenylene Sulfide (PPS), which is extruded to form component.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PPS-I<.

1.3 Typical Applications. Typical applications include extruded tubes that require chemical and temperature resistance, such as the Positive Crankcase Ventilation (PCV) vent tubes.

1.4 Remarks. This specification is divided into two (2) types based on tensile modulus.

Table 1: Type Definition

Type	
1	Medium Range Modulus
2	Low Range Modulus

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 179/1eA	ISO 527-1/2	ISO 3146	ISO 11469
ISO 188			

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221	GMW14270
---------	---------	---------	----------

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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.

Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding per the resin manufacturer.

All tests shall be performed on un-annealed specimens in a controlled atmosphere of $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $50\% \pm 5\%$ 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 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.

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.

3.2.1 Compound Properties (Natural, Black and Integrally Colored). See 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), Stress/Strain Curve at approximately -30 °C, +23 °C, +85 °C, +150 °C and +200 °C. See GMW3013 for all test procedures and parameters.

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

3.4 All materials supplied to this standard must comply with GMW3059, Restricted and Reportable Substances, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

Table 2: Compound Properties (Natural and Black)

Property	Standard	Units	Value	
			1	2
Type				
Density	ISO 1183/A	g/cm ³	Target Range 1.25 ± 0.5	Target Range 1.20 ± 0.5
Tensile Modulus	ISO 527-1/2	MPa	1800 to 2600	1100 to 1900
Tensile Strength at Break	ISO 527-1/2	MPa	≥ 44	≥ 35
Tensile Stress at 10% Strain	ISO 527-1/2	MPa	≥ 45	≥ 32
Notched Charpy Impact Strength At +23 °C	ISO 179/1eA	kJ/m ²	≥ 25	≥ 50
Notched Charpy Impact Strength At -30 °C	ISO 179/1eA	kJ/m ²	≥ 4	≥ 6
Tensile Strength at Break after Heat Aging ^{Note 1}	ISO 527-1/2	% Retention	≥ 75	≥ 75
Notched Charpy Impact Strength after Heat Aging ^{Note 2}	ISO 179/1eA	% Retention	≥ 50	≥ 50
Melting Temperature	ISO 3146 or ISO 11357-3	°C	274 to 284	
Heat Deflection Temperature under Load 0.45 MPa	ISO 75-1/2	°C	≥ 90	≥ 88

Note 1: Specimens tested for Tensile Stress at Break to ISO 527 after heat aging 1000 h ± 5 h at +150 °C ± 5 °C according to ISO 188 Method A (air oven method) shall have a minimum of 75% retention relative to unaged specimens tested concurrently.

Note 2: Specimens tested for Notched Charpy Impact per ISO 179/1eA after heat aging 1000 h ± 5 h at +150 °C ± 5 °C according to ISO 188 Method A (air oven method) shall have a minimum of 75% retention relative to unaged specimens tested concurrently. Charpy impact specimens shall be notched 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.

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.