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October 9, 2017

Mr. Tom Morrison
Executive Director
Metal Treating Institute

By email

Dear Tom,

I am writing to you to emphasize the importance of the upcoming ANS TM E 28 committee meeting in Atlanta at the Hyatt Regency Hotel on November 13 and 14. As you will recall, the proposed language changes relating to ASTM E 10, E 18, and E110 have been balloted and have been circulated amongst the committee members for voting and comments. These ballots and comments will be reviewed and approved or dismissed at the upcoming meeting in Atlanta.

As a member of the ASTM E 28 committee; I would like to highlight to you the importance of both this issue and the importance of being present at the meeting in-order-to make known the heat treater perspective on the proposed changes. Written input in advance of the meeting directed to Sam Lowe at NIST is certainly helpful; however, in person representation is far more effective and tends to carry the day. The ballots of the committee members along with their comments will be available for discussion in the meeting. Specifically, negative votes can be found non persuasive as a function of the conversation in the room that day.

I am attaching to this email the specific language changes which are being proposed and I strongly encourage any MTI members with an interest in E 10, E18, or the E110 standards to attend the meeting in Atlanta on the 13th and 14th of November to make their viewpoint heard.

Sincerely yours,

James Knight
President

/encl

ITEM 17

ASTM WK55562

Concurrent E28/E28.06 Ballot Item:

This E28.06 Subcommittee ballot item is to revise ASTM E10-17 *Standard Test Method for Brinell Hardness of Metallic Material* to add requirements covering the "Use of Portable Brinell Hardness Testing Machines." This is the third time that similar revisions have been proposed, and the first time to be balloted as a concurrent E28 and E28.06 ballot. The first ballot had added the requirements as a new Annex. The second ballot and this revision places the requirements into Section 5 of the Method. This third ballot now also requires that for a portable tester to meet this standard, the tester must pass direct verification.

Rationale:

A standard fixed-location Brinell hardness machine may not be capable of testing certain samples because of the sample size or weight, sample location, accessibility of the test point or other requirements. In these circumstances, the use of a portable hardness tester may be the only method available to test these samples. In the past, there were few, if any, portable Brinell hardness testers available that could meet the direct verification requirements of E10. Consequently, the ASTM E110 *Standard Test Method for Rockwell and Brinell Hardness of Metallic Materials by Portable Hardness Testers* was developed to cover portable Brinell hardness testers meeting the requirements of E10, but with the exception that direct verification of the tester is not required. The problem is that many product and material specifications call out hardness testing to be in compliance with E10, and not with E110. There are many E110 hardness testers being used today to make measurements to meet E10, which is technically not in compliance with the specification. This has long been the situation, and was commonly ignored until auditing became more widespread. Today, there are portable Brinell hardness testing machines available that can meet direct verification requirements. This revision to E10 will specify requirements for portable Brinell hardness testing machines and their use to meet E10.

Note: Only the text marked as green underlined additions or marked as ~~red "strike-through" deletions~~ are being balloted. The remaining of the text is given only for informational purposes to help the reader understand the context of the revisions.

Designation: E10 – ??

Standard Test Methods for Brinell Hardness of Metallic Materials¹

This standard is issued under the fixed designation E10; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of the Brinell hardness of metallic materials by the Brinell indentation hardness principle. This standard provides the requirements for a Brinell testing machine and the procedures for performing Brinell hardness tests.

1.2 This method includes requirements for the use of portable Brinell hardness testing machines that measure Brinell hardness by the Brinell hardness test principle.

~~1.23~~ This standard includes additional requirements in ~~four~~ annexes:

Verification of Brinell Hardness Testing Machines
Brinell Hardness Standardizing Machines
Standardization of Brinell Hardness Indenters
Standardization of Brinell Hardness Test Blocks

Annex A1
Annex A2
Annex A3
Annex A4

~~1.34~~ This standard includes nonmandatory information in ~~an appendix~~ appendixes which relates to the Brinell hardness test:

Table of Brinell Hardness Numbers
Examples of Procedures for Determining Brinell Hardness Uncertainty

Appendix X1
Appendix X2

2. Referenced Documents

2.1 *ASTM Standards:*

E110 Test Method for Indentation Hardness of Metallic Materials by Portable Hardness Testers of Metallic Materials

3. Terminology and Equations

3.1 *Definitions:*

3.1.10 portable Brinell hardness testing machine—a Brinell hardness testing machine that is designed to be transported, carried, set up and operated by the users, and which measures Brinell hardness by the Brinell hardness test principle.

