GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17968

Polyoxymethylene, Glass Fiber Reinforced, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of glass fiber reinforced, heat stabilized, injection moldable polyoxymethylene (acetal) copolymer.

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

1.3 Applicability. Typical applications include, but are not limited to, the following: Latch mechanism, gears, other functional parts and fuel pump components.

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

2 References

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

2.1 External Standards/Specifications.

ISO 75	ISO 294	ISO 1183	ISO 3795
ISO 179/1eA	ISO 527	ISO 1874-2	ISO 11469
ISO 188	ISO 527-1/2	ISO 3451	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW16853
GMW3059	GMW3232	GMW15634	
GMW3205	GMW3235	GMW15635	

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 charts. 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 from ISO 1874-2. 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 ± 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.

3.2.1 Compound Properties (Natural, Black and Integrally Colored). 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 (for example -30 °C, +23 °C, +120 °C), Shear Modulus Curve. See GMW3013 for the test procedures.

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Table 1: Compound Properties (Natural and Black)

			Glass Fiber Reinforcement Percentage		
			10%	20%	25%
Property	**Standard**	**Units**	**Value**	**Value**	**Value**
ISO Symbol	ISO 11469		>POM-GF10<	>POM-GF20<	>POM-GF25<
Ash	ISO 3451	%	7.5 to 12.5	17.5 to 22.5	23.5 to 28.5
Density	ISO 1183	g/cm^3	Target Range 1.46 to 1.5	Target Range 1.52 to 1.58	Target Range 1.56 to 1.62
Tensile Modulus	ISO 527-1/2	MPa	≥4200	≥ 6500	≥ 7900
Tensile Stress at Break	ISO 527-1/2	MPa	75 to 110	95 to 145	110 to 160
Tensile Stress at Break after Heat Aging Note 1	ISO 188 ISO 527	% Retention	≥ 75	≥ 75	≥ 75
Tensile Strain at Break	ISO 527-1/2	%	≥ 2.5	≥ 2.0	≥ 1.5
Notched Charpy Impact Strength At +23 °C At -30 °C	ISO 179/1eA	kJ/m^2	≥ 3 ≥ 3	≥ 5 ≥ 3	≥ 5 ≥ 5
Notched Charpy Impact after Heat Aging Note 2	ISO 188 ISO 179/1eA	% Retention	≥ 75	≥ 75	≥ 75
Heat Deflection Temperature under Load 1.8 MPa	ISO 75	°C	≥ 150	≥ 150	≥ 155
Emission Testing of Interior Materials: For initial approval, test 1 lot in black.	GMW16853				
- Odor	GMW3205-B3	Rating	≥ 6		
- Fogging	GMW3235-B-Y1-T2	mg	Requirements see GMW16853		
- Emissions	GMW15634 VOC Value SVOC Value	µg/g µg/g	Requirements see GMW16853 Requirements see GMW16853		
- Carbonyls (if applicable) Note 1	GMW15635	mg/kg	Requirements see GMW16853		
Flammability	GMW3232 or ISO 3795 All reporting must be in accordance with GMW3232	mm/minute	No burn or flame front transmission across the surface at a rate > 100 mm/minute		

Note 1: Specimens tested for Tensile Stress at Break to ISO 527 after heat aging 1000 h ± 5 h at +120 °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 +120 °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.

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