Designation: E3068 – 17ε1

Standard Test Method for Contact Measurement of Backface Deformation in Clay Backing During Body Armor Testing[1]

This standard is issued under the fixed designation E3068; 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—Added research report footnote to Section 12 editorially in April 2017.

1. Scope

1.1 This test method describes test methods for the contact measurement of backface deformation (BFD) in clay backing caused by a test threat that produces a partial penetration in a body armor test item.

1.2 This test method is applicable to testing of planar and nonplanar soft armor and hard armor.

1.3 This test method is not applicable to testing of helmets.

1.4 The purpose of this test method is to achieve consistent measurements between laboratories and reduce differences that could result from using different measurement techniques.

1.5 It is anticipated that this test method will be referenced by certifiers, purchasers, and other users in order to meet their specific needs.

1.6 This test method does not specify BFD performance requirements for body armor. The performance requirements are included in other standards or specifications. The decision rules for determining conformance to specifications and the consideration of uncertainty are also included in other standards or specifications.

1.7 *Units*—The values stated in SI units are to be regarded as standard. Where appropriate, mathematical conversions to non-SI units are provided in parentheses for informational purposes.

1.8 *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.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E3004 Specification for Preparation and Verification of Clay Blocks Used in Ballistic-Resistance Testing of Torso Body Armor

E3005 Terminology for Body Armor

2.2 *Other Standards:*

MIL-STD-3027 Department of Defense Test Method Standard for Performance Requirements and Testing of Body Armor[3]

NIJ Standard 0101.06 Ballistic Resistance of Body Armor[4]

National Research Council Testing of Body Armor Materials Phase III[5]

3. Terminology

3.1 The terms and definitions of Terminology E3005 apply for the following terms: *backface deformation, backing fixture, backing material, body armor, complete penetration, hard armor, nonplanar, partial penetration, soft armor, test item*, and *test threat*.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *applique, n*—backing material intended to fill the space behind a nonplanar test item during testing or conditioning procedures.

3.2.2 *backface deformation (BFD), n*—the indentation in the backing material caused by a projectile impact on the test item during testing. **E3005**

3.2.2.1 *Discussion*—See Fig. 1.

[1] This test method is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.04 on Personal Protective Equipment (PPE).

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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.

[3] Available from IHS, 15 Inverness Way East, Englewood, CO 80112, http://www.global.ihs.com.

[4] Available from National Institute of Justice (NIJ), 810 7th St., NW, Washington, DC 20531, http://nij.gov.

[5] Available from The National Academies Press, 500 Fifth St., NW, Washington, DC 20001, https://www.nap.edu.

