



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 Typical Applications. 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 ($\geq 60\%$) 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	

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221
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2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

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

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

Note: For each product, the requirements to Table 1 shall be documented by Certification Statement according to GMW3013.

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 0.95 ± 0.01	Target Range 0.965 ± 0.015	Target Range 0.965 ± 0.015
Melt Flow Rate	190 °C with 2.16 kg weight per ISO 1133-2, Condition G, Procedure A	g/10 minutes	Target Range 0.29 ± 0.06	Target Range 0.3 ± 0.1	Target Range 0.3 ± 0.1
Melt Volume Rate	190 °C with 21.5 kg weight per ISO 1133-2, Condition G, Procedure B	cc/10 minutes	Report	Report	Report
Yield Stress	ISO 527-1/2 (50 mm/minimum)	MPa	20 to 30	20 to 33	20 to 33
Strain at Yield	ISO 527-1/2 (50 mm/minimum)	%	Report	Report	Report
Strain at Break	ISO 527-1/2 (50 mm/minimum)	%	≥550	≥200	>60
Tensile Modulus	ISO 527-1/2 (1 mm/minimum)	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

Note 1: Standard test specimen and test setup should follow GMW3013.

Note 2: Either test shall be run to determine the level of stress crack resistance.

3.3 Requirements on Test Specimens. Unless otherwise specified, compression molding of test specimens shall be accomplished per ISO 1872-2. Test methods and specimen dimensions are also to be in accordance with ISO 1872-2. 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.

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

3.4 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: Poisson's Ratio, Stress/Strain Curve at +23 °C. See GMW3013 for the test procedures.

3.5 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications.

4 Manufacturing Process

Not applicable.