GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16259

Polycarbonate – High Temperature - Unfilled

1 Scope

1.1 Material Description. This specification describes material types of unfilled high temperature polycarbonate and polycarbonate copolymer/blends, which are used in injection molded components. This specification is based on GMW3013 per ISO 7391-1 and ISO 7391-2 recommendations.

1.1.1 Paintability. Approved paint systems that can be used on this material are listed, e.g., in the General Motors Approved Paint on Parts Systems (GM APOPS) database.

1.1.2 Types. The classification into type codes is according to the different properties as described in Table 1. Standard Properties are listed in Table 2.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PC-HT<.

1.3 Applicability. Typical applications include protected substrates that require low temperature ductility and higher temperature stability compared to general purpose polycarbonate.

2 References

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

2.1 External Standards/Specifications.

ASTM D955	ISO 179/1eA	ISO 527	ISO 7391-2
ASTM D1003	ISO 294-1	ISO 1133	ISO 11359-2
ASTM E831	ISO 294-3	ISO 1183	ISO 11469
ISO 75-1	ISO 294-4	ISO 3167	
ISO 75-2	ISO 306	ISO 7391-1	

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221	GMW14650

3 Requirements

3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294-1 with the conditions for injection molding from ISO 7391-1 and ISO 7391-2. Test methods and specimen dimensions are also to be in accordance with ISO 7391-1 and ISO 7391-2 with the following additions: Use ISO 3167, Type 1A, thickness 4 mm, for tensile and flexural properties.

- 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, unless otherwise noted.
- The values specified in Table 1 and Table 2 shall be met by test specimens in natural/crystal 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.

3.2 Material Requirements. Materials approved to this specification shall meet the requirements of GMW3013, General Requirements for Handling of Technical Terms of Delivery for Plastics.

© Copyright 2016 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: GM GMW16259 2016

3.3 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2.

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

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. For compound property requirements, see Table 1 and Table 2. Table 1 defines the properties by Type Code numbers which will be used within the specification. The values listed in the compound property tables shall represent the minimum tested values. Full specification approval also requires general material properties listed in Table 2 and in 3.5.1.

3.5.1 Other Data. The minimum number of lots per test required is one (1) in natural for: Poisson's Ratio, Stress Strain Curve at +23 °C, +120 °C, -30 °C; Differential Scanning Calorimeter (DSC) Curve; Multiaxial Impact Curve, and Infrared Spectroscopy Curve. All finished parts for Exterior applications shall meet the requirements according to GMW14650, and will require the use of an ultraviolet (UV) protecting coating such as a clearcoat or a hard coat.

Table 1: Compound Property Requirements - Type Code (Natural/Crystal and Black)

Property	Standard Note	Units	T1	T2	T3	T4	T5
Vicat Softening Temperature Heating Rate 50 °C/h Load 50 N	ISO 306	°C	≥ 145	≥ 155	≥ 170	≥ 175	≥ 180
Deflection Temperature Under Load (DTUL) 0.45 MPa	ISO 75-1 ISO 75-2	°C	Report	Report	Report	Report	Report
DTUL – Heat Deflection Temperature (HDT)-A 1.8 MPa	ISO 75-1 ISO 75-2	°C	≥ 130	≥ 140	≥ 145	≥ 155	≥ 160
Charpy Notched Impact at 23 °C	ISO 179/1eA	kJ/m^2	≥ 5	≥ 5	≥ 4	Report	Report
Charpy Notched Impact at -30 °C	ISO 179/1eA	kJ/m^2	≥ 4	≥ 5	≥ 1.5	Report	Report
Melt Flow Rate 330 °C/2.16 kg	ISO 1133	g/10 minutes	≥ 25	≥ 15	≥ 10	≥ 4	≥ 4

Note: Standard test specimen and test setup should follow GMW3013.

© Copyright 2016 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: GM GMW16259 2016