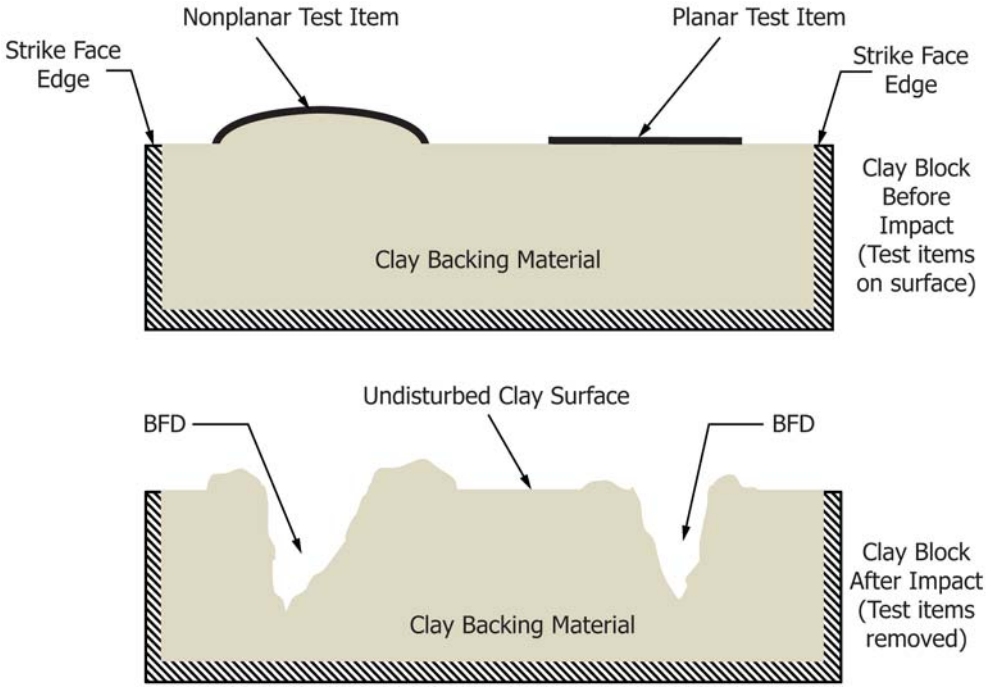

FIG. 1 Examples of Backface Deformation (Side View)

3.2.3 *bridge gauge, n*—an assembly used for measuring that consists of a depth gauge and supports that rest on opposite sides of the backing fixture. **E3004**

3.2.3.1 *Discussion*—See Fig. 2 for a photograph of a bridge gauge.

3.2.4 *check standard, n*—stable, durable artifact that may be used for training, comparing among measuring instruments, and checking instruments prior to and after calibration, maintenance, or normal use to detect changes in the instruments.

3.2.5 *clay block, n*—a type of backing assembly in which the backing material is *ROMA Plastilina No. 1*®[6] modeling clay. **E3004**

3.2.5.1 *Discussion*—See Fig. 3 for a graphical representation of a clay block.

3.2.6 *depth gauge, n*—instrument (for example, caliper) used to measure the indentations in the backing material.

[6] U.S. Government standards require ROMA Plastilina No. 1®, from Sculpture House, Inc., as the backing material for ballistic-resistance testing.

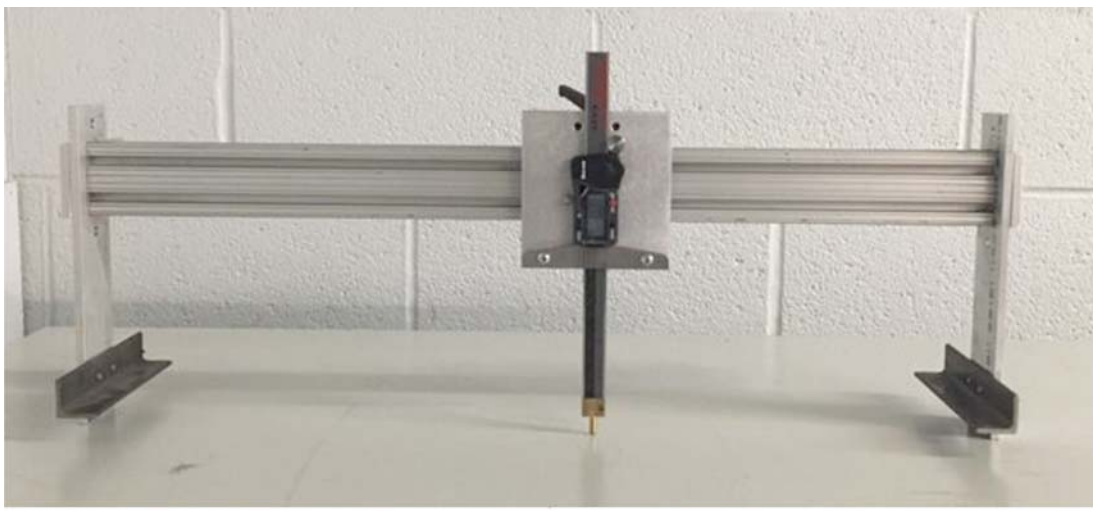

FIG. 2 Photograph of Bridge Gauge