



Polyethylene - Adhesive

1 Scope

1.1 Material Description. This specification covers the properties of an adhesive type polyethylene for the manufacturing of multi-material parts, especially for applications in the fuel area. The polyethylene exhibits excellent longtime Environmental Stress Cracking Resistance (ESCR).

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

1.3 Applicability. Typical applications include fuel system component bonding layers. The specification is classified by Types according to the materials to which they are adhering.

1.3.1 Type 1. Layer used in the adhesion of Ethylene Vinyl Alcohol (EVOH) to High Density Polyethylene (HDPE) in blow molded fuel tank applications. Resins to Type 1 will only be given full approval in GM Materials Approved Source List after a fuel tank has been validated for a GM program.

1.3.2 Type 2. Layer used in the adhesion of Polyamide to HDPE in fuel system components.

2 References

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

2.1 External Standards/Specifications.

ASTM D1693	ISO 527-1/2	ISO 1872-2	ISO 17855-1
ISO 179/1eA	ISO 1133-2	ISO 11469	
ISO 306	ISO 1183/A	ISO 16770	

2.2 GM Standards/Specifications.

GMW3013	GMW3059	GMW3221
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3 Requirements

3.1 Requirements on Materials. Materials approved to this specification shall meet the requirements of GMW3013.

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.

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.

3.3.1 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.

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

3.3.3 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 (1) in natural:

- Tensile Modulus.
- Poisson's Ratio, Stress-Strain Curve at +23 °C.
- Differential Scanning Calorimeter Curve.
- Infrared Spectroscopy Curve. See GMW3013 for the test procedures.

3.5 Performance Requirements. Performance requirements, e.g., flammability, fogging, or resistance to odor shall be specified on part drawings or in component specifications.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS requirements.

5.5 All materials supplied to this standard must comply with the requirements of the International Material Data System (IMDS) and GMW3059, **Restricted and Reportable Substances**.

Table 1: Compound Properties (Natural and Black)

Property	Standard	Units	Type 1	Type 2
Melt Flow Rate (MFR) 190/2.16	ISO 1133-2, Condition D per ISO 17855-1	g/10 minutes	1 ± 0.5	Not applicable
MFR 190/21.6	ISO 1133-2, Condition G per ISO 17855-1	g/10 minutes	Not applicable	17.0 ± 5.0
Density	ISO 1183/A	g/cm ³	0.92 ± 0.02	0.94 ± 0.03
Tensile Stress at Yield	ISO 527-1/2, 50 mm/minute	MPa	9.0 to 15.0	17.0 to 23.0
Tensile Elongation at Break	ISO 527-1/2, 50 mm/minute	%	≥ 350	≥ 400
Notched Charpy Impact at -30 °C	ISO 179/1eA	kJ/m ²	≥ 30	≥ 5.8