Designation: E 18 – 02

An American National Standard

Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials[1,2]

This standard is issued under the fixed designation E 18; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 These test methods cover the determination of the Rockwell hardness and the Rockwell superficial hardness of metallic materials, including test methods for the verification of machines for Rockwell hardness testing (Part B) and the calibration of standardized hardness test blocks (Part C).

1.2 Values stated in inch-pound units are to be regarded as the standard. SI units are provided for information only.

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.* (See Note 6.)

NOTE 1—The National Institute of Standards and Technology (NIST) maintains the national Rockwell hardness standards for the United States. In June 1998, NIST released new Rockwell C scale (HRC) test blocks as Standard Reference Materials (SRMs). The blocks were calibrated using NIST's primary reference standardizing machine. The major benefit of the NIST standards is that their HRC levels are in line with the other industrialized countries around the world. The NIST HRC levels establish the hardness of materials slightly harder than the historical standards used in the United States for the past 75 years. The revision of E 18 requires that all performance verifications of Rockwell hardness indenters and hardness machines must be made using test blocks calibrated traceable to the Rockwell standards maintained by NIST. This can be accomplished through the use of commercial test blocks calibrated traceable to the NIST standards or by directly using the NIST SRMs. This requirement will apply only to the Rockwell scale(s) for which NIST supplies primary reference test blocks

NOTE 2—In previous editions of this standard, ball indenters were required to be of hard steel. Beginning with this edition, tungsten-carbide balls are also allowed. This change is a first step in a planned future transition to eliminate steel balls and allow only the use of tungsten carbide balls. The elimination of steel ball indenters is scheduled to occur in about two years. The use of tungsten carbide balls will provide an improvement to the Rockwell hardness test because of the tendency of steel balls to flatten with use, which results in an erroneously elevated hardness value. In addition, NIST is planning to standardize the HRB scale using tungsten-carbide balls. As a result of this change, this edition also requires that when a ball indenter is used, the Rockwell hardness value must be reported with the scale designation followed by the letter "S" to indicate the use of a steel ball or the letter "W" to indicate the use of a tungsten carbide ball. The user is cautioned that Rockwell hardness tests comparing the use of steel and tungsten carbide balls have been shown to give different results. For example, depending on the material tested and its hardness level, Rockwell B scale tests using a tungsten carbide ball indenter have given results up to one Rockwell point lower than when a steel ball indenter is used.

2. Referenced Documents

2.1 *ASTM Standards:*

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[3]

B 19 Specification for Cartridge Brass Sheet, Strip, Plate, Bar, and Disks (Blanks)[4]

B 36/B36 M Specification for Brass Plate, Sheet, Strip, and Rolled Bar[4]

B 96 Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels[4]

B 97 Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes[5]

B 103/B 103 M Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar[4]

B 121/B 121 M Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar[4]

B 122/B 122 M Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar[4]

B 130 Specification for Commercial Bronze Strip for Bullet Jackets[4]

B 134 Specification for Brass Wire[4]

B 152 Specification for Copper Sheet, Strip, Plate, and Rolled Bar[4]

B 291 Specification for Copper-Zinc-Manganese Alloy (Manganese Brass) Sheet and Strip[4]

[1] These test methods are under the jurisdiction of ASTM Committee E28 on Mechanical Testing and are the direct responsibility of Subcommittee E28.06 on Indentation Hardness Testing.

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[2] In this test method, the term Rockwell refers to an internationally recognized type of indentation hardness test as defined in Section 3, and not to the hardness testing equipment of a particular manufacturer.

[3] *Annual Book of ASTM Standards*, Vol 01.03.

[4] *Annual Book of ASTM Standards*, Vol 02.01.

[5] Discontinued, see *1981 Annual Book of ASTM Standards*, Part 6.

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