



Polyphenylene Ether and Polyphenylene Ether/Polystyrene Blends

1 Scope

1.1 Material Description. This specification describes material types of unfilled polyphenylene ether and polyphenylene ether plus polystyrene blends that are used in injection components for exterior trim that are not weatherable.

1.1.1 Types. The classification into groups is according to the different properties as described in Table 1.

1.2 Symbols. All plastic parts must have legible plastic compound identification symbol per GMW3116 and ISO 11469 requirements, >PPE< or >PPE+PS<.

1.3 Applicability. Typical applications include exterior decorative trim.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM E831	ISO 294-3/4	ISO 1183	ISO 11469
ISO 75-1/2	ISO 527-1/2	ISO 3167	
ISO 179/1eA	ISO 1133	ISO 11359-2	

2.2 GM Standards/Specifications.

GMW3013	GMW3116	GMW14444	GMW16853
GMW3059	GMW3221	GMW14650	

2.3 Additional References.

Not applicable.

3 Requirements

Materials approved to this specification shall meet the standard requirements of GMW3013.

3.1 Requirements on Test Specimens. Reference GMW3221. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294-3/4. Unless otherwise specified, test methods and specimen dimensions are also to be in accordance with GMW3013.

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.

All tests shall be performed on unannealed specimens immediately following a conditioning period of 24 h minimum in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. In addition, tests specified at temperatures below or above 23 °C shall be conditioned at the specified temperature for 4 h minimum and tested at the specified temperature.

The values specified in Table 1 shall be met by test specimens in natural, black, or integrally colored.

3.4 Chemical Requirements. All parts manufactured from molding compounds shall be resistant to the media they contact at their place of use.

Note: For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013.

3.5 Compound Properties. See Table 1. The following are also required for full specification approval. The minimum number of lots per test required is one: Stress Strain Curve at multiple temperatures, e.g., +23 °C, +85 °C, -30 °C.

3.6 Performance Requirements. Performance requirements, e.g., flammability, fogging or resistance to odor, shall be specified on part drawings or in component specifications.

All finished parts for exterior applications shall meet the requirements according to GMW14650.

Table 1: Compound Properties

Property	Standard ^{Note 1}	Units	PPE Requirement	PPE+PS Requirement
ISO Symbol	ISO 11469	-	>PPE<	>PPE+PS<
Density	ISO 1183, Method A, ≥ 10 mm x ≥ 10 mm x 4 mm	g/cm ³	1.05 $\pm$ 0.03	1.04 $\pm$ 0.03
Tensile Modulus	ISO 527-1/2, Specimen ISO 3167, 4 mm thick Type A bar, Test speed 1 mm/minute; between 0.05% to 0.25% strain	MPa	2000 to 2600	1900 to 2500
Tensile Strength at Yield	ISO 527-1/2, Specimen ISO 3167, 4 mm thick Type A bar, Test speed 50 mm/minute	MPa	35 to 42	38 to 46
Tensile Elongation at Break	ISO 527-1/2, Specimen ISO 3167, 4 mm thick Type A bar, Test speed 50 mm/minute	MPa	Report	
Poisson's Ratio (one lot only)	ISO 527-1/2 Specimen ISO 3167, 4 mm thick Type A bar, Tensile method, Test speed 1 mm/minute	No units	Report	
Charpy Notched Impact Strength at +23 °C	ISO 179/1eA, Specimen Machined V-notch, r = 0.25 mm, 80 mm x 10 mm x 4 mm	kJ/m ²	≥ 15	≥ 25
Charpy Notched Impact Strength at -30 °C	ISO 179/1eA, Specimen Machined V-notch, r = 0.25 mm, 80 mm x 10 mm x 4 mm	kJ/m ²	≥ 3	≥ 10
Melt Volume Rate (MVR) Or Melt Volume-Flow Rate (MFR)	ISO 1133	g/10 minute or cm ³ /10 minute	Report rate, temperature, and pressure	
Mold Shrink - Flow Direction (report one lot for information only)	ISO 294-3/4, plaque size 60 mm x 60 mm x 2 mm, Type D2 preferred or larger with maximum thickness 4 mm	%	Report	
Mold Shrink - Cross Flow Direction (report one lot for information only)	ISO 294-3/4, plaque size 60 mm x 60 mm x 2 mm, Type D2 preferred or larger with maximum thickness 4 mm	%	Report	
HDT - 1.8 MPa, flatwise	ISO 75-1/2	°C	85 to 105	105 to 115
Coefficient of Linear Thermal Expansion (CLTE) - Flow Direction (report one lot for information only)	ASTM E831 or ISO 11359-2	10 ⁻⁶ mm/(mm*K)	Report	
CLTE - Cross Flow Direction (report on lot for information only)	ASTM E831 or ISO 11359-2	10 ⁻⁶ mm/(mm*K)	Report	
Tensile Strength after Heat Aging 1000 h, 110 °C (report one lot)	ISO 527-1/2	%	Minimum 75% retention in properties	