GM WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16902

Polypropylene - 45% Glass/Mineral Reinforced, Sheet, Compression Molded

1 Scope

1.1 Material Description. This standard covers the properties of a 45% glass/mineral reinforced polypropylene sheet, homopolymer used in a compression molding process.

1.2 Symbols. The material abbreviation according to ISO 11469 is > PP-(GF33+TD12) <.

1.3 Typical Applications. Typical applications include non-Class "A" surface appearance structural components such as the following; underbody panels, chassis shields, bumper beams, running boards.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ISO 75	ISO 1183	ISO 6603-1/2	ISO 11469
ISO 178	ISO 3451-1	ISO 11359-2	SAE J1686
ISO 527-1/2			

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14650	GMW15725
GMW3059	GMW14444		

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. The physical, mechanical and thermal properties that characterize the material are summarized in Table 1.

Note: The requirements to Table 1 shall be documented for self-certification of the product according to GMW3013. The color shall be specified on drawings, in material specifications, and otherwise.

3.1.1 Requirements on Test Specimens. Unless otherwise specified, all specimens for test shall be obtained from molded plaques with a thickness of 2.5 mm ± 0.5 mm. The specimens shall be molded using temperatures and pressures typical of those used in production.

All tests shall be performed on specimens 40 h minimum after molding and immediately following a conditioning period of 24 h minimum in a controlled atmosphere per GMW3221, Code A unless otherwise specified. All tests shall be performed on unannealed specimens. Five coupons minimum shall be tested. The average value is the material property value.

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

3.2 Requirements on Materials. See Table 1.

3.3 Performance Requirements. All finished parts for Interior applications shall meet the requirements according to GMW14444. All finished parts for Exterior applications shall meet the requirements according to

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GMW14650. All finished parts for Engine Compartment applications shall meet the requirements according to GMW15725.

3.3.1 Limitations. Parts made of this material are subject to the following limitations.

3.3.1.1 Maximum continuous use temperature shall not exceed 125 °C.

3.3.1.2 Maximum short term use, <30minutes, shall not exceed 145 °C.

3.4 Compound Properties. The following are also required for full specification approval. The minimum number of lots per test required is one: Poisson's Ratio, Stress Strain Curve at +23 °C, +85 °C, -30 °C; Differential Scanning Calorimetry (DSC) Curve; and Infrared Spectroscopy Curve.

Table 1: Compound Properties [Note 1, Note 2]

Property	Standard	Unit	Value
Ash	ISO 3451-1, Method A	% by Mass	45 ± 3
Specific Gravity	ISO 1183, Method A	g/cm^3	1.26 ± 0.05
Tensile Strength at Break	ISO 527-1, ISO 527-2, Specimen A, Test speed 5 mm/minute	MPa	76
Tensile Elongation at Yield	ISO 527-1/2	%	1.8
Tensile Modulus	ISO 527-1/2	MPa	5500
Flexural Modulus At 23 °C At 80 °C	ISO 178, Method 1	MPa	5300 4800
Multiaxial Impact at +23 °C, 2.2 m/s	ISO 6603-1/2 Energy at maximum load, Sample size 60 mm x 60 mm	J	15
Multiaxial Impact at -30 °C, 2.2 m/s	ISO 6603-1/2 Energy at maximum load, Sample Size 60 mm x 60 mm	J	21
Tensile Strength after Heat Aging 1000 h at 100 °C	ISO 527-1, ISO 527-2, Specimen A, Test Speed 5 mm/minute	% Retention	75
Deflection Temperature Under Load, 1800 kPa, Method A	ISO 75 (refer to SAE J1686), flatwise	°C	155
Coefficient of Linear Thermal Expansion (CLTE) Parallel to flow Transverse to flow	ISO 11359-2 Thermal Mechanical Analysis (TMA), Mean secant value over the temperature range -40 °C to 85 °C	mm/mm/°C	Report

Note 1: Minimum requirements are listed unless otherwise stated.
Note 2: Unless otherwise stated, requirements are for samples obtained from plaques irrespective of flow direction.

4 Manufacturing Process

Not applicable.

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