



Designation: E3062/E3062M – 20

# Standard Specification for Indoor Ballistic Test Ranges for Small Arms and Fragmentation Testing of Ballistic-resistant Items<sup>1</sup>

This standard is issued under the fixed designation E3062/E3062M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This standard specifies indoor ballistic test range requirements for small arms and fragmentation testing of the following ballistic-resistant items: soft body armor, hard armor plates, body armor accessories, shields, and helmets. The specification includes requirements for range geometry (for example, dimensions, alignment, spacing), range conditions (for example, temperature, humidity, lighting), test equipment (for example, receiver, mounting, test barrels, backing assembly mounting), instrumentation (for example, light screens, high speed cameras, radar), and measurement procedures (for example, projectile velocity, yaw).

1.2 The purpose of this standard is to specify critical test range parameters in order to achieve consistency/repeatability among test ranges.

1.3 This specification is not applicable for “contact” shots taken on the test item (that is, the muzzle rests on the strike face of the test item).

1.4 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4.1 The user of this standard will identify the system of units to be used, and it is critical to ensure that any cross-referenced standards maintain consistency of units between standards.

1.5 *This standard does not address environmental concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate practices and determine the applicability of regulatory requirements prior to use.*

1.6 *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.*

1.7 *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:*<sup>2</sup>

E3005 *Terminology for Body Armor*

2.2 *SAAMI Standard:*<sup>3</sup>

SAAMI *Glossary of Industry Terms*

## 3. Terminology

3.1 For terms not defined in this specification, the following definitions of Terminology E3005 apply: *angle of incidence, backing assembly, backing material, backing fixture, body armor, hard armor, plates, soft body armor, stop, strike face, test item, test item mounting system, test stand, universal receiver, and yaw.*

## 4. Significance and Use

4.1 U.S. Department of Defense and U.S. Department of Justice standards for assessing the performance of ballistic-resistant personal protective equipment require the use of properly configured indoor test ranges. This specification is one of several standards that will help to ensure that testing results between test ranges are comparable.

4.2 This specification may be used by private-sector and government laboratories, manufacturers, research and development organizations, and others assessing the ballistic resistance of personal protective equipment.

<sup>1</sup> This specification 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).

Current edition approved April 1, 2020. Published April 2020. Originally approved in 2016. Last previous edition approved in 2019 as E3062/E3062M – 19. DOI: 10.1520/E3062\_E3062M-20.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

<sup>3</sup> Available from Sporting Arms and Ammunition Manufacturers’ Institute (SAAMI), 11 Mile Hill Rd, Newtown, CT 06470, [www.saami.org](http://www.saami.org).

4.3 It is intended that this specification be referenced by other standards, specifications, or test methods, or combinations thereof.

## 5. Minimum Room Dimensions

5.1 The test range dimensions should be sufficient to accommodate the required equipment and spacing between that equipment and the room walls and ceiling so personnel can safely perform testing without obstruction.

## 6. Range Environmental Conditions

6.1 The relative humidity shall be  $50 \pm 20$  %.

6.2 The controlled ambient temperature shall be  $20.0 \pm 5.6^\circ\text{C}$  [ $68 \pm 10^\circ\text{F}$ ].

6.3 General lighting on the range should provide adequate light levels to enable personnel to perform assigned duties. Local lighting to supplement general lighting, if needed, should be available to provide better visibility for tasks associated with measurements and instrument readings.

NOTE 1—Local lighting may be a flashlight, headlamp, or other light source that does not emit enough heat to affect the test results.

## 7. Projectile Firing System

7.1 The projectile firing system shall be one of the following:

- 7.1.1 Universal receiver and test barrel.
- 7.1.2 Firearm.

NOTE 2—Use of a firearm is not the preferred method.

7.2 All components of the projectile firing system shall be mounted.

NOTE 3—The intent of mounting the projectile firing system is to achieve accurate and repeatable performance.

## 8. Measurement Systems

8.1 *Projectile Velocity Measurement System:*

8.1.1 The system shall maintain position and alignment during testing.

8.1.2 The system shall be appropriate for the projectile and the velocities being measured.

8.1.3 An independent method for verifying the accuracy of the system shall be available.

8.1.4 The projectile velocity should be determined using at least two electronically independent sets of instrumentation. If two electronically independent sets of instrumentation are not used, the reason and the type of instrumentation used shall be documented.

8.1.4.1 For each projectile firing, the two independent sets of instrumentation shall provide individual velocity measurements within 3 m/s [10 ft/s] of each other, with the following considerations.

(1) If the two instrumentation sets do not agree within 3 m/s [10 ft/s] and either yields a reading that is not within 75 % of the intended test threat velocity, that value should be discarded, and the other reading shall be recorded as the velocity measurement. All occurrences of this condition shall be documented.

(2) If the two instrumentation sets do not agree within 3 m/s [10 ft/s] and both yield a reading that is within 75 % of the intended test threat velocity, the test result is considered invalid, and the test shall be redone. All occurrences of this condition shall be documented.

(3) If there is reasonable doubt that the instrumentation sets are reading correctly, the test result may be considered invalid, and the test shall be redone. All occurrences of this condition shall be documented.

NOTE 4—Appendix X1 provides examples to aid in understanding these considerations.

NOTE 5—This standard does not address velocity loss (that is, drag) from the measurement location to the test item. Other standards, specifications, or test methods can address velocity loss.

8.1.5 Undesirable influences on the velocity measurement system shall be mitigated.

NOTE 6—Undesirable influences include, but are not necessarily limited to, shock waves, sound waves, light, ejected propellant, sabots, and other debris.

8.2 *Projectile Yaw Measurement System:*

8.2.1 The test laboratory shall provide a method for verifying yaw.

NOTE 7—Yaw requirements (for example, maximum allowable yaw) and details necessary for making yaw measurements (for example, location of yaw measurement) are specified in other standards, specifications, or test methods, or combinations thereof.

## 9. Spacing and Set Up of Test Equipment

9.1 The test equipment shall be set up as shown in Fig. 1 with spacing and additional requirements as described in Table 1 and the remainder of this section.

9.1.1 The test equipment shall be set up as though the shot were to be taken at an angle of incidence of  $0^\circ$ ; the test equipment shall not be moved, except as it pertains to translating for aiming and rotating to accommodate obliquity or angle of incidence requirements.

9.2 The distance from muzzle to test item reference plane (D1 in Fig. 1) may be adjusted to minimize yaw or blast effects. The reason for the adjustment and the distance used shall be documented. The distance from the location of velocity measurement to the test item reference plane (D2 in Fig. 1) shall not be adjusted.

NOTE 8—The test item reference plane will be specified in other standards, specifications, or test methods because the test item's reference plane differs depending on the test item.

9.3 If radar, high-speed video, or X-ray is used for velocity measurement, the velocity reported shall be either the velocity measured at the location given in Table 1 or the velocity measured at the test item as specified in other standards, specifications, or test methods.

9.4 If light screens are used for velocity measurement, the requirements below shall be met.

9.4.1 The light screens shall be positioned as shown in Fig. 2.

9.4.2 The inner screens shall be paired together, and the outer screens shall be paired together.