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Standard Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive¹

This standard is issued under the fixed designation D 658; 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 determination of the resistance of organic coatings to abrasion produced by an air blast of abrasive on coatings applied to a plane, rigid surface, such as a metal or glass panel.

1.2 *This standard does not purport to address the safety problems 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 Test Methods for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels²
- D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive²
- 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 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base²
- E 11 Specification for Wire-Cloth Sieves For Testing Purposes³

3. Terminology

3.1 Description of Term Specific to This Standard:

3.1.1 *abrasion resistance*—the weight of abrasive required to wear through a unit film thickness of the coating.

4. Summary of Test Method

4.1 An abrasive under the action of a controlled air stream is allowed to impinge on a coated panel until the substrate becomes visible. The amount of abrasive used per unit film thickness is reported as the abrasion resistance of the coating.

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings and Materials 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 14.02.

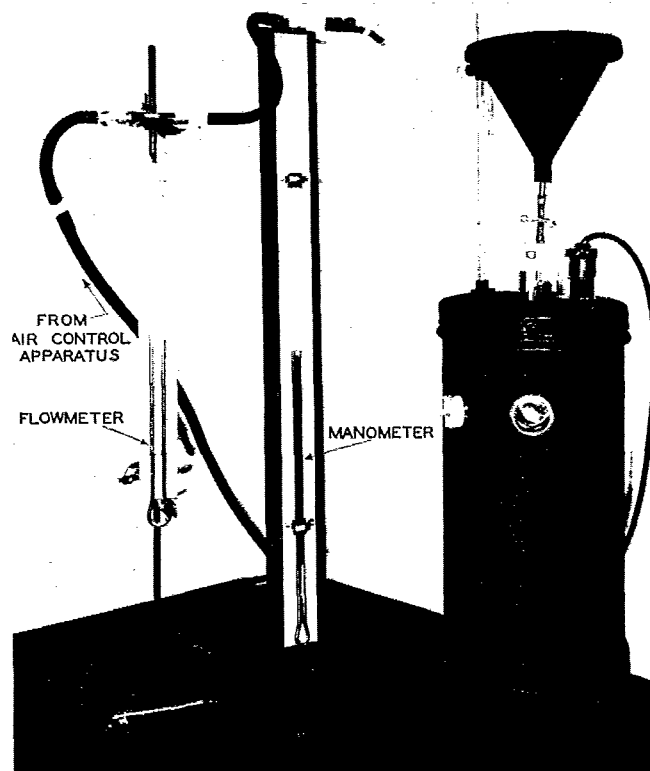


FIG. 1 Abrasion Test Apparatus (Closed)

5. Significance and Use

5.1 This test method and Test Method D 968 are two similar methods to measure the abrasion resistance of organic coatings.

5.2 These test methods provide approximately the same rankings of coatings for abrasion resistance.

5.3 Each of the test methods has been found useful in rating the abrasion resistance of specific types of coatings.

6. Apparatus

6.1 *Abrasion Tester*,⁴ such as is illustrated in Figs. 1 and 2 equipped with a glass nozzle as illustrated in Fig. 3. The specimen stage should be set at 45° from horizontal.

NOTE 1—To prevent clogging of the tube outlet of the abrasive holder by extraneous material, a screen can be inserted at the throat of

⁴ Drawings for a suitable tester of this type are available from ASTM Headquarters. Order Adjunct No. 12-406580-00.

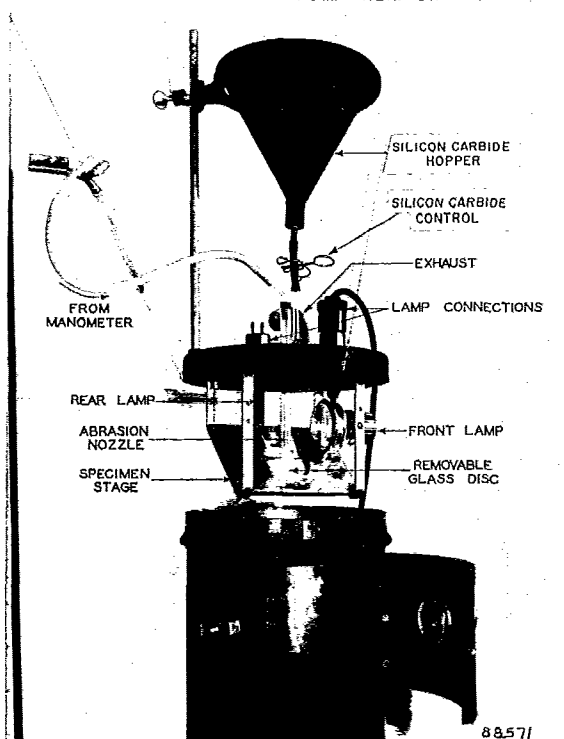
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FIG. 2 Abrasion Test Apparatus (Open)

8. Standardization

8.1 Assemble the abrasion tester and connect the inner tube of the nozzle by a flexible tube to a suitable oil-free air supply under pressure.

