Designation: C944/C944M – 99(Reapproved 2005)ε1

Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method[1]

This standard is issued under the fixed designation C944/C944M; 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.

ε[1] NOTE—The designation was changed editorially to agree with the existing values statement in the Scope in March 2008.

1. Scope

1.1 This test method covers a procedure for determining the resistance of either concrete or mortar to abrasion. This test method is similar to Procedure B of Test Method C779/C779M.

1.2 The values stated in SI units or inch–pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non–conformance with the standard.

1.3 *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:*[2]

C42/C42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

C418 Test Method for Abrasion Resistance of Concrete by Sandblasting

C779/C779M Test Method for Abrasion Resistance of Horizontal Concrete Surfaces

3. Significance and Use

3.1 This test method gives an indication of the relative wear resistance of mortar and concrete based on testing of cored or fabricated specimens. This test method has been successfully used in the quality control of highway and bridge concrete subject to traffic. Primarily intended for use on the top ends of 152-mm [6-in.] diameter concrete cores, mortar specimens, or other samples of concrete of insufficient test area to permit the conduct of tests by Test Method C418 or C779/C779M, this test method is also applicable on concrete surfaces in place by measuring the abrasion loss as described in Section 9, Procedure B, of Test Method C779/C779M.

4. Apparatus

4.1 *Abrasion Device*—A drill press or similar device with a chuck capable of holding and rotating the abrading cutter at a speed of 200 r/min and exerting a force of either a normal load of 98 ± 1 N [22 ± 0.2 lbf] or a double load of 197 ± 2 N [44 ± 0.4 lbf] on the test specimen surface. Fig. 1 shows a commercial drill press and Fig. 2 illustrates details of the rotating cutter. The difficulty in maintaining a constant load on the abrading cutter when using the lever, gear, and spring system of a drill press has been eliminated by placing the desired load directly upon the spindle that turns the cutter. The machine consists essentially of a frame that supports the drive motor, stepped pulley, and spindle. A clamping device to hold the specimen is built into the base.

4.2 *Rotating Cutter*—A rotating cutter similar to that shown in Fig. 2 and Fig. 3 shall be used in which 22 37.5 mm [1.5 in.] diameter dressing wheels and 24 25.4 to 31.75 mm [1 to 1.25 in.] diameter washers are mounted. The washers as received shall be stacked and locked on a bolt for the purpose of reducing their diameter to the specified range to avoid restricting abrasion of the concrete by the washers. Cutter assembly, including washers, shall be locked onto horizontal rods such that individual dressing wheels are free to turn independently. The overall diameter of the cutter or the diameter of the circular area abraded is 82.5 mm [3¼ in.]. Care shall be taken to achieve constant contact between the rotating cutter and the entire test surface of the sample. This can be better accomplished if the cutters have a swivel connection allowing some vertical movement. If the dressing wheels have one rounded edge, they shall be mounted with the rounded edge toward the