3.1.11 movable Brinell hardness testing machine—a Brinell hardness testing machine that is designed to be moved to different locations on a moveable frame, table or similar support that is integral to the testing machine (e.g., securely fixed to a rolling table), or a Brinell hardness testing machine that is designed to move into the testing position prior to a test, (e.g., securely fixed to a moving support arm), and has been previously verified to ensure that such moves will not affect the hardness result.

4. Significance and Use

4.1 The Brinell hardness test is an indentation hardness test that can provide useful information about metallic materials. This information may correlate to tensile strength, wear resistance, ductility, or other physical characteristics of metallic materials, and may be useful in quality control and selection of materials.

4.2 Brinell hardness tests are considered satisfactory for acceptance testing of commercial shipments, and have been used extensively in industry for this purpose.

4.3 Brinell hardness testing at a specific location on a part may not represent the physical characteristics of the whole part or end product.

5. Principles of Test and Apparatus

5.7 Use of Portable Brinell Hardness Testing Machines

5.7.1 A standard fixed-location Brinell hardness testing machine may not be capable of testing certain samples because of the sample size or weight, sample location, accessibility of the test point or other requirements. In these circumstances, the use of a portable Brinell hardness testing machine is an acceptable method to test these samples. This method allows the use of a portable Brinell hardness testing machine as follows.

5.7.1.1 A portable Brinell hardness testing machine shall be used only when testing circumstances make it impractical to use a standard fixed-location Brinell hardness testing machine. In such cases, it is recommended that an agreement or understanding be made between all parties involved (e.g., testing service and customer) that a portable Brinell hardness testing machine will be used in lieu of a fixed-location Brinell hardness testing machine.

5.7.1.2 The portable Brinell hardness testing machine shall measure hardness by the Brinell hardness test principle (see 5.1). Portable hardness testing machines or instruments that measure hardness by other means or procedures different than the Brinell hardness test principle, such as those defined in ASTM standards A833, A956, A1038 or B647, produce a converted Brinell hardness values and do not comply with this method.

5.7.2.3 The portable Brinell hardness testing machine shall meet the requirements of this method, including the test principle, apparatus, indenters, applied forces, test procedures

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and the direct and indirect verifications of the testing machine (except as indicated in Table A1.1).

5.7.3 Daily Verification of portable hardness testing machines - Portable hardness testing machines are susceptible to damage when they are transported or carried from one test site to another. Therefore, in addition to complying with the daily verification requirements specified in 7.1 and Annex A.1, a daily verification shall be performed at each test worksite where the hardness tests are to be made just prior to making the hardness tests. The verification shall be performed with the portable hardness testing machine oriented as closely as practical to the position that it will be used. It is recommended that the daily verification be repeated occasionally during testing and after testing is completed.

5.7.4 Additional reporting requirements when using a portable Brinell hardness testing machine are given in 9.2.

5.7.5 Portable hardness testing machines by the nature of their application may induce errors that could influence the test results. To understand the differences in results expected between portable and fixed-location hardness testing machines, the user should compare the results of the precision and bias studies given in Section 10 and in Method E110.

600 HBW/P 2.5/62.5/20 = Brinell hardness of 600 determined with a ball of 2.5 mm diameter and with a test force of 62.5 kgf (612.9 N) applied for 20 s.

9 Report

9.1 At a minimum, the test report shall include the following information:

9.1.1 The Brinell hardness value \bar{H} of the test results rounded to three significant digits, including all zero digits, in accordance with Practice E29, for example, 225 HBW, 100 HBW 10/500, 95.9 HBW or 9.10 HBW 5/62.5.

9.1.2 The test conditions, when other than a 3000 kgf (29.42 kN) applied force, a 10 mm ball diameter, and a 10 s to 15 s application of test force are used (see 5.6.1).

9.1.3 A statement that the indentation measuring device was Type A, when such a device is used. When a Type B indentation measuring device is used, no statement is required.

9.1.4 The ambient temperature of the test, if outside the limits of 10 to 35°C (50 to 95°F), unless it has been shown to not affect the measurement result.

9.2 When using a portable Brinell hardness testing machine, the measured hardness number shall be reported in accordance with 9.1, and appended with a /P to indicate that it was determined by a portable Brinell hardness testing machine. For example,

220 HBW/P 10/3000 = Brinell hardness of 220 determined with a ball of 10 mm diameter and with a test force of 3000 kgf (29.42 kN) applied for 10 s to 15 s.

350 HBW/P 5/750 = Brinell hardness of 350 determined with a ball of 5 mm diameter and with a test force of 750 kgf (7.355 kN) applied for 10 s to 15 s.