8.2 Set the air supply pressure at a value that will provide approximately the desired flow rate of abrasive.

8.2.1 Unless otherwise agreed upon between the purchaser and seller, the abrasive flow rate should be 45 ± 2 g/min. An air supply pressure of approximately 13 kPa (100 mmHg) should provide this rate.

NOTE 6—For some types of coatings, it may be desirable to use a higher flow rate of abrasive. A rate of 75 ± 2 g/min has been found to be useful in some instances.

8.3 Place a metal panel on the specimen stage of the abrader. Using the operating steps outlined in the procedure section, determine the flow rate of the abrasive by allowing the abrasive to flow for 3 min and weighing the amount collected.

8.4 If needed, make further adjustments to the air pressure and make repeated checks of the flow rate until the specified rate is obtained.

9. Conditioning

9.1 Unless otherwise agreed upon between purchaser and seller, condition the coated panel for at least 24 h at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity. Conduct the test in the same environment or immediately on removal therefrom.

the holder. Insect screen (approximately 270 openings per square inch) is suitable for this purpose.

6.2 *Air Supply*, oil-free, under pressure, capable of maintaining a selected pressure within ± 200 Pa.

6.3 *Standard Abrasive*⁵—Silicon carbide grain passing a No. 170 (90- μm) sieve and retained on a No. 200 (75- μm) sieve.

NOTE 2—To obtain maximum accuracy and precision of results, the abrasive should be sieved for a minimum of $\frac{1}{2}$ h with vigorous agitation, and only that portion which passes through a No. 170 (90- μm) sieve and is retained on a No. 200 (75- μm) sieve should be used in the test. The retained portion of the abrasive is considered satisfactory if a minimum of 85 % by weight meets the grain size requirements of 90 to 75 μm . Use the sieves described in Specification E 11.

7. Specimens

7.1 Apply uniform coatings of the material to be tested to a plane, rigid panel, such as metal or glass. Prepare a minimum of two coated panels for the material.

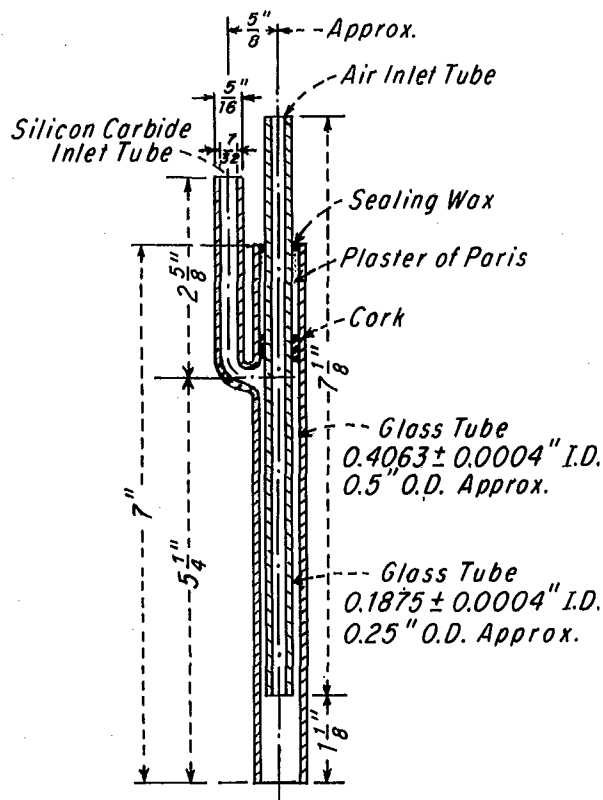
7.2 Cure the coated panels under conditions of humidity and temperature as agreed upon by the purchaser and seller.

NOTE 3—The coatings should be applied in accordance with Test Methods D 823, or as agreed upon between the purchaser and the seller.

NOTE 4—The thickness of the dry coatings should be measured in accordance with Test Methods D 1005, D 1400, or D 1186.

NOTE 5—For the apparatus shown in Figs. 1 and 2, the coated panels should not be larger than 5 by 4 by $\frac{1}{4}$ in. (125 by 100 by 6.3 mm) thick.

⁵ Suitable silicon carbide grain is Carborundum grain #180GG obtainable from the Carborundum Co., P. O. Box 423, Electro Minerals Div., Niagara Falls, NY 14302, or 180-mesh silicon carbide obtainable from City Chemical Corp., 132 W. 22nd St., New York, NY 10011. Other grades of abrasive may be used when mutually agreed upon between the purchaser and the seller.



NOTE—1 in. = 25.4 mm.

FIG. 3 Glass Nozzle



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