



Polyethylene - High Density, Heat Stabilized, Injection Moldable

1 Scope

1.1 Material Description. This standard covers the properties of high density, heat stabilized, and injection moldable polyethylene copolymer.

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

1.3 Applicability. Injection molded Diesel Exhaust Fluid (DEF) tanks, with high flexibility, suitable for usage at low temperatures.

1.4 Remarks. Resins for DEF tank applications will only be given full approval in the GM Approved Materials Source List after a tank, made with said resin, has been fully validated for a GM program.

2 References

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

2.1 External Standards/Specifications.

ISO 75-1	ISO 306	ISO 1133	ISO 11469
ISO 179/1eA	ISO 527	ISO 1183	ISO 16770
ISO 188	ISO 527-1	ISO 1872-2	ISO 22241-1
ISO 294	ISO 527-2	ISO 11357-3	ISO 22241-2

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221	GMW14270
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2.3 Additional References.

Component Technical Specification (CTS)

3 Requirements

3.1 Requirements on Test Specimens. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 1872-2. Test methods and specimen dimensions are also to be in accordance with ISO 1872-2 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.

3.2 Compound Properties (Natural and Black). See Table 1. Values specified in Table 1 shall be met by test specimens in natural or black. If the intended application calls for the polymer to be black, refer to the appropriate GM Component Technical Specification (CTS) for allowable amounts of carbon black and applicable testing requirements. The following are also required for full standard approval. The minimum number of lots per test required is one (1) in natural:

- Coefficient of Linear Thermal Expansion (CLTE)
- Mold Shrinkage
- Poisson's Ratio, and
- Electronic Stress/Strain Curves at multiple temperatures. For example: -30 °C, +23 °C, +90 °C.

See GMW3013 for all test procedures and parameters.

3.3 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from molding compounds shall be resistant to the media they contact, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at their places of use.

3.4 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

Table 1: Compound Properties (Natural and Black)

Property	Standard ^{Note 1}	Units	Value
Density	ISO 1183	g/cm ³	0.942 to 0.947
Melt Flow Rate ^{Note 2}	ISO 1133 2.16 kg, 190 °C	g/10 minutes	1.5 to 2.5
Melt Volume Rate ^{Note 2}	ISO 1133 2.16 kg, 190 °C	cm ³ /10 minutes	2.0 to 3.3
Vicat Softening Temperature	ISO 306	°C	116 to 124
Melting Temperature	ISO 11357-3	°C	126 to 134
Heat Deflection Temperature 1.82 MPa	ISO 75-1	°C	≥ 35
Notched Charpy Impact Testing +23 °C	ISO 179/1eA	kJ/m ²	No Break
Notched Charpy Impact Testing -30 °C	ISO 179/1eA	kJ/m ²	≥ 2.2
Notched Charpy Impact Testing -30 °C after Heat Aging ^{Note 3}	ISO 188, ISO 179/1eA 1000 h at 120 °C	% Retention	≥ 85
Notched Charpy Impact Testing -30 °C after AdBlue Soak	ISO 188, ISO 179/1eA 1000 h at 60 °C in AdBlue per ISO 22241-1, ISO 22241-2	% Retention	Report
Tensile Modulus	ISO 527-1, ISO 527-2	MPa	650 to 1300
Tensile Stress at Yield	ISO 527-1, ISO 527-2	MPa	≥ 18
Tensile Strain at Break	ISO 527-1, ISO 527-2	%	≥ 290
Tensile Strain at Yield	ISO 527-1, ISO 527-2	%	≥ 6.0
Tensile Stress at Yield after Heat Aging ^{Note 3}	ISO 188, ISO 527 1000 h at 120 °C	% Retention	≥ 85
Tensile Strain at Yield after Heat Aging ^{Note 3}	ISO 188, ISO 527 1000 h at 120 °C	% Retention	≥ 85