



# Standard Test Method for Measurement of Dry Film Thickness of Thin Film Coil- Coated Systems by Destructive Means Using a Boring Device<sup>1</sup>

This standard is issued under the fixed designation D 5796; 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 the measurement of dry film thickness (DFT) of coating films by microscopic observation of a precision-cut shallow-angle crater in the coating film.

1.2 The substrate may be any rigid, metallic material, for example, cold-rolled steel, hot-dipped galvanized steel, aluminum, etc. The substrate should be planar.

NOTE 1—Variations in the surface profile of the substrate may result in nonrepresentative organic coating thickness readings. This condition may exist over substrates such as hot-dipped, coated steel sheet. This is true of all “precision cut” methods that are used to determine dry film thickness of organic coatings.

1.3 The range of thickness measurement is 0 to 3.5 mils (0 to 88  $\mu\text{m}$ ).<sup>2</sup>

1.4 Measurements may be made on coil-coated sheet, certain formed products, or on test panels.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *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:

D 3794 Guide for Testing Coil Coatings<sup>3</sup>

## 3. Significance and Use

3.1 Measurement of dry film thickness of organic coatings by physically cutting through the film and optically observing and measuring the thickness offers the advantage of direct

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<sup>2</sup> For DFT measurements of films greater than 3.5 mils (88  $\mu\text{m}$ ), but less than 63 mils (1575  $\mu\text{m}$ ), a 45° borer may be purchased and used in accordance with this test method, with the exception of 6.8, where the micrometer reading would provide a direct read-out, and division by ten would be unnecessary.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 06.02.

measurement as compared with nondestructive means.

3.2 Constituent coats of an overall thickness of a coating system can usually be measured individually by this test method. (This can be difficult in cases where the primer and topcoat have the same, or very similar, appearance.)

## 4. Apparatus

4.1 *Dry Film Thickness Device*,<sup>4</sup> is an apparatus consisting of a carbide-tipped boring device (drill) that is automated by a lever that raises and lowers the boring tip perpendicular to the surface to be tested, and a video imaging system, which is attached to an illuminated microscope that views the crater formed by the boring device.

4.2 *Carbide Borer Bit*, this configuration shall be designed to provide a very smooth circular incision in the paint film at a precise angle to the surface (see Fig. 1).<sup>5</sup>

4.3 *Video Camera*, attached to an illuminated microscope, conveys the image onto a closed-circuit television (CCTV) monitor, so that it is an easy matter to line-up the cross hair on the enlarged image. This very effectively minimizes any error or lack of consistency on the part of the operator in lining-up the cross hair.

4.4 The measurement is performed by first boring a shallow-angle crater of known configuration through the coating(s) film into the substrate and then viewing the crater with an illuminated microscope with a measuring reticle. The verification of the instrument calibration is performed by taking measurements on a standard, which is traceable to a National Standards Institution.<sup>6</sup>

<sup>4</sup> The sole source of supply of the dry film thickness device known to the committee at this time is DJH Designs, 2366 Wycroft Rd., Unit D4, Oakville, Ont., Canada L6L 6M1. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.

<sup>5</sup> The angle formed between the surface of the coating and the substrate is set by the manufacturer at 5° 42' 38" and the resulting crater is circular.

<sup>6</sup> The sole source of supply of the standard (silver-plated, copper substrate) known to the committee at this time is DJH Designs. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend. Another acceptable standard (copper and chromium coating on steel, SRM 1357) may be obtained from NIST, Standard Reference Materials Program, Building 202, Room 204, Gaithersburg, Maryland 20899.