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| GM | WORLDWIDE ENGINEERING STANDARDS | **Material Specification** | **GMW15801** |

# Ethylene-Vinyl Alcohol

## 1 Scope

**1.1 Material Description.** This specification covers the properties of a blow molding pellet form of Ethylene-Vinyl Alcohol (EVOH).

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

**1.3 Applicability.** Typical applications include barrier layer for fuel system components.

## 2 References

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

**2.1 External Standards/Specifications.**

| | | | |
|---|---|---|---|
| ISO 294-1 | ISO 1133-2 | ISO 10350-1 | ISO 14663-2 |
| ISO 527-1/2 | ISO 1183/A | ISO 11469 | ISO 15512 |

**2.2 GM Standards/Specifications.**

| | | | |
|---|---|---|---|
| GMW3013 | GMW3059 | GMW3221 | GMW14270 |

## 3 Requirements

**3.1 Requirements on Test Specimens.**

**3.1.1** Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294-1. Test methods and specimen dimensions are also to be in accordance with ISO 10350-1.

**3.1.2** All tests shall be performed on specimens for 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.

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

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

**3.2 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.

**3.3 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.

**3.4 Compound Properties.** See Table 1. See Polyethylene tab on the Plastic Submission Template (located in GM SupplyPower) and GMW3013 for the test procedures and parameters that include:

**Note:** The minimum number of lots per test required is one unless otherwise specified.

- 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.



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

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

**3.6** 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 | Units | Value |
|---|---|---|---|
| Moisture Content | ISO 15512, Method A or Method B | % | ≤ 0.25 |
| Melt Flow | ISO 1133-2, Condition D | g/10 minutes | 1.6 ± 0.35 |
| Density | ISO 1183/A | $g/cm^3$ | Target Range 1.18 ± 0.02 |
| Tensile Stress at Break | ISO 527-1/2, 50 mm/minute | MPa | ≥ 30 |
| Tensile Strain at Break | ISO 527-1/2, 50 mm/minute | % | ≥ 10 |
| Tensile Modulus | ISO 527-1/2, 1 mm/minute | MPa | ≥ 2500 |
| Oxygen Transmission Rate | ISO 14663-2, Annex C | $cm^3/m^2 \cdot 24\ h \cdot atmosphere$ | ≤ 0.5 |
| Ethylene Content | ISO 14663-2, Annex B | % | 33 ± 3 |

## 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.



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