ANNEXES
(Mandatory Information)
A1. VERIFICATION OF BRINELL HARDNESS TESTING MACHINES

TABLE A1.1 Verification Schedule for a Brinell Testing Machine

Verification procedure	Schedule
Direct verification	<ul style="list-style-type: none"> • When a testing machine is new, or when adjustments, modifications or repairs are made that could affect the application of the test forces or the measuring system. • When a testing machine fails an indirect verification.
Indirect verification	<ul style="list-style-type: none"> • Recommended every 12 months, or more often if needed. • Shall be no longer than every 18 months. • When a test machine is installed or moved, [only the procedure for verifying the as-found condition is required, (see A1.4.4). <u>Indirect verification is not required after moving a portable or movable Brinell hardness testing machine (see 3.1.10, 3.1.11 and 5.7).</u> <p>When a test machine is moved, [only the procedure for verifying the as-found condition is required, (see A1.4.4). This does not apply to machines that are designed to be moved or that move prior to each test, when it has been previously demonstrated that such a move will not affect the hardness result.</p> <ul style="list-style-type: none"> • Following a direct verification.
Daily verification	<ul style="list-style-type: none"> • Required each day that hardness tests are to be made. • Recommended whenever the indenter or test force is changed.

ITEM 18

Concurrent E28/E28.06 Ballot Item: [WK59973] Revision of ASTM E18 *Standard Test Method for Rockwell Hardness of Metallic Materials*

Rationale: In the E18-07 edition of this method, four notes were added to the text that pointed out significant requirement changes to the standard. Each of the notes included text stating that the changes were, “*a new requirement starting with this edition of the standard.*” Ten years have passed with several new editions of E18, but the notes have remained.

This concurrent E28.06/E28 ballot proposes to delete the following notes:

NOTE A2.1—Accreditation is a new requirement starting with this edition of the standard.

NOTE A2.2—Periodic direct verification (every 12 months) is a new requirement starting with this edition of the standard. In previous editions of this standard, direct verification was required only when a standardizing machine was new, moved, or when adjustments, modifications or repairs were made that could affect the application of the test forces, the depth measuring system, or the machine hysteresis.

NOTE A3.2—Accreditation is a new requirement starting with this edition of the standard.

NOTE A4.1—Accreditation is a new requirement starting with this edition of the standard.

Note: Only the text marked as **red “strike-through” deletions** are being balloted. The remaining of the text is given only for informational purposes to help the reader understand the context of the revisions.

Revise text as follows, and re-number Notes as appropriate:

A2.2 Accreditation

A2.2.1 The agency conducting direct and/or indirect verifications of Rockwell hardness standardizing machines shall be accredited to the requirements of ISO 17025 (or an equivalent) by an accrediting body recognized by the International Laboratory Accreditation Cooperation (ILAC) as operating to the requirements of ISO/IEC 17011. An agency accredited to perform verifications of Rockwell hardness standardizing machines may perform the verifications of its own standardizing machines. The standardizing laboratory shall have a certificate/scope of accreditation stating the types of verifications (direct and/or indirect) and the Rockwell scales that are covered by the accreditation.

~~NOTE A2.1—Accreditation is a new requirement starting with this edition of the standard.~~

A2.5 Verifications

A2.5.1 The standardizing machine shall undergo direct and indirect verifications at periodic intervals and when circumstances occur that may affect the performance of the standardizing machine, according to the schedule given in Table A2.3.

~~NOTE A2.2—Periodic direct verification (every 12 months) is a new requirement starting with this edition of the standard. In previous editions of this standard, direct verification was required only when a standardizing machine was new, moved, or when adjustments, modifications or repairs were made that could affect the application of the test forces, the depth measuring system, or the machine hysteresis.~~

A3.2 Accreditation

A3.2.1 The agency conducting the standardizations of indenters shall be accredited to the requirements of ISO 17025 (or an equivalent) by an accrediting body recognized by the International Laboratory Accreditation Cooperation (ILAC) as

operating to the requirements of ISO/IEC 17011. The standardizing laboratory shall have a certificate of accreditation stating the class and types of indenters that are covered by the accreditation. Only indenters of the class and types within the laboratory’s scope of accreditation are considered to meet this standard, except as stated below.

~~NOTE A3.2—Accreditation is a new requirement starting with this edition of the standard.~~

A4.2 Accreditation

A4.2.1 The agency conducting the standardizations of test blocks shall be accredited to the requirements of ISO 17025 (or an equivalent) by an accrediting body recognized by the International Laboratory Accreditation Cooperation (ILAC) as operating to the requirements of ISO/IEC 17011. The standardizing agency shall have a certificate/scope of accreditation stating the Rockwell hardness scales that are covered by the accreditation, and the standards to which the test block standardizations are traceable.

~~NOTE A4.1—Accreditation is a new requirement starting with this edition of the standard.~~

ITEM 19

ASTM WK55561

Concurrent E28/E28.06 Ballot Item:

This E28.06 Subcommittee ballot item is to revise ASTM E18 *Standard Test Methods for Rockwell Hardness of Metallic Materials* to add requirements covering the "Use of Portable Rockwell Hardness Testing machines." This is the third time that similar revisions have been proposed, and the first time to be balloted as a concurrent E28 and E28.06 ballot. The first ballot had added the requirements as a new Annex. The second ballot and this revision places the requirements into Section 5 of the Method. This third ballot now also requires that for a portable tester to meet this standard, the tester must pass direct verification.

Rationale:

A standard fixed-location Rockwell hardness machine may not be capable of testing certain samples because of the sample size or weight, sample location, accessibility of the test point or other requirements. In these circumstances, the use of a portable hardness tester may be the only method available to test these samples. In the past, there were few, if any, portable Rockwell hardness testers available that could meet the direct verification requirements of E18. Consequently, the ASTM E110 *Standard Test Method for Rockwell and Brinell Hardness of Metallic Materials by Portable Hardness Testers* was developed to cover portable Rockwell hardness testers meeting the requirements of E18, but with the exception that direct verification of the tester is not required. The problem is that many product and material specifications call out hardness testing to be in compliance with E18, and not with E110. There are many E110 hardness testers being used today to make measurements to meet E18, which is technically not in compliance with the specification. This has long been the situation, and was commonly ignored until auditing became more widespread. Today, there are portable Rockwell hardness testing machines available that can meet direct verification requirements. This revision to E18 will specify requirements for portable Rockwell hardness testing machines and their use to meet E18.

Note: Only the text marked as green underlined additions or marked as ~~red "strike-through" deletions~~ are being balloted. The remaining of the text is given only for informational purposes to help the reader understand the context of the revisions.

Designation: E18 – ??

Standard Test Methods for Rockwell Hardness of Metallic Materials^{1,2}

This standard is issued under the fixed designation E18; 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 U.S. 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 by the Rockwell indentation hardness principle. This standard provides the requirements for Rockwell hardness machines and the procedures for performing Rockwell hardness tests.

1.2 This standard includes requirements for the use of portable Rockwell hardness testing machines that measure Rockwell hardness by the Rockwell indentation hardness test principle.

1.2.3 This standard includes additional requirements in annexes:

Verification of Rockwell Hardness Testing Machines	Annex A1
Rockwell Hardness Standardizing Machines	Annex A2
Standardization of Rockwell Indenters	Annex A3
Standardization of Rockwell Hardness Test Blocks	Annex A4
Guidelines for Determining the Minimum Thickness of a Test Piece	Annex A5
Hardness Value Corrections When Testing on Convex Cylindrical Surfaces	Annex A6

1.3.4 This standard includes nonmandatory information in appendixes which relates to the Rockwell hardness test.

List of ASTM Standards Giving Hardness Values Corresponding to Tensile Strength	Appendix X1
Examples of Procedures for Determining Rockwell Hardness Uncertainty	Appendix X2

2. Referenced Documents

2.1 ASTM Standards:

E110 Test Method for Indentation Hardness of Metallic Materials by Portable Hardness Testing Machines

3. Terminology and Equations

3.1 Definitions:

3.1.8 portable Rockwell hardness testing machine—a Rockwell hardness testing machine that is designed to be transported, carried, set up and operated by the users, and which measures Rockwell hardness by the Rockwell indentation hardness test principle.

3.1.9 movable Rockwell hardness testing machine—a Rockwell hardness testing machine that is designed to be moved to different locations on a moveable frame, table or similar support that is integral to the testing machine (e.g., securely fixed to a rolling table), or a Rockwell hardness testing machine that is designed to move into testing position

prior to a test, (e.g., securely fixed to a moving support arm), and has been previously verified to ensure that such a move will not affect the hardness result.

4. Significance and Use

4.1 The Rockwell hardness test is an empirical indentation hardness test that can provide useful information about metallic materials. This information may correlate to tensile strength, wear resistance, ductility, and other physical characteristics of metallic materials, and may be useful in quality control and selection of materials.

4.2 Rockwell hardness tests are considered satisfactory for acceptance testing of commercial shipments, and have been used extensively in industry for this purpose.

4.3 Rockwell hardness testing at a specific location on a part may not represent the physical characteristics of the whole part or end product.

