



Standard Test Method for Measurement of Dry Film Thickness of Thin-Film Coil-Coated Systems by Destructive Means Using a Boring Device¹

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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 bored into the coating film. This crater reveals cross sectional layers appearing as rings, whose width is proportional to the depth of the coating layer(s) and allows for direct calculation of dry film thickness.

1.1.1 The Apparatus, Procedure, and Precision and Bias discussions include Method A and Method B. Method A involves the use of an optical measurement apparatus which is no longer commercially available, but remains a valid method of dry film measurement. Method B is a software driven measurement procedure that supersedes Method A.

1.2 The substrate may be any rigid, metallic material, such as cold-rolled steel, hot-dipped galvanized steel, aluminum, etc. The substrate must be planar with the exception of substrates exhibiting “coil set,” which may be held level by the use of the clamping tool on the drilling device.

NOTE 1—Variations in the surface profile of the substrate may result in misrepresentative 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. This is why several measurements across the strip may be useful if substrate surface profile is suspect.

1.3 The range of thickness measurement is 0 to 3.5 mils (0 to 89 μm).

NOTE 2—For DFT measurements of films greater than 3.5 mils (89 μm), but less than 63 mils (1600 μm), a 45° borer may be 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 per 4.3.1 Method A.

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

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

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 D01.53 on Coil Coated Metal.

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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 Coatings²

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 measurement as compared with nondestructive means.

3.2 Constituent coating layers of an overall thickness of a coating system can usually be measured individually by this test method, provide adhesion between each layer is sufficient. (However, this can be difficult in cases where the primer, topcoat, or multiple coating layers have the same, or very similar, appearance.)

4. Apparatus

4.1 *Dry Film Thickness Device*,³ It is an apparatus consisting of either a manual or automated carbide-tipped drill that raises and lowers the boring tip perpendicular to the surface to be tested, a cleaning brush, a marking device (optional), and a video imaging system, which is attached to a microscope that views the crater formed by the boring device.

4.2 *Carbide Borer Bit*, The configuration is designed to provide a very smooth circular incision in the paint film at a precise angle to the surface (see Fig. 1).⁴

4.3 *Optical Magnification*:

² *Annual Book of ASTM Standards*, Vol 06.02.

³ 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 International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

⁴ The manufactured angle formed between the surface of the coating and the substrate is 5° 42' 38" and the resulting crater is circular.