



Designation: ~~E3003—15~~ E3003 – 20

## Standard Practice for Body Armor Wearer Measurement and Fitting of Armor<sup>1</sup>

This standard is issued under the fixed designation E3003; 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 practice provides measurement and fit guidance for soft ballistic-resistant or stab-resistant body armor, or both, covering the torso. Proper measurement of the wearer and fitting of armor to that individual are necessary to obtain sufficient coverage of the torso and vital organs while allowing the full range of motion required for officer operations.

1.2 This practice is primarily directed toward law enforcement and corrections officers and addresses measurements for and fit of concealable (normal duty) body armor worn under or over the uniform for both male and female wearers. This practice addresses only body armor composed of front and back protective panels contained within a carrier that positions and holds the panels on the torso.

~~1.3 Female wearers require more measurements than male wearers to achieve proper armor fit; therefore, the minimum required measurements are specified individually for males and females. This practice can be used to train individuals on proper measurement techniques and to train wearers on proper fitting of body armor.~~

~~1.4 In addition to the required measurements, optional measurements are recommended when necessary to accommodate the wearer's body shape and dimensions.~~

~~1.4 Measurement guidance is provided in Section 5 of this practice. Section 5 may also be used to train individuals on proper measurement techniques.~~

~~1.5 Guidance for use of a tape measure is provided in Section 6 of this practice.~~

~~1.6 Guidance for use of sizing vests is provided in Section 7 of this practice.~~

~~1.7 In addition to measurement guidance, this practice provides two tools for assessing armor relative to the intended wearer: A personal armor fit assessment is provided in Section 8 for use by wearers.~~

~~(1) Comparison of wearer measurements and armor measurements in Section 6.~~

~~(2) Personal armor fit assessment in Section 7.~~

1.8 *Units*—English units are specified in this standard practice to be consistent with measurement units used in the United States body armor community. Approximate values in SI units are given in parentheses.

<sup>1</sup> This practice 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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1.9 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:<sup>2</sup>

D5219 Terminology Relating to Body Dimensions for Apparel Sizing

E3005 Terminology for Body Armor

F1731 Practice for Body Measurements and Sizing of Fire and Rescue Services Uniforms and Other Thermal Hazard Protective Clothing

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *apex, n*—the greatest protrusion of the breast as seen from the side (Terminology D5219). (See Fig. 1 and Fig. 2.)

3.1.1 *armhole, n*—in garment construction, the area of a garment through which the arm passes or into which a sleeve is fitted. fitted (Practice F1731 – 96 (2013))(2013)).

3.1.3 *back break-point, n*—the location on the back of the torso where the arm separates from the body (Terminology D5219). See Fig. 1 and Fig. 2.

3.1.4 *back width, n*—the horizontal distance straight across the back of the torso at the level of the back break-points; for the purposes of this practice, the back width measurement is defined to be the same value as the chest width measurement. See Fig. 3.

3.1.2 *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; impact (Terminology E3005).

