



Designation: **E3347/E3347M – 22** E3347/E3347M – 23

Standard Specification for Ballistic-Resistant Shields Used by Law Enforcement Officers¹

This standard is issued under the fixed designation E3347/E3347M; 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 standard specifies minimum performance requirements and test methods for the ballistic resistance of shields used by U.S. law enforcement officers to protect against handgun and rifle ammunition.

1.1.1 The option for testing either handgun-rated or rifle-rated shields with a shotgun threat is included in [Appendix X2](#).

NOTE 1—Shields rated as “shotgun only” are not typically produced in the industry because they are not used by law enforcement agencies.

1.2 Products addressed by this specification include hand-held or hand-carried shields (having single or multiple panels, multi-fold shields) and person-portable shields with wheels.

1.2.1 Shields may be stand-alone or may incorporate in conjunction with (ICW) armor appliques.

1.3 Products not addressed by this specification include fixed or mobile barriers not intended to move during an operation and flexible shields that drape across the surfaces upon which they are placed (for example, ballistic blankets).

<https://standards.iteh.ai/catalog/standards/sist/65810bdf-1789-4948-bcb3-ed974132561d/astm-e3347-e3347m-23>
NOTE 2—The above products are addressed by Specification [E3236/E3236M](#).

1.4 This specification addresses ballistic performance in terms of resistance to penetration (RTP) of the shield body, body edges, viewports, fasteners, and weak points.

1.5 Shields covered by this specification are classified into ASTM shield ballistic protection levels (see Section [10](#)).

1.6 This specification is applicable for certification testing, verification testing, or research and development testing.

1.7 Values stated in either the International System of Units (metric) or U.S. Customary units [inch-pound] are to be regarded separately as standard. The values stated in each system may not be exact equivalents. Both units are referenced to facilitate acquisition of materials internationally and minimize fabrication costs. Tests conducted using either system maintain repeatability and reproducibility of the test method and results are comparable.

¹ This specification is under the jurisdiction of ASTM Committee [E54](#) on Homeland Security Applications and is the direct responsibility of Subcommittee [E54.04](#) on Public Safety Equipment.

Current edition approved ~~Aug. 1, 2022~~ May 1, 2023. Published ~~August 2022~~ June 2023. Originally approved in 2022. Last previous edition approved in 2022 as [E3347/E3347M – 22](#). DOI: [10.1520/E3347-E3347M-22.10.1520/E3347-E3347M-23](#).

1.8 This specification is divided into the following sections:

Section	Title
1	Scope
2	Referenced Documents
3	Terminology
4	Significance and Use
5	Equipment and Materials
6	Conditioning Requirements
7	Test Requirements
8	Test Item Requirements
9	Procedure for Visual Examination
10	Ballistic Protection Levels and Test Threats
11	Ballistic Performance Requirements for Handgun-rated Shields
12	Ballistic Performance Requirements for Rifle-rated Shields
13	Product Documentation Requirements
14	Product Label and Package Label Requirements
15	Test Report
16	Keywords
Appendix X1	Example Test Item and Shot Distribution Diagrams
Appendix X2	Performance Requirements for Adding a Shotgun Threat to a Handgun-rated or Rifle-rated Shield

1.9 *The tests required by this standard have inherent hazards. 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *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

[E3005 Terminology for Body Armor](#)

[E3141/E3141M Test Method for Ballistic Resistant Shields for Law Enforcement](#)

[E3236/E3236M Specification for Ballistic-resistant Barriers Used in Homeland Security or Public Safety Applications](#)

2.2 ANSI/SAAMI Standards:³

[ANSI/SAAMI Glossary of Industry Terms](#)

2.3 ISO/IEC Standards:⁴

[ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories](#)

3. Terminology

3.1 *Definitions*—The following terms and definitions from Terminology [E3005](#) are applicable:

3.1.1 *ammunition, n*—one or more loaded cartridges consisting of case, primer, propellant, and one or more projectiles.

3.1.2 *backface deformation, n*—the indentation in the backing material caused by a projectile impact on the test item during testing; synonymous with *backface signature*.

3.1.3 *backing assembly, n*—a backing fixture filled with backing material; for example, a clay block is a type of a backing assembly.

3.1.4 *ballistic resistance, n*—a characteristic of protective equipment or materials describing their ability to provide protection from projectiles.

