This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D3900 – 17 (Reapproved 2021)

Standard Test Methods for Rubber—Determination of Ethylene Units in Ethylene-Propylene Copolymers (EPM) and in Ethylene-Propylene-Diene Terpolymers (EPDM) by Infrared Spectrometry[1]

This standard is issued under the fixed designation D3900; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover the determination of the proportion of ethylene and propylene units in ethylene-propylene copolymers (EPM) and ethylene-propylenediene terpolymers (EPDM) over the range from 35 to 85 mass % ethylene. Four test methods are needed to encompass the variety of commercial polymers that contain additives or polymerized diene units that interfere with the various infrared peaks. Except when interferences are present, all four test methods should give similar results. The test methods appear in the following order:

1.1.1 *Pressed Film Test Methods:*

	Sections
Test Method A—For EPM and EPDM between 35 and 70 mass % ethylene	9 – 14
Test Method B—For EPM and EPDM between 60 and 85 mass % ethylene, except for ethylene/propylene/1,4-hexadiene terpolymers	15 – 19
Test Method C—For all EPM and EPDM polymers between 35 and 85 mass % ethylene, using near infrared	20 – 24

1.1.2 *Cast Film Test Methods:*

Test Method D—For all EPM and EPDM polymers between 35 and 85 mass % ethylene, except for ethylene/propylene/1,4-hexadiene terpolymers	25 – 32

1.2 These test methods are not applicable to oil-extended EPDM unless the oil is first removed in accordance with Test Method D.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D297 Test Methods for Rubber Products—Chemical Analysis

D3568 Test Methods for Rubber—Evaluation of EPDM (Ethylene Propylene Diene Terpolymers) Including Mixtures With Oil

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

E168 Practices for General Techniques of Infrared Quantitative Analysis

3. Summary of Test Methods

3.1 *Test Method A*—Pressed films are measured for their infrared absorbance ratios at 8.65/13.85 µm (1156/722 cm^{-1}), and mass percent ethylene is read from a calibration obtained from standard polymers.

NOTE 1—Peak typically appears at the wavelength indicated, but peak may shift slightly in its position.

3.2 *Test Method B*—Thin pressed films are measured for their infrared absorbance ratios at or near 7.25/13.85 µm (1379/722 cm^{-1}), and mass percent ethylene is read from a calibration obtained from standard polymers.

3.3 *Test Method C*—Pressed films are measured for their infrared absorbance ratios at or near 8.65/2.35 µm (1156/4255 cm^{-1}) using near infrared, and mass percent ethylene is read from a calibration obtained from standard polymers.

[1] These test methods are under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and are the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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