



High Density Polyethylene - Blow Moldable, Low Environmental Stress Cracking Resistance

1 Scope

1.1 Material Description. This specification covers the properties of a blow moldable High Density Polyethylene (HDPE) pellet form.

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

1.3 Applicability. Typical applications include windshield washer containers and Heating, Ventilation, Air Conditioning (HVAC) ducts.

1.4 Remarks. The classification into types is according to the different elongation:

- **T1:** Higher elongation ($\geq 550\%$) used in windshield washer applications.
- **T2:** Lower elongation ($\geq 200\%$) used in HVAC ducts.
- **T3:** Recycled material with low elongation ($\geq 45\%$) used in HVAC ducts.

2 References

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

2.1 External Standards/Specifications.

ISO 306	ISO 1133-2	ISO 1872-2	ISO 16770
ISO 527-1/2	ISO 1183	ISO 11469	ISO 17855-2

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14270	GMW15634
GMW3059	GMW3235	GMW14444	GMW16853
GMW3205			

3 Requirements

Materials approved to this specification shall meet the standard requirements of GMW3013.

3.1 Requirements on Test Specimens. Unless otherwise specified, compression molding of test specimens shall be accomplished per ISO 17855-2. Test methods and specimen dimensions are also to be in accordance with ISO 17855-2. 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.

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

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

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

Note: For each product, the requirements to Table 1 shall be documented by the Plastic Submission Template according to GMW3013.

3.2 Compound Properties. See Table 1. The following are also required for full specification approval. The minimum number of lots per test required is one in natural.

- Interior Emissions report per GMW16853.
- Poisson's Ratio.
- Stress Strain Curve at multiple temperatures: -30 °C, +23 °C, +85 °C (see GMMPD tab on Plastics Submission Template for test details).
- Coefficient of Linear Thermal Expansion (CLTE) data (see GMMPD tab on Plastics Submission Template for test details).
- Differential Scanning Calorimetry (DSC) Curve.
- Fourier Transform Infrared Spectroscopy (FTIR) Curve.
- Mold Shrinkage.

See the Polyethylene tab on the Plastics Submission Template for the test procedures.

3.3 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.

3.4 Integrally Colored Properties Requirements. Any integrally colored resin (other than generic black) must submit three lots of Table 1 properties to demonstrate performance. These colors are not intended for interior color matched components; they are typically for part identification.

3.5 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 Value	T2 Value	T3 Value
Density	ISO 1183/A	g/cm ³	Target Range 0.94 – 0.96	Target Range 0.94 – 0.97	Target Range 0.94 – 0.97
Melt Flow Rate	190 °C with 2.16 kg weight per ISO 1133-2, Condition G, Procedure A	g/10 minutes	Target Range 0.15 – 0.35	Target Range 0.15 – 0.45	Target Range 0.20 – 0.60
Yield Stress	ISO 527-1/2	MPa	20 to 30	20 to 33	20 to 33
Strain at Yield	ISO 527-1/2	%	Report	Report	Report
Strain at Break	ISO 527-1/2	%	≥ 550	≥ 200	≥ 45
Tensile Modulus	ISO 527-1/2	MPa	≥ 900	≥ 700	≥ 700
Vicat Softening Temperature	ISO 306	°C	≥ 75	≥ 75	≥ 63
Full Notch Creep Test ^{Note 2}	ISO 16770	h	Report	Report	Report
Environmental Stress Cracking ^{Note 2}	ISO 1872-2, Table 4, Condition B, F50, 100% Igepal, a nonionic surfactant	h	≥ 75	≥ 20	≥ 20