3.1.5 *complete penetration, n*—the result of a test threat impact if one or more of the following conditions are met: (1) any portion of a test threat, a fragment of a test threat, or a fragment of the test item passes through the wear face of the test item; (2) a hole

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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

is created through the test item; (3) the presence of a test threat, a fragment of a test threat, or a fragment of the test item is embedded or passes into the backing material; or (4) a hole is created through the witness panel; synonymous with *perforation*.

3.1.5.1 *Discussion*—

The conditions for complete penetration are specified in individual test methods.

3.1.6 *conditioning, n*—a process that exposes an item, prior to testing, to a specified controlled environment or physical stresses, or both.

3.1.7 *controlled ambient, n*—conditions with temperature of 68 °F ± 10 °F (20 °C ± 5.6 °C) and 50 % ± 20 % relative humidity (RH).

3.1.8 *fair hit, n*—a test threat impact (on a test item) that meets all specified requirements in a particular test method.

3.1.9 *model, n*—the manufacturer’s design, with unique specifications and characteristics, of a particular item.

3.1.10 *partial penetration, n*—any result of a test threat impact that is not a complete penetration; synonymous with *stop*.

3.1.11 *shot-to-edge distance, n*—the distance from the center of the projectile impact to the nearest test item edge; for soft armor, the test item edge shall be the edge of the ballistic material.

3.1.12 *shot-to-shot distance, n*—the distance from the center of the projectile impact to the center of any other projectile impact on the test item.

3.1.13 *supplier, n*—the party that is responsible for ensuring that products meet and, if applicable, continue to meet, the requirements on which the certification is based.

3.1.14 *stop, n*—see *partial penetration*.

3.1.15 *test item, n*—a single article intended for testing.

3.1.16 *test series, n*—the set of all shots necessary to obtain the required number of fair hits on a single test item or the set of all shots necessary over multiple test items to generate the required data.

3.1.17 *unfair hit, n*—a test threat impact that does not meet the specified requirements in a particular test method for impact location and spacing, velocity, obliquity, or yaw.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *armor applique, n*—a removable unit of protective material (soft armor or hard armor) intended to be placed over the strike face of a protective product, such as a ballistic-resistant helmet or shield, to enhance ballistic protection in a localized area.

3.2.2 *in conjunction with armor applique, n*—an armor applique that is designed to provide a specific level of ballistic protection only when layered with a specified model(s) of ballistic-resistant shield, helmet, or other protective product.

4. Significance and Use

4.1 The purpose of this specification is to provide performance requirements and test methods for the evaluation of ballistic-resistant shields used by law enforcement officers.

4.2 This specification may be used by suppliers, certification bodies, verification bodies, testing laboratories, research and development organizations, and others assessing the performance of ballistic-resistant shields.

4.3 The specification may be used by purchasers in their evaluation of products to meet their needs and requirements.

5. Equipment and Materials

5.1 The test range shall meet the requirements of Test Method **E3141/E3141M**, subsection 5.1, *Test Range Configuration*.

5.1.1 No firearms shall be used for testing.

5.2 Equipment for test item temperature and submersion conditioning shall meet the requirements of Test Method **E3141/E3141M**, Section 6, *Conditioning Procedures*.

5.3 Test item mounting shall be as described in Test Method **E3141/E3141M**, subsection 5.6.1, *Test Item Mounting*.

5.4 The witness panel shall be as described in Test Method **E3141/E3141M**, subsection 5.6.2, *Witness Panel*.

6. Conditioning Requirements

6.1 Controlled ambient conditioning shall be done in accordance with Test Method **E3141/E3141M**, subsection 6.1, *Controlled Ambient Conditioning*.

6.2 High and low temperature conditioning shall be done in accordance with Test Method **E3141/E3141M**, subsection 6.2, *Temperature Extremes Procedure*.

6.3 Thermal shock conditioning shall be done in accordance with Test Method **E3141/E3141M**, subsection 6.3, *Temperature Shock Procedure*.

6.4 Submersion conditioning shall be done in accordance with Test Method **E3141/E3141M**, subsection 6.4, *Conditioning by Submersion in Plain Water*.

7. Test Requirements

7.1 The supplier shall declare the intended ballistic protection level for a shield model being submitted for testing to this standard.

