GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15580

Acrylonitrile Butadiene Styrene and Polyamide Blends, UV Stable

1 Scope

1.1 Material Description. This specification describes material types of unfilled acrylonitrile butadiene styrene and polyamide blends which are used in injection components.

Note: Additional characteristics will be indicated by code letters according to the respective specification number. Code letters that may apply to this specification are defined in GMW3013.

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

1.1.2 Types. The classification into groups is according to the different properties as described in Tables1, 2, and 3.

1.2 Symbols. The material abbreviation according to ISO 11469 is >ABS+P6<, >ABS+PA6+GF8<, >ABS+PA6+GF15<, or >ABS+PA6+GF20<.

1.3 Typical Applications. Typical applications include interior trim.

2 References

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

2.1 External Standards/Specifications.

ASTM D955	ISO 179/1eA	ISO 960	ISO 3451-1
ASTM D3763	ISO 294-3	ISO 1133	ISO 3795
ASTM E831	ISO 294-4	ISO 1183-1	ISO 6603-2
ISO 75-1	ISO 306	ISO 1874-2	ISO 11359-2
ISO 75-2	ISO 527-1	ISO 2580-2	ISO 11469
ISO 178	ISO 527-2	ISO 3167	SAE J1885

2.2 GM Standards/Specifications.

GMW3013	GMW3232	GMW14162	GMW14650
GMW3059	GMW3235	GMW14334	GMW15634
GMW3205	GMW3417	GMW14444	GMW16853
GMW3221			

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 Test Specimens.

3.1.1 Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294-3, ISO 294-4 with the conditions for injection molding from ISO 2580-2.

3.1.2 Test methods and specimen dimensions are to be in accordance with ISO 2580-2 with the following additions: use ISO 3167, Type 1A, thickness 4 mm, for tensile and flexural properties.

3.1.3 Test values indicated herein are based on material with moisture content of 0.2% maximum (dry as molded) as tested per ISO 960, Method A.

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3.1.4 Immediately after molding, per ISO 1874-2, specimen shall be sealed in moisture-proof containers and stored at 23 °C ± 3 °C for at least 24 h.

3.1.5 All tests shall be performed on unannealed specimen immediately after their removal from the containers in a controlled atmosphere per GMW3221, Code A, unless otherwise specified.

3.1.6 The values specified in Table 1 shall be met by test specimen in natural or black.

3.1.7 The values specified in Table 2 shall be met by integrally colored test specimens.

3.1.8 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.

3.1.9 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 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 to Table 1 and Table 2 shall be documented by Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications, and otherwise.

3.3 Compound Properties. For Compound Property requirements, natural, black and integrally colored, see Table 1 and Table 2. The following are also required for full specification approval.

3.3.1 The minimum number of lots per test required is one in natural: Stress Strain Curve at +23 °C, +85 °C, -30 °C; Multiaxial Impact Curve.

3.4 Performance Requirements.

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

3.4.2 All finished parts for interior applications shall meet the requirements according to GMW14444.

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

Table 1: Compound Property Requirements (Natural and Black)

Property	Standard Note 1	Units	T1	T2	T3	T4	T5	T6
Tensile Modulus	ISO 527-1 ISO 527-2	MPa	≥1700	≥1500	≥1900	≥3000	≥3000	≥4500
Tensile Strength @ Yield or Break	ISO 527-1 ISO 527-2	MPa	≥35	≥30	≥35	≥50	≥60	≥65
Flexural Modulus	ISO 178	MPa	≥1700	≥1500	≥1900	≥2500	≥3000	≥4500
Tensile Elongation @ Break	ISO 527-1 ISO 527-2	MPa	Report	Report	Report	Report	Report	Report
Poisson's Ratio (one lot)	ISO 527-1 ISO 527-2	Not applicable	Report	Report	Report	Report	Report	Report
Charpy Notched Impact Strength @ +23 °C	ISO 179-1eA	kJ/m^2	≥40	≥35	≥35	≥4	≥5	≥6
Charpy Notched Impact Strength @ -30 °C	ISO 179-1eA	kJ/m^2	≥10	≥10	≥10	Report	Report	Report
Density	ISO 1183-1 Method A	g/cm^3	1.06 ± 0.03	1.06 ± 0.03	1.06 ± 0.03	1.11 ± 0.03	1.17 ± 0.03	1.19 ± 0.03

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Property	Standard Note 1	Units	T1	T2	T3	T4	T5	T6
Ash	ISO 3451-1	%	None	None	None	8 ± 2	15 ± 2	20 ± 2
Melt Mass Flow Rate or Melt Volume Flow Rate	ISO 1133	cm^3/10 minutes or g/10 minutes	Report	Report	Report	Report	Report	Report
Mold Shrink - Flow Direction (information only)	ISO 294-3, ISO 294-4 or ASTM D955	%	Report one lot as nominal target, actual shrink dependent upon wall thickness, flow distance, etc., - exact shrink should be determined on a tool by tool basis.					
Mold Shrink – Cross Flow Direction (information only)	ISO 294-3, ISO 294-4 or ASTM D955	%	Report one lot as nominal target, actual shrink dependent upon wall thickness, flow distance, etc., - exact shrink should be determined on a tool by tool basis.					
Heat Deflection Temperature (HDT) – 0.45 MPa	ISO 75-1 ISO 75-2	°C	≥85	≥75	≥95	≥105	≥120	≥120
HDT – 1.8 MPa	ISO 75-1 ISO 75-2	°C	≥60	≥50	≥75	≥80	≥90	≥100
Vicat	ISO 306	°C	≥95	≥90	≥100	≥105	≥100	≥105
Coefficient of Linear Thermal Expansion (CLTE) -Flow Direction (information only)	ASTM E831 or ISO 11359-2	10^{-6} mm/(mm*K)	Report one lot					
CLTE-Cross Flow Direction (information only)	ASTM E831 or ISO 11359-2	10^{-6} mm/(mm*K)	Report one lot					
Multiaxial Impact Strength @ +23 °C	ASTM D3763, specimen C, 6.6m/s impact velocity or ISO 6603-2/40/20/C/4.4. Sample to be either square 60 mm x 60 mm minimum, or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm.	J	≥30 (information only)	≥30 (information only)	≥30 (information only)	No specification requirement	No specification requirement	No specification requirement
Chemical Resistance (report one lot)	GMW14334-A	Not Applicable	≥ Rating 1					

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