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Plastics — Film and sheeting — Determination of water vapour transmission rate —

Part 6: Atmospheric pressure ionization mass spectrometer method

Plastiques — Film et feuille — Détermination du coefficient de transmission de vapeur d'eau —

Partie 6: Méthode utilisant un spectromètre de masse à ionisation sous pression atmosphérique

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

ISO 15106 consists of the following parts, under the general title *Plastics — Film and sheeting — Determination of water vapour transmission rate*:

— *Part 1: Humidity detection sensor method*

— *Part 2: Infrared detection sensor method*

— *Part 3: Electrolytic detection sensor method*

— *Part 4: Gas-chromatographic detection sensor method*

— *Part 5: Pressure sensor method*

— *Part 6: Atmospheric pressure ionization mass spectrometer method*

— *Part 7: Calcium corrosion method*

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Plastics — Film and sheeting — Determination of water vapour transmission rate —

Part 6: Atmospheric pressure ionization mass spectrometer method

1 Scope

This part of ISO 15106 specifies a method for determining the water vapour transmission rate of plastic film, plastic sheeting, and multi-layer structures including plastics, using an atmospheric pressure ionization mass spectrometric detection sensor.

NOTE The method provides rapid measurement over a wide range of water vapour transmission rates.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6145-8, *Gas analysis — Preparation of calibration gas mixtures using dynamic volumetric methods — Part 8: Diffusion method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
water vapour transmission rate
amount of water vapour transmitted through unit area of test specimen per unit time under specified conditions

Note 1 to entry: Water vapour transmission rate is expressed in grams per square metre per 24 h [g/(m^2·24 h)].

4 Principle

The gas transmission cell is designed in such a way that, with the test specimen inserted, it is divided into a dry chamber and a wet chamber. The dry side of the specimen is swept by a flow of dry carrier gas such as nitrogen or argon, and water vapour permeating through the specimen from the wet chamber is carried by the carrier gas into an atmospheric pressure ionization mass spectrometer. This sensor contains an ion formation region near atmospheric pressure and a mass analysis region in ultra-high vacuum. The carrier gas with the moisture is introduced into the ion formation region where the carrier gas is ionized as primary ions by corona discharge ion sources, and then, an ion-molecule reaction is produced between the primary ions and water molecules contained in the carrier gas and the water molecules are ionized. These ionized water molecules are fed to the mass analysis region. Water vapour content in the range between ppt and ppb in the carrier gas can be detected as an ion intensity of mass number (m/z) of ion species, such as H_2O^+ at m/z 18, H_3O^+ at m/z 19, and $H^+(H_2O)_2$ at m/z 37. These are produced by ionization of water in the ion source and determined using a calibration curve. The mass of the water vapour which permeates through the specimen per unit time is calculated from the ion intensity of the water molecules.

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