7.1.1 The supplier shall declare the intended ballistic protection level for any ICW armor applique or area of increased protection.

7.2 The shield shall be tested in the intended-use configuration.

7.2.1 Any in conjunction with (ICW) armor applique declared for use with a specific shield model shall be tested with that shield model to demonstrate the increased level of ballistic protection.

7.2.2 Multi-panel shields shall be tested to assess joints between panels.

7.3 The fair hit requirements shall apply as listed in Test Method **E3141/E3141M**, subsection 5.3, *Fair Hit Requirements*.

7.4 Cluster shot requirements shall apply as listed in Test Method **E3141/E3141M**, subsection 5.4, *Cluster Shot Requirements*.

7.5 Determination of shot results shall be done in accordance with Test Method **E3141/E3141M**, subsection 5.7, *Determination of Shot Result*.

7.6 The supplier shall identify nonballistic-resistant portions of shields (such as rifle supports on the sides).

8. Test Item Requirements

8.1 Test items shall meet the requirements specified in Test Method **E3141/E3141M**, subsection 4.1, *Test Item Requirements*.

8.2 The manufacturer shall submit as test items shields identical in ballistic layout and construction to those sold in the marketplace.

8.2.1 Test items shall be fully assembled products that are sized as specified in Sections 11 and 12 of this specification.

8.2.2 All test items shall be identical in materials of construction and material configuration. Test items of the same size shall be identical in construction.

8.3 The manufacturer shall provide a build sheet and dimensioned diagram indicating the location of hardware (including fasteners), potential weak points, interfaces between the viewport and shield body, and thickness of viewport.

8.3.1 The build sheet and dimensioned diagram shall show areas of increased protection (for example, an applique or “plus up”).

8.4 The number of test items required for ballistic testing is specified in Sections 11 and 12 of this specification.

NOTE 3—The number of test items required may increase if the ballistic layout changes over the shield body or if there are unique body edges, unique fasteners, and unique weak points.

9. Procedure for Visual Examination

9.1 Verify the group of test items for correct quantity and sizes.

9.2 Examine each test item exterior for defects as specified in Test Method E3141/E3141M, subsection 4.2.

9.3 Examine the group of test items for variations in appearance, materials, and manner of construction as specified in Test Method E3141/E3141M, subsection 4.3.

9.4 Examine the group of test items as specified in Test Method E3141/E3141M, subsection 4.4, to identify regions of identical construction and regions of unique construction. [ASTM E3347/E3347M-23](https://standards.iteh.ai/catalog/standards/sist/65810bdf-1789-4948-bcb3-ed974132561d/astm-e3347-e3347m-23)

<https://standards.iteh.ai/catalog/standards/sist/65810bdf-1789-4948-bcb3-ed974132561d/astm-e3347-e3347m-23>

9.5 Prior to conditioning, photograph at least one test item.

9.6 Following conditioning, examine the test items for visible damage due to conditioning and photograph any test items showing such damage.

10. Ballistic Protection Levels and Test Threats

10.1 This specification identifies five ASTM shield ballistic protection levels, one for handgun (HG) protection, three for rifle (RF) protection, and one for shotgun (SG) protection:

10.1.1 ASTM-Shield-HG2;

10.1.2 ASTM-Shield-RF1;

10.1.3 ASTM-Shield-RF2;

10.1.4 ASTM-Shield-RF3; and

10.1.5 ASTM-Shield-SG.

10.2 The ballistic protection levels and associated ballistic test threats are as shown in Annex A1, Table A1.1.

11. Ballistic Performance Requirements for Handgun-rated Shields

11.1 The test item shall be tested as specified in Test Method [E3141/E3141M](#), Section 7, *Ballistic Resistance Test Procedures*, with the following modifications:

11.1.1 The manufacturer shall declare the dimensions of smallest and largest shields that will be sold in the marketplace.

11.1.2 There are two conditioning sequences which shall be completed to satisfy the requirements of this specification. At least two shields shall be submitted for each of the following conditioning sequences prior to ballistic testing:

11.1.2.1 *Sequence 1:*

- (1) Controlled ambient conditioning;
- (2) Thermal shock conditioning;
- (3) Controlled ambient conditioning;
- (4) Submersion conditioning; then
- (5) Low temperature conditioning.