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

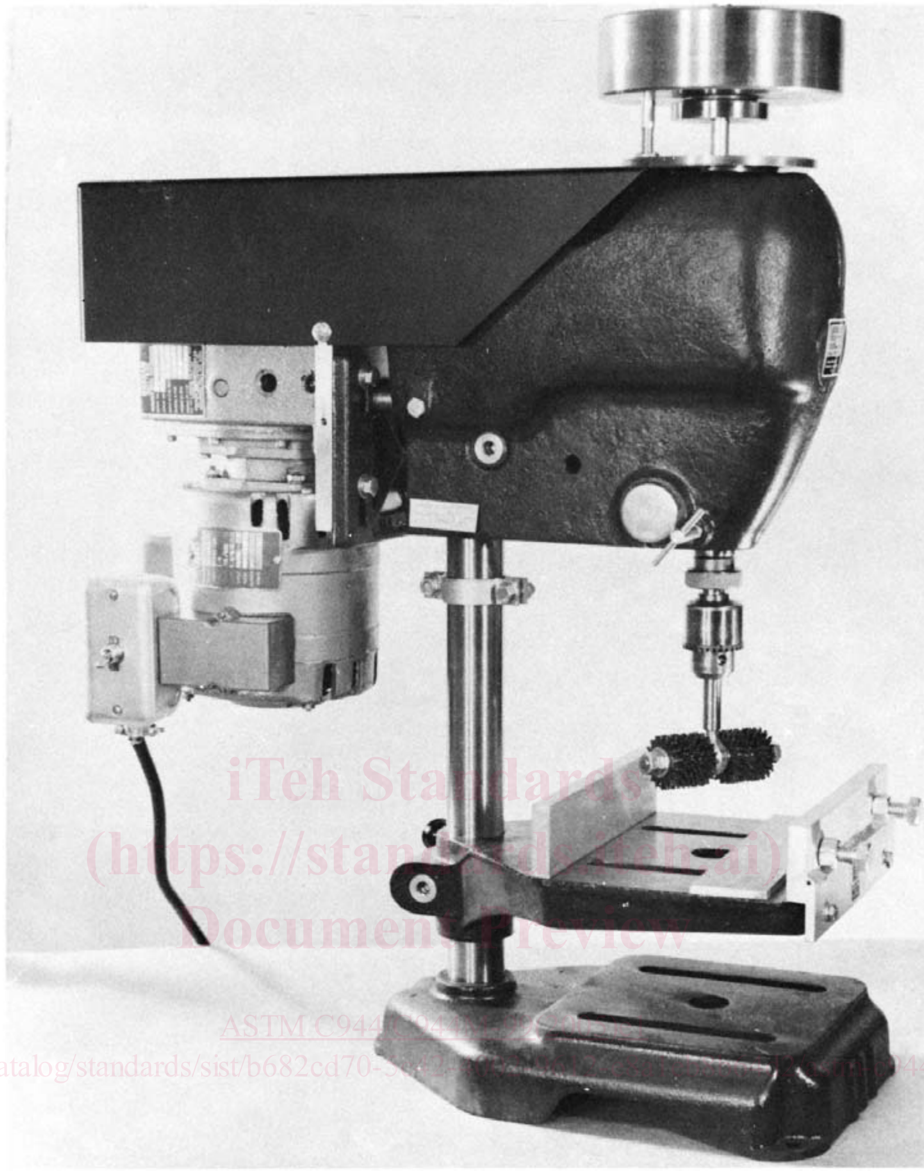

FIG. 1 Rotating-Cutter Drill Press

vertical shaft. The individual grinding wheel dressers on the horizontal shaft of the cutter shall be repositioned whenever a change in the diameter of the outer cutters becomes apparent. This is accomplished by reversing each set of dressing wheels to bring the smaller diameter cutters toward the vertical shaft.

4.2.1 In making a test, the rotating cutter is held in a raised position by means of the rod provided, the specimen clamped securely in position, and motor started. The rotating cutter is then lowered into contact with the specimen for a specified time, after which the cutter is raised.

4.2.2 A set of dressing wheels shall be replaced periodically, preferably after each 90 min of use. The washers may be ground or replaced to maintain the proper diameter.

4.3 *Balance*—A balance having a capacity of at least 4 kg, and accurate to at least 0.1 g.

4.4 *Leveling Plate*—The base plate upon which the specimen rests shall be capable of rotating in the horizontal plane so that the specimens when placed thereon can be positioned to secure maximum contact with the rotating cutter throughout the full test area.

5. Sampling

5.1 Cores shall be taken in accordance with Test Method C42/C42M.

6. Specimens

6.1 The specimens used in this test shall be of any size and shape that can be accommodated by the abrasion device and the balance provided. The surface to be tested shall be either formed or finished and shall be positioned in the plane of contact of the cutter.

7. Procedure

7.1 Determine the mass of the specimen to the nearest 0.1 g.