



Designation: D8597 – 24

Standard Test Method for Surface Wettability of Coatings, Substrates, and Pigments by Contact Angle Measurement Using Portable Goniometers¹

This standard is issued under the fixed designation D8597; 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 This test method covers the measurement of the angle of contact of a drop of liquid applied to a surface when using a portable (that is, handheld) goniometric device to deposit the liquid and obtain the measurement.

1.2 This test method is intended to supplement the manufacturer's instructions for the device being used to make the measurements but is not intended to replace them.

1.3 The choice of test liquid depends on the type of analysis being performed. Many liquids such as solvents, surfactant, and dispersant solutions can be used providing they are compatible with the construction of the particular instrumentation. Common test liquids include water, diiodomethane, ethylene glycol, formamide, and so forth.

1.4 This test method is based on goniometry, which involves the observation of a sessile drop of test liquid on a solid substrate.

1.5 Although contact angles are governed by surface free energy of the solid and the liquid, this test method cannot be used to measure surface tension directly. Contact angles can be used to estimate surface free energy of solid surfaces (Test Method D7490).

1.6 *Units*—The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *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.*

1.8 *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

D1193 Specification for Reagent Water

D7490 Test Method for Measurement of the Surface Tension of Solid Coatings, Substrates and Pigments using Contact Angle Measurements

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *advancing contact angle, n* —highest equilibrium contact angle.

3.1.1.1 *Discussion*—The advancing contact angle is established as the drop perimeter advances over the surface at a low rate. It is related to the free energy of wetting.

3.1.2 *contact angle, n* —interior angle that a drop makes between the substrate surface and a tangent to the drop drawn at the intersection of the perimeter of the drop and the substrate surface as shown in Fig. 1.

3.1.3 *equilibrium contact angle, n* —stable (that is, unchanging) contact angle established by a drop of liquid in contact with a substrate surface.

3.1.4 *goniometer, n* —device for determining the contact angle formed by a drop of liquid and a surface.

3.1.4.1 *Discussion*—Contact angles can be measured in several ways. For example, an image of the drop viewed parallel to the substrate surface allows direct observation of the angle formed between the substrate and the tangent to the drop perimeter at the points of intersection (three-phase contact point) between the drop contour and the projection of the surface (baseline) (see Fig. 1). Alternatively, the contact angle formed by the drop with the surface can be calculated from

¹ This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.23 on Physical Properties of Applied Paint Films.

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