GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17697

Polypropylene – Long Glass Fiber Reinforced, UV Stabilized, Heat Stabilized

1 Scope

1.1 Material Description. This specification covers the properties of long glass fiber reinforced, ultraviolet (UV) stabilized, heat stabilized polypropylene. It covers injection molding types for manufacturing of technical parts requiring high structural stiffness.

1.2 Symbols. The material abbreviation according to ISO 11469 is shown in Table 1.

1.3 Applicability. Typical applications include interior visible components in console door, etc.

1.4 Remarks. The classification into groups is according to the different ranges of glass fiber content. The Code Letter E at the end indicates that these types are impact modified.

2 References

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

2.1 External Standards/Specifications.

ISO 75-1	ISO 294	ISO 1873-2	ISO 11359-1
ISO 75-2	ISO 294-4	ISO 3167	ISO 11359-2
ISO 75-3	ISO 527-1	ISO 3451-1	ISO 11469
ISO 179-1	ISO 527-2	ISO 3795	
ISO 188	ISO 1183	ISO 4577	

2.2 GM Standards/Specifications.

GMW3013	GMW3232	GMW14270	GMW16853
GMW3059	GMW3235	GMW14334	
GMW3205	GMW3417	GMW14444	
GMW3221	GMW14162	GMW15634	

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

Note: For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

3.2 Requirements on Test Specimens.

3.2.1 Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 1873-2. Test methods and specimen dimensions shall also be in accordance with ISO 1873-2 with the following additions:

- Use ISO 3167, Type A, thickness 4 mm, for tensile and flexural properties.

3.2.2 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.

© Copyright 2017 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17697 2017

3.2.3 The values specified in Table 1 shall be met by test specimens in natural or black. For integrally colored grades where other additive systems (e.g. stabilizer) are used, the impact values shall not decrease more than 10% from the specified minimum value. See Table 2.

3.2.4 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 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.

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

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 (1) in natural:
- Tensile Modulus
- Poisson's Ratio

Stress Strain Curve at +23 °C, +85 °C and -30 °C. See GMW3013 for all test procedure and parameters.

© Copyright 2017 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Full document details: GMW GMW17697 2017

Licensee=/, User=,
Not for Resale,

Table 1: Compound Properties (Black or Natural)

Property	Standard	Unit	Types					
			20	20E	30	30E	40	50
Ash	ISO 3451-1, Method A, at +600 °C	% by mass	20 ± 2	20 ± 2	30 ± 3	30 ± 3	40 ± 3	50 ± 3
Density	ISO 1183, Method A	g/cm^3	1.04 ± 0.03	1.04 ± 0.03	1.12 ± 0.03	1.12 ± 0.03	1.22 ± 0.03	1.33 ± 0.03
Average Glass Fiber Length (cutting length)		mm	Target Range: 9 to 13					
Tensile Modulus	ISO 527-1, ISO 527-2	MPa	4300 to 6200	3600 to 5800	6500 to 8500	5500 to 7500	8600 to 11000	10500 to 13000
Tensile Strength at Break	ISO 527-1, ISO 527-2	MPa	≥ 75	≥ 65	≥ 95	≥ 75	≥ 105	≥ 115
Tensile Strength at Break After Heat Aging 1000 h ± 5 h at +140 °C ± 3 °C Note 1	ISO 527-1, ISO 527-2	% Retention	≥ 75 Note 2					
Charpy Impact Strength at +23 °C	ISO 179-1/1eU	kJ/m^2	≥ 30	≥ 35	≥ 45	≥ 47	≥ 40	≥ 45
Charpy Impact Strength at -30 °C	ISO 179-1/1eU	kJ/m^2	≥ 25	≥ 30	≥ 25	≥ 50	≥ 20	≥ 40
Charpy Impact Strength at +23 °C After Heat Aging 1000 h ± 5h at +140 °C ± 3 °C Note 1	ISO 179-1/1eU	% Retention	≥ 75 Note 2					
Heat Deflection Temperature, Method A	ISO 75-1, ISO 75-2, ISO 75-3, flatwise	°C	≥ 148	≥ 148	≥ 151	≥ 153	≥ 155	≥ 155
Shrink, 48 h After Molding, Longitudinal	ISO 294-4	%	Target Range: 0.18 to 0.25	Target Range: 0.18 to 0.25	Target Range: 0.15 to 0.2	Target Range: 0.15 to 0.2	Target Range: 0.15 to 0.2	Target Range: 0.15 to 0.18

© Copyright 2017 General Motors Company All Rights Reserved

AVA Documents Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Full document details: GMW GMW17697 2017

Licensee=/, User=,
Not for Resale,