#### 3.1.2.1 Discussion—

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

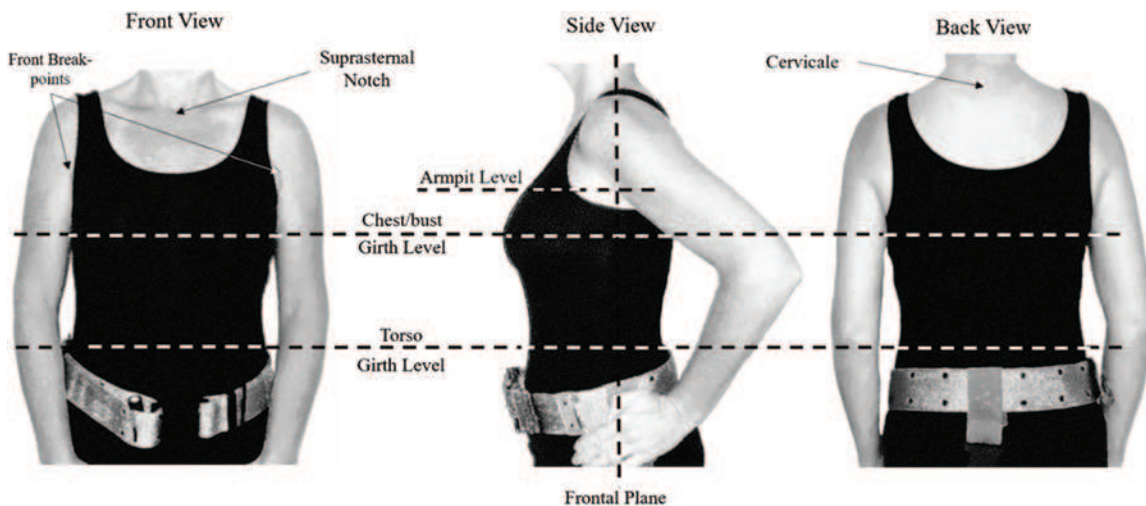


FIG. 1 Female Torso Body Landmarks

<sup>2</sup> 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.

3.1.6 *bust point to bust point, n*—the horizontal distance from apex to apex. (Adapted from Terminology D5219.) See Fig. 4.

3.1.7 *bust point to side seam, n*—on either side of the body, the horizontal distance from apex to the midpoint between front break-point and back break-point. See Fig. 4.

3.1.3 *cervicale, n*—the superior palpable point of the spine of the seventh cervical (C7) vertebra. (Anthropometric Survey (ANSUR) II Pilot Study; (2012 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics) Statistics (ANSUR II))<sup>3</sup>; the most protruding vertebrae at the back of the base of the neck. Refer to Fig. 1 and Fig. 2.

3.1.4 *chest/bust girth, n*—the horizontal circumference around the torso, taken under the arms and at the level of the apex. (Terminology D5219.) See Fig. 1 and Fig. 2 showing the location of this measurement.

3.1.5 *chest width, n*—the horizontal distance straight across the chest between the front break-points. Refer to Fig. 3 for the location of this measurement.

3.1.6 *chest width, shooting stance, n*—the horizontal distance straight across the chest between the front break-points, taken while the wearer is in the preferred handgun-shooting stance. See shooting stance.

3.1.12 *clavicle, n*—the long curved bone that connects the upper part of the breastbone with the shoulder blade at the top of each shoulder; the clavicle may also be referred to as the collarbone. See Fig. 1 and Fig. 2 showing the location of the clavicle.

3.1.7 *concealable armor, n*—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. (Terminology E3005.)

3.1.8 *duty belt, n*—a belt worn around the waist by law enforcement and corrections personnel to which essential equipment is attached.

3.1.9 *fit, n*—the quality, state, or manner in which the length and closeness of clothing, when worn, relates to the human body. (Practice F1731 – 96 (2013)); a characteristic of an individual body armor relative to the wearer that encompasses coverage, comfort, and functionality.

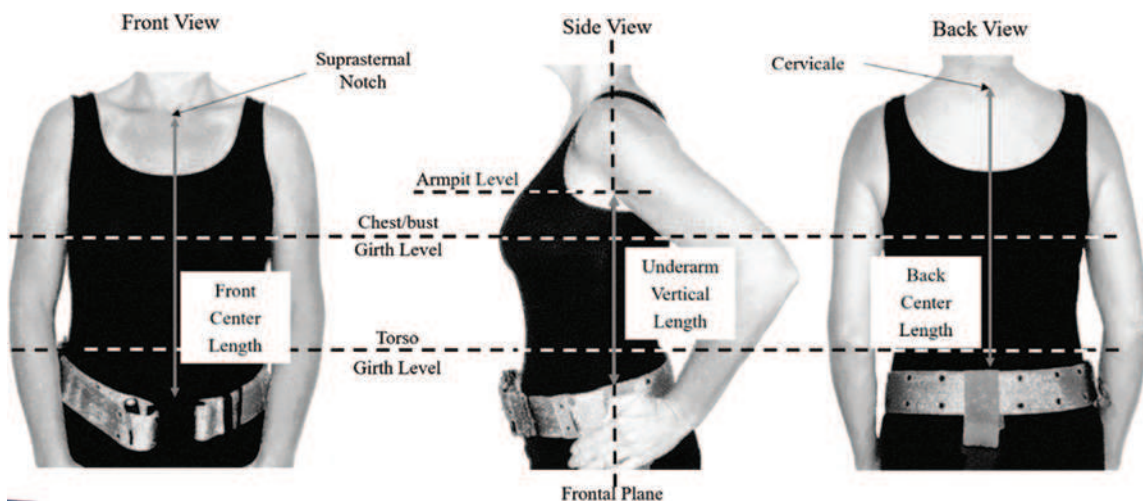


FIG. 4 Female Torso Front and Side-Vertical Measurements

<sup>3</sup> Available from [www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA498172](http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA498172); Gordon CC, Blackwell, C.L., Bradtmiller B, Parham, J.L., Barrientos, P., Paquette, S.P., Corner, B.D., Carson, J.M., Venezia, J.C., Rockwell, B.M., Mucher, M., and Kristensen, S. "2012 Anthropometric Survey of U.S. Army Personnel: Methods and Summary Statistics (ANSUR II)" NATICK/TR-15/007. U.S. Army Natick Soldier Research, Development, and Engineering Center, Natick, MA., Final Report October 2010 – April 2012, published December 2014. Available from DTIC ADA611869 (<https://apps.dtic.mil/dtic/tr/fulltext/u2/a611869.pdf>).



3.1.10 *front break-point, n*—the location on the front of the torso where the arm separates from the torso (Terminology D5219). Refer to Fig. 1 and Fig. 2.

3.1.11 *front center length, n*—the vertical distance from the bottom of the suprasternal notch to the top of the duty belt. See Fig. 54 and Fig. 65 for the location of this measurement.

3.1.18 *front lateral length, n*—the vertical distance from the top of the clavicle over the bust point to the top of the duty belt. See Fig. 5 and Fig. 6 for the location of this measurement.

3.1.12 *shooting stance, n*—body and arm positioning of a shooter relative to the target when preparing to fire a handgun; four types of shooting stances are typical for law enforcement handgun. For this standard, the shooting stance shall be hands together with both arms extended and parallel to the ground.

3.1.19.1 *isosceles stance, n*—a shooting stance in which the individual is directly facing or squared up to the target, with feet shoulder width apart, and is aiming the handgun with both arms held toward the target and parallel to the ground.

3.1.19.2 *modern isosceles stance, n*—a stance in which the individual is directly facing or squared up to the target, with feet shoulder width apart, and aiming the handgun with both arms straight and both shoulders rolled forward.

3.1.19.3 *modified Weaver stance, n*—a stance in which the individual is directly facing or squared up to the target, with feet shoulder width apart and is aiming the handgun with the primary arm held straight toward the target and parallel to the ground and the support arm elbow bent toward the ground.

3.1.19.4 *Weaver stance*—a stance in which the individual faces the target at an angle with the primary foot back and is aiming the handgun with the primary arm held straight toward the target and parallel to the ground and the support arm elbow bent toward the ground.

3.1.13 *suprasternal notch, n*—the depression in the top of the sternum between its articulations with the two clavicles; called also jugular notch (Merriam-Webster); the notch at the top of the sternum. See Fig. 1 and Fig. 2.

3.1.14 *torso, n*—the human trunk;trunk (Practice F1731 – 96 (2013))(2013)).

3.1.15 *torso girth, n*—the largest horizontal circumferential measurement around the torso below the rib cage near the waist; this measurement is not necessarily the wearer’s belt size or waist size. See Fig. 1 and Fig. 2 for the location of this measurement.

3.1.16 *underarm vertical length, n*—the vertical distance between the armpit and the top of the duty belt measured while the wearer is seated. See Fig. 4 and Fig. 5 for the location of this measurement.

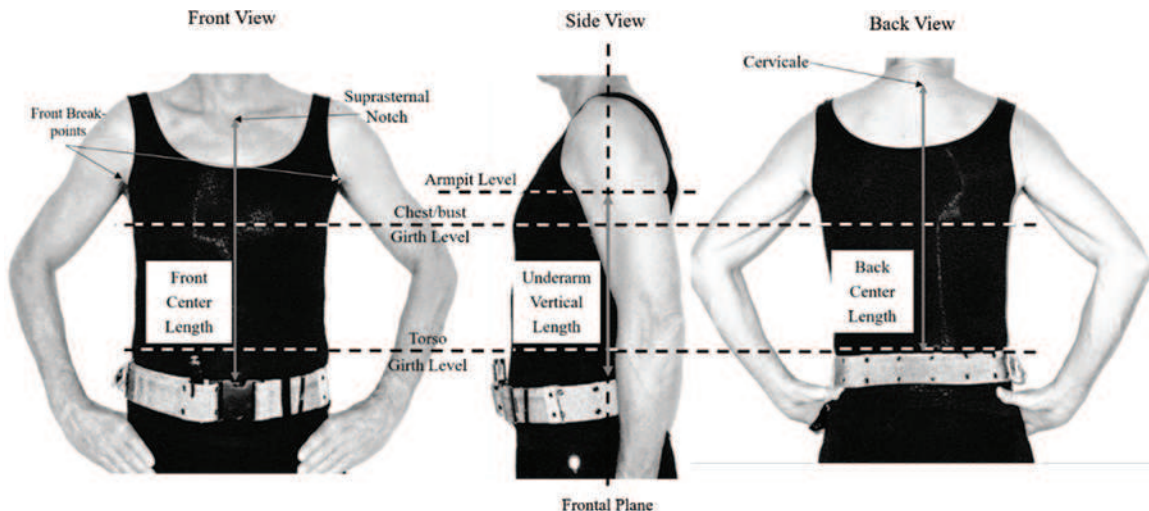


FIG. 5 Male Torso Vertical Measurements

3.1.24 *underarm vertical length, adjusted, n*—the measured underarm vertical length minus approximately 3 in. (7.6 cm). See Fig. 7 and Fig. 8.

3.1.25 *under-bust girth, n*—the horizontal circumference around the torso under the arms and bust (Terminology D5219). See Fig. 1 and Fig. 2 for the under-bust girth measurement location.

3.1.17 *vest, n*—a type of body armor intended to protect the wearer’s torso (Terminology E3005).

3.1.18 *waist, n*—in anatomy, the part of the body at the location between the lowest rib and hip identified by bending the body to the side (Practice F1731 – 96 (2013))(2013)).

#### 4. Significance and Use

4.1 Properly sized and fitted body armor enhances the safety and performance of the wearer by providing protection while not restricting movement. Having body armor that fits well begins with appropriate and accurate measurements. The measurement guidance of this practice will facilitate consistency of measurement across the body armor industry and will help wearers understand proper measurements.

4.2 Accurate measurements do not necessarily result in well-fitting armor, so this practice goes a step further by providing (1) a method for assessing how closely an armor matches the corresponding wearer measurements, and (2) a description of well-fitting armor along with a personal armor fit assessment that the wearer can do for himself/herself.

4.3 The measurement and fitting guidance specifically addresses officer-stated requirements for side overlap of front and back body armor panels, minimizing the armhole opening, eliminating any “V” gap (or similar) between the front and back panels, and providing vertical coverage on the front torso from approximately the “2<sup>nd</sup> uniform shirt button to 2 to 3 finger widths above duty belt.” Those requirements were considered in the development of this practice and the definition of measurements that can be consistently made for any individual.

4.4 This practice describes measurements for the front, back, and sides of the wearer, in addition to girth measurements, to achieve proper sizing of front and back panels and proper fit of the complete armor.

4.5 This practice can be used to train individuals on proper measurement techniques and to train wearers on proper fitting of body armor.

#### 5. Measurement Procedures Guidance

##### 5.1 Apparatus:

5.1.1 *Chair for Seated Position Measurements*—The recommended chair ~~shall be~~ is a rigid, non-adjustable chair, having a back and a flat, rigid seat, and resting on a flat surface. The chair should have no arm rests.

5.1.2 *Markers*—The use of markers to identify the location of relevant body landmarks on the wearer is recommended to facilitate the measurement process, and the markers should remain in place during all measurements. The remainder of the document refers to these markers; if the measurer chooses not to use the markers, he/she is responsible for accurately locating the body landmarks referred to.

5.1.2.1 *Chest/bust Girth Marker*—A length of stretchable cord, twine, narrow masking tape, or other thin material (for example, elastic) for encircling the torso and marking the chest/bust girth level. The ends of the material should be joined at the back of the body using removable clips, and the marker should be positioned appropriately across the front of the body by the wearer. The measurer should ensure that the marker is level horizontally around the body. See Fig. 4, Fig. 5, or Fig. 65.

5.1.2.2 *Side Marker*—A length of cord, twine, narrow masking tape, or other thin material (could be elastic but need not be stretchy) for marking the midpoint between the front and back break-points on one side of the body. The marker should be held vertically in place between the chest/bust girth marker and the duty belt. The measurer should ensure that the side marker is perpendicular to the chest/bust girth marker.

5.1.3 *Tape Measure*—The tape used shall be flexible and non-stretchable, have a length of at least ~~60~~120 in. (~~1.5~~3 m), with at least ¼-in. or mm divisions. An anthropometric ~~tape, such as Lafayette Instrument model J00305 or equivalent, tape~~ is recommended, but a tailor’s tape may also be used. Prior to using any flexible tape for making measurements, a verification check is recommended to check that the tape has not stretched since the last use and may be done by comparing the flexible tape measure to a non-stretchable tape, such as a Lufkin model L610 steel tape or equivalent.

5.1.4 *Weighing Scale*—A bathroom scale shall be used for weighing, if weight is unknown, and the scale shall have the capability to be zeroed prior to weighing, shall provide weight in units of pounds or kilograms, shall indicate weight to at least the nearest pound or kilogram, and shall have weight capacity appropriate for the individual being weighed. If better quality than a bathroom scale is available, such as a medical or fitness scale, it is acceptable to use such a scale for measurements, given that the other requirements of this section are met.

## 5.2 *Measurement Skill, Accuracy, and Cautions:*

5.2.1 *Measurement Skill*—Individuals making measurements must have a complete understanding of this practice and demonstrate their ability to make accurate measurements. (Adapted from Practice **F1731** – 96 (2013).)

5.2.2 *Measurement Accuracy*—Measurement accuracy depends on (1) the skill of the individual doing the measuring, (2) the condition of the equipment being used for making measurements, and (3) the level of cooperation from the subject being measured. Reliable measurements can be made only when all of the above variables are controlled. (Adapted from Practice **F1731** – 96 (2013).) The body measurements described in this practice cannot be made accurately on oneself but require another individual as the measurer.

### 5.2.3 *Cautions:*

5.2.3.1 When measuring female officers, care should be taken to make appropriate measurements from behind with the wearer adjusting the tape over her chest.

5.2.3.2 When measuring officers and discussing their measurements, care should be taken to be sensitive to the desire for privacy of body measurements.

## 5.3 *Preparation for Measuring the Wearer:*

5.3.1 The type of clothing worn during measuring can influence the accuracy of the measurements, and the following clothing and equipment shall be worn during measuring:

5.3.1.1 Uniformed officers being measured for concealable body armor worn under the uniform shirt shall wear a snugly fitting T-shirt, duty pants, duty belt with their typical gear installed (for example, weapon, magazine pouch, restraints), inner belt (if normally worn), and keepers. The position of the duty belt on the wearer shall be as is typically worn, and the position should not be artificially adjusted. Females shall wear the type of bra that they usually wear on duty.

5.3.1.2 Uniformed officers being measured for concealable body armor worn over the uniform shirt in an outer carrier shall wear the uniform shirt, a T-shirt (if normally worn), duty pants, duty belt with their typical gear installed (for example, weapon, magazine pouch, restraints), inner belt (if normally worn), and keepers. The position of the duty belt on the wearer shall be as is typically worn, and the position should not be artificially adjusted. Females shall wear the type of bra that they usually wear on duty.

5.3.1.3 Non-uniformed personnel (for example, special agents, detectives) being measured for concealable body armor worn under the outermost shirt shall wear a snugly fitting T-shirt, pants, and a belt that are representative of what is worn on duty. The position of the belt on the wearer shall be as is typically worn, and the position should not be artificially adjusted. Females shall wear the type of bra that they usually wear on duty.

5.3.2 Markers should be appropriately placed on the wearer. Refer to **5.1.2**. The chest/bust girth marker should be put in place and positioned with the aid of the wearer, especially across the front of the body. The measurer should adjust the position properly on the sides and back.

5.3.3 All linear and circumferential measurements shall be taken to the nearest ~~¼ in.~~inch or ~~em.~~centimeter.

5.3.3.1 Linear measurements should be rounded down to the nearest inch or centimeter.

5.3.3.2 Circumferential measurements should be rounded up to the nearest inch or centimeter.

NOTE 1—~~One cm is not equivalent to~~ centimeter is smaller than an ¼-in. but inch and is sufficient for these measurements.

5.3.4 For all measurements, the wearer shall breathe normally without holding the breath and shall not hold in the stomach.

5.3.5 For all measurements requiring the wearer to be in a standing position, except chest ~~width,~~ width measurements, the wearer shall stand with feet shoulder width apart, facing forward, arms relaxed down at the sides, and looking straight ahead. ~~For chest width, shooting stance, the wearer shall assume his/her preferred shooting stance with the hands touching as if holding a handgun. If the wearer does not carry a handgun during normal duties, the arms shall be extended in front of the body and parallel to each other and to the floor.~~

5.3.6 For all measurements requiring the wearer to be in a seated position, the wearer shall sit ~~straight up~~ in a natural comfortable position, facing forward and looking straight ahead with feet apart flat on the floor and arms relaxed at sides. If the chair has arm rests, the individual being measured should not place either arm on the arm rests but have arms relaxed at the sides.

#### 5.4 *Measuring the Wearer:*

5.4.1 *Weight*—The measurer shall record the wearer’s weight in pounds or kilograms and to the nearest pound or kilogram (for example, 125 lb or 57 kg) either by having the wearer specify his or her known weight or weighing the wearer. If the wearer needs to be weighed, the measurer shall ensure that the scale is set to zero initially and record the weight of the wearer to the nearest pound or kilogram. If the wearer is a uniformed officer and is being weighed, ensure that the officer removes the duty belt prior to being weighed.

5.4.2 *Female Wearers Only: Bust Point to Bust Point*—The wearer shall align the tape appropriately from bust point to bust point and hold the tape in position while the measurer records the value. Refer to Fig. 4 for the location of this measurement.

5.4.3 *Female Wearers Only: Bust Point to Side Seam*—The wearer shall align the tape appropriately from bust point to the side marker and hold the tape in position while the measurer records the value.

