

# Standard Test Method for Corona-Treated Polymer Films Using Water Contact Angle Measurements<sup>1</sup>

This standard is issued under the fixed designation D5946; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This test method covers measurement of the contact angle of water droplets on corona-treated polymer film surfaces.

NOTE 1—This test method is identical to ISO 15989.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D618 Practice for Conditioning Plastics for Testing

D724 Test Method for Surface Wettability of Paper (Angle-of-Contact Method) (Withdrawn 2009)<sup>3</sup>

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

### 2.2 ISO Standard:<sup>4</sup>

ISO 15989 Plastics—Film and Sheet—Measurement of Water-Contact Angle of Corona-Treated Films

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *static contact angle,  $\theta$  (degrees),  $n$* —the angle between the substrate surface and the tangent line drawn to the droplet surface at the three-phase point, when a liquid drop is resting on a plane solid surface.

3.1.1.1 *Discussion*—Contact angle values can be determined as follows: (1) by analyzing an image of a droplet using various projection or reflective devices and measuring the contact angle directly with a protractor by using tangential alignment of a cursor line or the use of reference alignment procedures (Test Method D724); or (2) by analyzing an image of a droplet using various projection or reflective devices and measuring the height and width on the substrate surface to calculate the contact angle as follows:

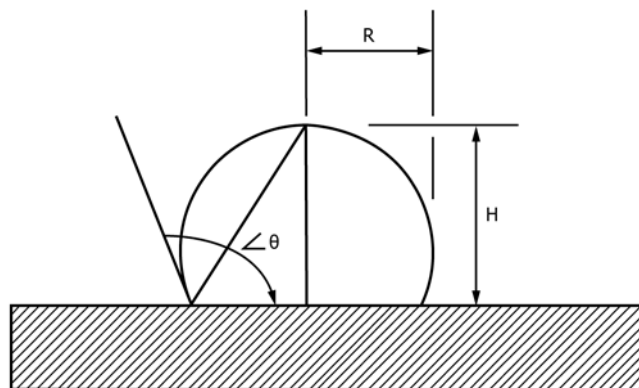
$$\theta = 2 \cdot \arctan(H/R) \quad (1)$$

where:

$\theta$  = contact angle,

$H$  = height of a droplet's image, and

$R$  = half its width.



3.1.1.2 *Discussion*—Instrumentation is also available that utilizes an image and directly determines the contact angle based on the calculation shown for Method (2) of U.S. Patent No. 5,268,733.

3.1.1.3 *Discussion*—Method (1) may be biased due to the subjective nature of visually finding a tangent to the droplet image at the three-phase point; if Method (1) is to be used, the bias of each operator's measurements shall be determined. Because Method (2) utilizes measured dimensions of the

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film, Sheet, and Molded Products.

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

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.