11.1.2.2 *Sequence 2:*

- (1) Controlled ambient conditioning;
- (2) Thermal shock conditioning;
- (3) Controlled ambient conditioning;
- (4) Submersion conditioning; then
- (5) High temperature conditioning.

11.1.3 Following low or high temperature conditioning, ballistic testing shall be completed on the test items within 30 min of removal from conditioning.

11.1.3.1 If ballistic testing cannot be completed within 30 min, the test item shall be returned to conditioning at the final extreme temperature for at least 2 h.

11.1.4 The following test item and shot distribution requirements shall apply for each test threat:

11.1.4.1 For each conditioning sequence, at least one test item shall be the smallest manufactured, and at least one test item shall be the largest manufactured.

NOTE 4—The supplier may choose to submit the same shields to both conditioning sequences with ballistic testing after each sequence.

- (1) If size or design prohibits all required shots on a test item, additional test items of the same size shall be used.

11.1.4.2 At least 33 % of the shots shall be taken on the smallest shield, and at least 33 % of the shots shall be taken on the largest shield.

(1) The manufacturer is permitted to specify more than the minimum number of shots on a single test item to achieve the required shots.

11.1.4.3 The following shots shall be distributed over the two sizes of test items (per conditioning sequence) as shown:

(1) *Largest Shield:*

- (a) Single 3-shot cluster at 0 degrees;
- (b) Single 3-shot cluster at 30 degrees;
- (c) Two edge shots (see [Note 45](#));
- (d) Single viewport edge shot;
- (e) Single viewport center shot;
- (f) Single viewport corner shot; and
- (g) Single viewport interface shots.

NOTE 5—A shot from the 3-shot cluster at 0 degrees may be counted as an edge shot.

(2) *Smallest Shield:*

- (a) Single 3-shot cluster at 0 degrees;
- (b) Single 3-shot cluster at 30 degrees;

- (c) Two edge shots (see [Note 45](#));
- (d) Single viewport center shot;
- (e) Single viewport corner shot; and
- (f) Single viewport interface shot.

11.1.4.4 The distribution of fastener shots and weak point shots among the two sizes of test items shall be at the discretion of the manufacturer.

11.1.5 An example is provided in Fig. X1.1 of [Appendix X1](#).

11.2 Performance Requirements:

11.2.1 Each test item shall withstand the required number of fair hits and shall experience no complete penetrations. Any complete penetration by a fair hit shall be considered a failure.

12. Ballistic Performance Requirements for Rifle-rated Shields

12.1 The test item shall be tested as specified in Test Method [E3141/E3141M](#), Section 7, *Ballistic Resistance Test Procedures*, with the following modifications:

12.1.1 The manufacturer shall declare the dimensions of smallest and largest shields that will be sold in the marketplace.

12.1.2 There are two conditioning sequences which shall be completed to satisfy the requirements of this specification. A minimum number of shields (see [12.1.4](#)) shall be submitted for each of the following conditioning sequences prior to ballistic testing:

12.1.2.1 Sequence 1:

- (1) Controlled ambient conditioning;
- (2) Thermal shock conditioning;
- (3) Controlled ambient conditioning;
- (4) Submersion conditioning; then
- (5) Low temperature conditioning.

12.1.2.2 Sequence 2:

- (1) Controlled ambient conditioning;
- (2) Thermal shock conditioning;
- (3) Controlled ambient conditioning;
- (4) Submersion conditioning; then
- (5) High temperature conditioning.

12.1.3 Following low or high temperature conditioning, ballistic testing shall be completed on the test items within 30 min of removal from conditioning.

12.1.3.1 If ballistic testing cannot be completed within 30 min, the test item shall be returned to conditioning at the final extreme temperature for at least 2 h.

12.1.4 The manufacturer shall select one of the following options for testing:

12.1.4.1 Option 1:

(1) At least three test items are required for each conditioning sequence (in other words, three shields for Sequence 1 and three shields for Sequence 2). For each conditioning sequence, at least one test item shall be the smallest manufactured, and at least one test item shall be the largest manufactured. If only two sizes are manufactured, the third test item may be the smallest or the largest. If more than two sizes are manufactured, the third test item shall be a mid-sized shield.

NOTE 6—The manufacturer may choose to condition more shields than will be shot.

- (2) An example is provided in Fig. X1.2 of [Appendix X1](#).

12.1.4.2 Option 2: