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Standard Terminology for Body Armor[1]

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1. Scope

1.1 The scope of this terminology is to provide a standard terminology for body armor providing protection against ballistic threats, stabbing, fragmentation, blunt impact, or a combination of threats.

1.2 The intent of this terminology is to have terms, abbreviations, and formulas that are applicable across federal agencies, law enforcement and corrections agencies, testing and certification bodies, and manufacturers.

1.2.1 The terminology is kept general herein and should be defined more specifically as needed within individual test methods or other standards.

1.3 This terminology is not intended to describe test methods or performance requirements for body armor.

2. Referenced Documents

2.1 *DOD Standard:*[2]

MIL-STD-3027 Method Standard for Performance Requirements and Testing of Body Armor

2.2 *NIJ Standard:*[3]

NIJ Standard-0101.06 Ballistic Resistance of Body Armor

2.3 *SAAMI Standard:*[4]

SAAMI Glossary of Industry Terms

3. Terminology

accessory, *n*—a body armor component that is detachable or removable from the body armor and is intended to provide extended area of coverage protection against threats that may include ballistic threats, stabbing, fragmentation, blunt impact, or a combination of threats.

DISCUSSION—Accessories are typically attachments to tactical body armor providing protection to areas not covered by the vest, such as the shoulders, upper arms, neck, sides, pelvis, and groin. See ***tactical body armor***. See *vest*.

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

angle of incidence, *n*—the angle between the test threat line of aim and the line normal to a reference plane based on the front surface of the backing assembly. (Adapted from NIJ 0101.06). See also *obliquity*.

DISCUSSION—Some standards have used the terms *angle of incidence* and *obliquity* as synonyms, but in this standard, they are defined differently. Fig. 1 provides examples to aid in visualizing the difference between *angle of incidence* and *obliquity*.

areal density, *n*—a measure of the mass of the armor panel per unit area, usually expressed in kilograms per square meter (kg/m^2) or pound-mass per square foot (lbm/ft^2).

armor carrier, *n*—See *carrier*.

armor panel, *n*—a component of soft body armor consisting of protective materials, typically enclosed in a panel cover. See *ballistic panel, blunt impact panel, stab panel*. See also *panel cover*.

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

DISCUSSION—Details necessary for making BFD measurements are specified in individual test methods.

backface signature, *n*—See *backface deformation*.

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

backing fixture, *n*—any apparatus designed to hold the backing material(s) for a specific test.

backing material, *n*—the substance placed behind the test item during testing.

DISCUSSION—The backing material typically provides support for the test item, and it may act as a witness material and may provide a measurable indication of the test item performance.

ballistic panel, *n*—a type of armor panel intended to provide ballistic resistance.

[1] This terminology 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] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

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

[4] Available from Sporting Arms and Ammunition Manufacturers' Institute, Inc., 11 Mile Hill Rd, Newtown, Connecticut, 06470–2539, www.saami.org.

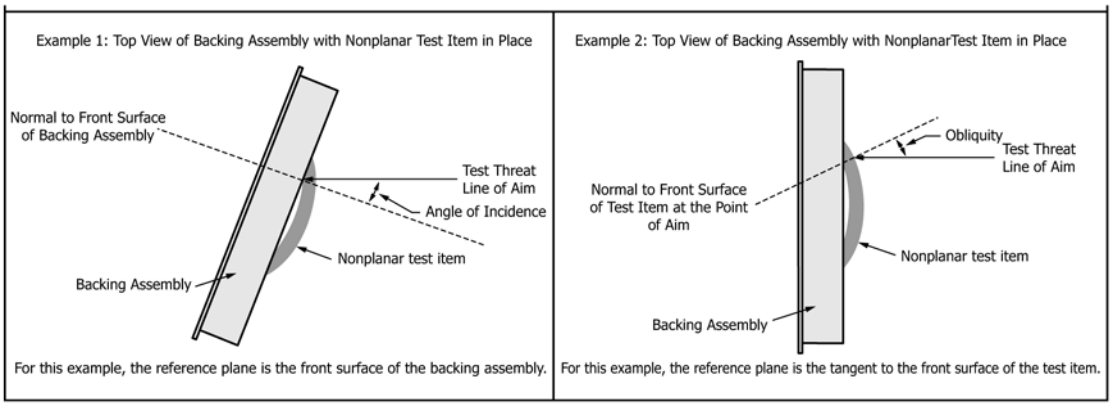

FIG. 1 Examples to Aid in Visualizing the Difference Between Angle of Incidence (Example 1) and Obliquity (Example 2)

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

blunt impact panel, *n*—a type of armor panel intended to provide protection against impact from a blunt object.

blunt impact resistance, *n*—a characteristic of protective equipment or materials describing their ability to provide protection against impact from a blunt object.

body armor, *n*—an item of personal protective equipment intended to protect the wearer from threats that may include ballistic threats, stabbing, fragmentation, or blunt impact.

DISCUSSION—Law enforcement and corrections officers typically refer to body armor as a vest. See *vest*.

bullet, *n*—a projectile fired from a firearm or testing apparatus.

DISCUSSION—The SAAMI definition considers bullets to be projectiles fired from rifled barrels, which differentiates bullets from shot, slugs, fragment simulators, and other projectiles.

carrier, *n*—a garment whose primary purpose is to retain the armor panel(s) or plate(s) and provide a means of supporting and securing the armor panel(s) or plate(s) to the wearer.

cartridge, *n*—a single assembled unit consisting of a bullet, propellant, primer, and casing. Synonymous with *round*.

combination armor, *n*—a type of body armor intended to protect the wearer from both ballistic threats and stabbing.

DISCUSSION—Combination armor is sometimes called dual-threat armor or multiple-threat armor.

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 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*.

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

concealable body armor, *n*—a vest designed to be worn under the shirt (uniform or undercover) or in a carrier that looks like a uniform shirt so that it is not easily seen.

DISCUSSION—Concealable body armor is also called concealable armor.

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

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

hard armor, *n*—an item of personal protective equipment that is constructed of rigid materials and is intended to protect the wearer from threats that may include ballistic threats, stabbing, fragmentation, or blunt impact, or combinations thereof; synonymous with *hard armor plate* and *plate*.

hard armor plate, *n*—See *hard armor*.

in conjunction with armor, *n*—soft or hard armor that is designed to provide a specific level of ballistic protection only when layered with a specified model(s) of body armor.

insert, *n*—a removable unit of protective material (soft armor or hard armor) intended to be placed into a special pocket on a carrier to enhance protection in a localized area.

nonplanar, *adj*—having features that would prevent the test item from making full contact with a flat surface; typically used to describe curved plates and armor designed for female wearers.

obliquity, *n*—the angle between the test threat line of aim and the line normal to a reference plane based on features of the test item at the point of aim. (Adapted from MIL-STD-3027.) See also *angle of incidence*.

DISCUSSION—Some standards have used the terms *angle of incidence* and *obliquity* as synonyms, but in this standard, they are defined differently. Fig. 1 provides examples to aid in visualizing the difference between *angle of incidence* and *obliquity*.

over velocity, *n*—velocity that is greater than the upper limit of a specified range.

panel cover, *n*—a covering, typically nonremovable, that encloses the protective materials and protects them from environmental factors, such as moisture, ultraviolet light, debris, and dust.

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

perforation, *n*—See *complete penetration*.

plate, *n*—See *hard armor*.

projectile, *n*—an object launched by external force.

propellant, *n*—in ammunition, the chemical mixture which, when ignited by a primer, generates gas that propels the projectile from the firearm or testing apparatus.

residual velocity, *n*—the velocity at which a projectile exits the rear surface of a test item.

round, *n*—See *cartridge*.

shoot pack, *n*—a test item prepared with materials, or with materials and construction features, utilized in body armor, but not intended to be worn as body armor or an accessory.

DISCUSSION—The shape, dimensions, or area of a shoot pack, or combinations thereof, may be specified by the test method.

DISCUSSION—A shoot pack may be designed to simulate a body armor or an accessory.

shotshell, *n*—a single, assembled unit consisting of propellant, primer, wad, shell (that is, casing), and either multiple pellets or one slug, for use in a shotgun.

shot-to-edge distance, *n*—the distance from the center of the projectile impact to the nearest test item edge.

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.

small arms, *n*—portable firearms, typically including handguns, shotguns, rifles, and light machine guns.

DISCUSSION—There is no universally accepted definition of small arms. Some military organizations do not consider handguns to be small arms.

soft armor, *n*—an item of personal protective equipment constructed of pliable/flexible materials intended to protect the wearer from threats that may include ballistic threats, stabbing, fragmentation, or blunt imact.

soft body armor, *n*—See *soft armor*.

stab panel, *n*—a type of armor panel intended to provide stab resistance.

stab resistance, *n*—a characteristic of protective equipment or materials describing their ability to provide protection from sharp or pointed objects, or both, which may include edged blades, spikes, and ice picks.

stop, *n*—See *partial penetration*.

strike face, *n*—the surface of an armor panel or plate intended to face the incoming threat.

tactical body armor, *n*—a vest designed to be worn over the uniform shirt in a load bearing carrier that accepts various equipment.

DISCUSSION—Equipment may include holsters, magazines, radios, or accessories.

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

DISCUSSION—Examples may include one panel, one plate, or one shoot pack.

test threat, *n*—the projectile, edged blade, spike, or other object that is used in laboratory testing to impact the test item at a specific velocity or energy to assess performance of body armor.

trauma pack, *n*—a soft insert intended to reduce backface deformation due to a ballistic impact.

trauma plate, *n*—a hard insert intended to reduce backface deformation due to a ballistic impact.

under velocity, *n*—velocity that is less than the lower limit of a specified range.

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.

vest, *n*—a type of body armor intended to protect the wearer's torso.

V_x, *n*—the velocity at which x % of the impacts by a specified test threat are expected to completely penetrate nominally identical test items when tested according to a specified test method.

V_0, *n*—the maximum velocity at which 0 % of the impacts by a specified test threat are expected to completely penetrate nominally identical test items when tested according to a specified test method.

V_{05}, *n*—the velocity at which 5 % of the impacts by a specified test threat are expected to completely penetrate nominally identical test items when tested according to a specified test method.

V_{50}, *n*—the velocity at which 50 % of the impacts by a specified test threat are expected to completely penetrate nominally identical test items when tested according to a specified test method.

wear face, *n*—the surface of an armor panel or plate that is intended to be placed against or proximal to the wearer's body.

witness panel, *n*—a sheet of material placed in a specific location and orientation to determine complete or partial penetration of the test item or to determine other performance characteristics of the test item or projectile.

DISCUSSION—The requirements for the witness panel are specified in individual test methods.

yaw, *n*—the angular deviation between the projectile's axis of symmetry and its line of travel.

4. Keywords

4.1 body armor; hard armor; soft armor