



Test Method for Determining the Hardness of Organic Coatings with a Sward-Type Hardness Rocker¹

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1. Scope

1.1 This test method covers the determination of the relative degree of surface hardness of organic coatings using a specific apparatus widely used in the coatings industry.

1.2 *This test method does not purport to address all of the safety problems, 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 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, Lacquer, and Related Products on Test Panels²

D 1005 Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers²

D 1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base²

D 1400 Methods for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base²

D 3924 Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials²

D 4138 Test Method for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive Means³

3. Significance and Use

3.1 Sward-type hardness rocker instruments have been used by the coatings industry for more than a half a century as a nondestructive test instrument to measure cure and ultimate surface hardness of organic coatings (see Refs. (1) through (11)).⁴ An accepted standard test method for the use of such an instrument is long overdue.

¹ This test method is under the jurisdiction of ASTM Committee D-1 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 *Annual Book of ASTM Standards*, Vol 06.01.

³ *Annual Book of ASTM Standards*, Vol 06.02.

⁴ Boldface numbers in parentheses refer to the list of references at the end of this test method.

3.2 In previous task group work designed to establish an ASTM method for measuring hardness of organic coatings with Sward-type hardness rocker instruments, round-robin test results continually showed poor interlaboratory reproducibility. This lack of interlaboratory agreement could have resulted from dimensional variations among instruments, with the contact rocker rings as the most likely offender in that regard. There are several producers of Sward-type hardness rockers making instruments that differ among themselves in net weight and ring radius. Some of them exceed the measurements and net weight called for in this test method.

3.3 This test method, however, is useful within laboratories to quickly screen and measure the surface hardness of candidate coatings.

4. Apparatus

4.1 *Hardness Tester*⁵—The hardness tester shall consist of two flat, chromium-plated bronze rings with uniformly round outside edges. These rings are separated and held in position with a weighted lower member and three horizontal light-weight spacer bars with the topmost one supporting a weight adjustable in height. A rack across the center section supports two bubble tube-type levels that are used to measure the amplitude of the oscillations of the hardness tester. The rate of change in amplitude is used as a measure of hardness or softness of the test surface. The hardness tester shall meet the following characteristics:

Weight	100 ± 10 g
Diameter	4.000 ± 0.010 in. (10 ± 0.025 cm)
Width between rings	1.000 ± 0.005 in. (2.5 ± 0.0125 cm)
Period	50 swings on glass plate in 60.0 ± 0.5 s
Calibration	Decrease in amplitude of 6° taken between approximately 22° and 16° from the vertical, after 50 swings on glass

The hardness tester should be equipped with a clear cover to protect it from air currents during operation. A suitable tester is illustrated in Fig. 1.

4.2 *Glass Plates*—Glass panels approximately 6 in.² (15 cm²) and a minimum of 78 mils (2 mm) thick are required.

⁵ The Erichsen (Germany) Hardness Rocker, available from T. J. Bell, Inc., 1340 Home Ave., Akron, OH 44310 and Paul N. Gardner Company, Inc., 316 N.E. First Street, Pompano Beach, FL 33060 and Sward-type Sheen (England) Hardness Rockers, available from Paul N. Gardner Company, Inc., 316 N.E. First Street, Pompano Beach, FL 33060, have been found satisfactory for this purpose.