4.4 Adherence to this standard test method provides traceability to national Rockwell hardness standards except as stated otherwise.

5. Principles of Test and Apparatus

5.8 Use of Portable Rockwell Hardness Testing Machines

5.8.1 A standard fixed-location Rockwell hardness testing machine may not be capable of testing certain samples because of the sample size or weight, sample location, accessibility of the test point or other requirements. In these circumstances, the use of a portable Rockwell hardness testing machine is an acceptable method to test these samples. This method allows the use of a portable Rockwell hardness testing machine as follows.

5.8.1.1 A portable Rockwell hardness testing machine shall be used only when testing circumstances make it impractical to use a standard fixed-location Rockwell hardness testing machine. In such cases, it is recommended that an agreement or understanding be made between all parties involved (e.g., testing service and customer) that a portable Rockwell hardness testing machine will be used in lieu of a fixed-location Rockwell hardness testing machine.

5.8.1.2 The portable Rockwell hardness testing machine shall measure hardness by the Rockwell hardness test

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principle (see 5.1). Portable hardness testing machines or instruments that measure hardness by other means or procedures different than the Rockwell hardness test principle, such as those defined in ASTM standards A833, A956, A1038 or B647, produce a converted Rockwell hardness values and do not comply with this method.

5.8.2.3 The portable Rockwell hardness testing machine shall meet the requirements of this method, including the test principle, apparatus, indenters, applied forces, test procedures and the direct and indirect verifications of the testing machine (except as indicated in Table A1.1).

5.8.3 Daily Verification of portable hardness testing machines - Portable hardness testing machines are susceptible to damage when they are transported or carried from one test site to another. Therefore, in addition to complying with the daily verification requirements specified in 7.1 and Annex A.1, a daily verification shall be performed at each test worksite where the hardness tests are to be made just prior to making the hardness tests. The verification shall be performed with the portable hardness testing machine oriented as closely as practical to the position that it will be used. It is recommended that the daily verification be repeated occasionally during testing and after testing is completed.

5.8.4 Additional reporting requirements when using a portable Rockwell hardness testing machine are given in 9.2.

5.8.5 Portable hardness testing machines by the nature of their application may induce errors that could influence the test results. To understand the differences in results expected between portable and fixed-location hardness testing machines, the user should compare the results of the precision and bias studies given in Section 10 and in Method E110.

9 Report

9.1 The test report shall include the following information:

9.1.1 The Rockwell hardness number. All reports of Rockwell hardness numbers shall indicate the scale used. The reported number shall be rounded in accordance with Practice E29 (see 5.2.4 and Note 2),

9.1.2 The total force dwell time, if outside the specified standard test cycle tolerances (see Table 3), and

9.1.3 The ambient temperature at the time of test, if outside the limits of 10 to 35°C (50 to 95°F), unless it has been shown not to affect the measurement result.

9.2 When using a portable Rockwell hardness testing machine, the measured hardness number shall be reported in accordance with 9.1, and appended with a /P to indicate that it was determined by portable Rockwell hardness testing machine. For example,

40 HRC/P = Rockwell hardness number of 40 on Rockwell C scale.

72 HRBW/P = Rockwell hardness number of 72 on the Rockwell B scale with a tungsten carbide ball indenter.

ANNEXES
(Mandatory Information)

A1. VERIFICATION OF ROCKWELL HARDNESS TESTING MACHINES

**TABLE A1.1 Verification Schedule for a Rockwell
Testing Machine**

Verification procedure	Schedule
Direct verification	<ul style="list-style-type: none"> • When a testing machine is new, or when adjustments, modifications or repairs are made that could affect the application of the test forces, the depth measuring system, or the machine hysteresis. • When a testing machine fails an indirect verification (see A1.4.9.4)
Indirect verification	<ul style="list-style-type: none"> • Recommended every 12 months, or more often if needed. • Shall be no longer than every 18 months. • When a testing machine is installed or moved, [only a partial indirect verification is performed by following the procedure given in A1.4.7 for verifying the as-found condition]. This does not apply to machines that are designed to be moved or that move prior to each test, when it has been previously demonstrated that such a move will not affect the hardness result. <u>Indirect verification is not required after moving a portable or movable Rockwell hardness testing machine (see 3.1.8, 3.1.9 and 5.8).</u> • Following a direct verification. • To qualify an indenter that was not verified in the last indirect verification, (only a partial indirect verification is performed, see A1.4.10).
Daily verification	<ul style="list-style-type: none"> • Required each day that hardness tests are to be made. • Recommended whenever the indenter, anvil, or test force is changed.