GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15572

Acrylonitrile Butadiene Styrene - UV Stabilized and General Purpose, Heat Stabilized

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose/Material Description. This standard describes material types of unfilled, heat stabilized, Acrylonitrile Butadiene Styrene (ABS) terpolymer which are used in injection or blow molded components. Type 1 through Type 4 are Ultraviolet (UV) stabilized for molded-in-color interior components.

1.1.2 Types. The classification into groups is according to the different usages as described in Table 3.

1.2 Symbols. The material abbreviation according to ISO 11469 is >ABS<.

1.3 Applicability. Typical applications include mold in color, painted, or chrome plated interior trim, and painted or chrome plated exterior trim.

1.4 Paintability. Plastics used for painted applications are required to meet Paint Performance Requirements for New Plastic Materials per GMW16172. Additionally, painted plastic parts are required to meet Painted Plastic Parts Performance Requirements per GMW14797.

2 References

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

2.1 External Standards/Specifications.

ASTM D955	ISO 294	ISO 527-1/2	ISO 11469
ASTM D3763	ISO 294-3	ISO 1133	ISO 19062-2
ASTM E831	ISO 294-4	ISO 1183	SAE J1885
ISO 75-1/2	ISO 294-3/4	ISO 3167	
ISO 179-1/1eA	ISO 306	ISO 3795	
ISO 188	ISO 527	ISO 11359-2	

2.2 GM Standards/Specifications.

GMW3013	GMW3235	GMW14444	GMW16172
GMW3059	GMW3417	GMW14650	GMW16193
GMW3205	GMW14162	GMW14668	GMW16853
GMW3221	GMW14270	GMW14797	
GMW3232	GMW14334	GMW15634	

2.3 Additional References.

Plastic Submission Template

3 Requirements

3.1 Requirements on Test Specimens. Materials approved to this standard shall meet the requirements of GMW3013. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 19062-2. Test methods and specimen dimensions are also to

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be in accordance with ISO 19062-2 with the following additions: Use ISO 3167, Type 1A, thickness 4 mm for tensile and flexural properties.

All tests shall be performed on specimens for 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. The values specified in Table 1 shall be met by test specimens in natural, black or in a standard sampled color if natural or black are not available. The values specified in Table 2 shall be met by four typical interior colors (black, gray, tan/neutral, and either red or blue) for approval to the specification and by test specimens in specific colors as required during color development.

3.2 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 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.

3.4 Compound Properties (Natural, Black and Integrally Colored). See Table 1 and Table 2. The following are also required for full approval. The minimum number of lots per test required is one unless otherwise specified. See the Styrenics tab on the Plastics Submission Template (contact specification owning group named in Section 6 for access) and GMW3013 for test details and parameters.

- Poisson's Ratio.
- Stress/strain data points and curves at the following temperatures: -30 °C, +23 °C, and +85 °C.

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Coefficient of Linear Thermal Expansion (CLTE) data.

Note: See GMMPD tab on Plastic Submission Template for test details (contact specification owning group named in Section 6 for access).

- Differential Scanning Calorimetry (DSC) curve.
- Fourier Transform Infrared (FTIR) spectroscopy curve.
- Mold shrinkage.

3.5 Initial Source Approval. No shipments shall be made by any supplier until representative initial production samples have been approved by the appropriate Materials Engineering department(s) as meeting the requirements of this specification.

3.6 Performance Requirements. Performance requirements, e.g., flammability, fogging or resistance to odor, shall be specified on part drawings or in component standards. All parts manufactured from molding compounds shall be resistant to the media contacted at the place of use.

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 GMW14650.

All parts manufactured from molding compounds shall be resistant to the media contacted at the place of use.

3.7 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

Table 1: Compound Properties (Natural and Black)

Property	Standard Note 1	Units	T1	T2	T3	T4	T5	T6	T7	T8
Density	ISO 1183, Method A	g/cm^3	1.05 ± 0.03	1.05 ± 0.03	1.07 ± 0.04	1.07 ± 0.03	1.05 ± 0.03	1.05 ± 0.03	1.05 ± 0.03	1.05 ± 0.03
Tensile Modulus	ISO 527-1/2	MPa	≥ 1700 ≤ 3200	≥ 1900 ≤ 3200	≥ 2200 ≤ 3000	≥ 1900 ≤ 2700	≥ 1800 ≤ 3200	≥ 2200 ≤ 2900	≥ 1900 ≤ 3000	≥ 1500 ≤ 3000

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Property	Standard Note 1	Units	T1	T2	T3	T4	T5	T6	T7	T8
Tensile Stress at Yield	ISO 527-1/2	MPa	≥ 30	≥ 35	≥ 40	≥ 40	≥ 30	≥ 45	≥ 40	≥ 30
Tensile Elongation at Yield	ISO 527-1/2	%	Report	Report	Report	Report	Report	Report	Report	Report
Tensile Strain at Break	ISO 527-1/2	%	Report one lot							
Poisson's Ratio	ISO 527-1/2	MPa	Report one lot							
Notched Charpy at +23 °C	ISO 179-1/1eA	kJ/m^2	≥ 8	≥ 8	≥ 10	≥ 20	≥ 8	≥ 8	≥ 15	≥ 15
Notched Charpy at -30 °C	ISO 179-1/1eA	kJ/m^2	≥ 4	≥ 4	≥ 6	≥ 8	≥ 4	≥ 4	≥ 15	≥ 10
Multiaxial Impact at +23 °C (target value, report one lot)	ASTM D3763, Specimen C, 6.6 m/s impact velocity Sample to be either square 60 mm × 60 mm minimum or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm	J at maximum force	Report one lot.							
Melt Mass - Flow Rate or Melt Volume Flow Rate	ISO 1133, 220 °C/10 kg	g/10 minutes or cm^3/10 minutes	Report one lot							
Mold Shrink (report one lot)	ISO 294-3/4 or ASTM D955	%	0.6 reported in specification as nominal target, actual shrink dependent upon wall thickness, flow distance, etc. Exact shrink must be determined on a tool by tool basis.							
Heat Deflection Temperature (HDT) Method B 0.45 MPa	ISO 75-1/2	°C	≥ 80	≥ 90	≥ 100	≥ 100	≥ 80	≥ 90	≥ 100	≥ 90
HDT Method A 1.8 MPa	ISO 75-1/2	°C	≥ 70	≥ 80	≥ 90	≥ 90	≥ 70	≥ 80	≥ 85	≥ 80
Vicat Softening Temperature	ISO 306	°C	≥ 88	≥ 92	≥ 105	≥ 100	≥ 90	≥ 100	≥ 100	≥ 100
Tensile Strength after Heat Aging Note 2	ISO 527 ISO 188	% Retention	≥ 75							
Tensile Strain at Break after Heat Aging Note 2	ISO 527 ISO 188	% Retention	≥ 75							

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