GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW17061

Polyethylene - Low Density, Heat Stabilized, UV Stabilized

1 Scope

1.1 Material Description. This standard covers the properties of low density, heat stabilized, Ultraviolet (UV) stabilized, injection moldable polyethylene.

1.2 Symbols. The material abbreviation according to ISO 11469 is >PE-LD<.

1.3 Applicability. Seat belt sleeves.

1.4 Remarks. This resin is not suitable for long structural seat belt sleeves. Longer structural seat belt sleeves require linear low density polyethylene.

2 References

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

2.1 External Standards/Specifications.

ISO 188	ISO 527	ISO 3795	SAE J1545
ISO 294	ISO 1133	ISO 11469	
ISO 306	ISO 1183	ISO 17855-2	

2.2 GM Standards/Specifications.

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

3 Requirements

3.1 Requirements on Test Specimens. Materials approved to this specification 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 17855-2. Test methods and specimen dimensions are also to be in accordance with ISO 17855-2 unless otherwise specified.

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.

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. These test specimens may be produced using generic colorants in the four colors or by specific colors required by a GM program. See the Polyethylene tab on the Plastics Submission Template and GMW3013 for test details and parameters.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2. The color shall be specified on drawings, in material specifications and otherwise.

3.3 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

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specified. See the Polyamide tab on the Plastics Submission Template and GMW3013 for test details and parameters.

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

Note: See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.

- Coefficient of Linear Thermal Expansion (CLTE) data

Note: See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.

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

3.4 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.

3.5 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from these materials shall be resistant to the media contacted, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at the places of use.

3.6 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.

3.7 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	Value
Density	ISO 1183	g/cm^3	Target Range 0.915 to 0.919
Melt Flow Rate	ISO 1133 2.15 kg, 190 °C	g/10 minutes	5.9 to 8.0
Tensile Modulus	ISO 527	MPa	150 to 170
Tensile Stress at Yield	ISO 527	MPa	≥ 8.5
Tensile Elongation at Yield	ISO 527	%	Report
Tensile Stress at Yield after Heat Aging [Note 2]	ISO 188, ISO 527 1000 h at 90 °C	% Retention	≥ 75
Vicat Softening Point	ISO 306 50 °C/h, 10 N	°C	≥ 84
Flammability	GMW3232 or ISO 3795 All reporting must be in accordance with GMW3232	mm/minute	SE or < 100
Emission Testing of Interior Materials: For initial approval, test one lot in black.	GMW16853	-	-
Odor	GMW3205-B3	Rating	≥ 6
Fogging	GMW3235-B-Y1-T2	mg	Requirements see GMW16853

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