<https://standards.iteh.ai/catalog/standards/sist/7da71805-4bc8-4430-b7ae-34095f0ded64/astm-e3003-20>

NOTE 2—If holding the tape in position is difficult for the wearer, the measurer may assist in holding the end of the tape in line with the side marker so that the wearer can lower her arm. Refer to Fig. 4 for the location of this measurement.

5.4.2 *Chest/Bust Girth—Height*—~~With the wearer’s arms raised slightly away from the sides, the measurer shall wrap the tape around the torso horizontally under the arms and aligned with the chest/bust girth marker. The measurer should stand behind the wearer to take the measurement, and the wearer should position the tape correctly across the front of the chest. Once the tape is in place, the wearer shall lower the arms to~~ The measurer shall record the wearer’s height either by having the wearer specify his or her sides, and the measurement shall be taken, ensuring that the tape is snug around the torso. Refer to known height or measuring the wearer. Fig. 1 and Fig. 2 for the location of this measurement.

5.4.5 *Female Wearers Only: Under-Bust Girth*—With the wearer’s arms raised slightly away from the sides, the measurer shall wrap the tape around the rib cage horizontally under the arms and under the bust. The measurer should stand behind the wearer to take the measurement, and the wearer should position the tape correctly under the bust. Once the tape is in place, the wearer shall lower the arms to her sides, and the measurement shall be taken, ensuring that the tape is snug around the torso and horizontally level. Refer to Fig. 1 for the location of this measurement.

5.4.6 *Torso Girth*—With the wearer standing, the measurer shall wrap the tape around the torso at the largest circumference below the rib cage and near the waist, keeping the tape horizontally level. Once the tape is in place, the measurement shall be taken ensuring that the tape is snug around the torso and that the wearer is breathing normally and keeping the torso muscles relaxed. Refer to Fig. 1 and Fig. 2 for the location of this measurement.

5.4.7 *Chest Width*—With the wearer standing with arms down at sides, the measurer shall measure the horizontal distance straight across the front of the chest between the front break-points. Refer to Fig. 3 for the location of this measurement.



5.4.8 *Chest Width, Shooting Stance*—With the wearer positioned in his/her preferred shooting stance, the measurer shall measure the horizontal distance straight across the front of the chest at the front break-point.

5.4.9 *Back Width*—Back width is not measured in this version of the practice because there is not a body landmark on the back of the torso that facilitates consistent measurement. The value for *chest width* shall be recorded as the *back width*. Refer to [Fig. 3](#).

5.4.10 *Underarm Vertical Length*—With the wearer in a seated position and the right arm slightly raised to the side, the measurer shall place a plastic ruler under the arm where the arm joins the torso, ensuring the ruler is horizontally level. The wearer shall lower the right arm trapping the ruler. The top of the ruler corresponds to the armpit location. The measurer shall measure the vertical length straight from the armpit to the top of the duty belt. Refer to [Fig. 4](#) for the location of this measurement.

5.4.11 *Front Center Length – Standing*—The measurer shall measure vertically from the bottom of the wearer’s suprasternal notch to the top of the duty belt. Refer to [Fig. 5](#) and [Fig. 6](#) for this measurement location.

5.4.12 *Front Lateral Length – Standing*—The measurer shall measure vertically, following the body, from the top of the wearer’s clavicle over the bust point to the top of the duty belt. The wearer shall position the tape correctly over the bust point. Refer to [Fig. 5](#) and [Fig. 6](#) for this measurement location.

5.4.13 *Female Wearers Only: Front Lateral Length from the Top of Clavicle to the Bust Point – Standing*—The measurer shall measure vertically, following the body, from the top of the wearer’s clavicle to the bust point. The wearer shall position the tape correctly over the bust point. Refer to [Fig. 6](#).

5.4.14 *Front Center Length – Seated*—The wearer shall be seated during this measurement. The measurer shall measure vertically, following the body, from the bottom of the wearer’s suprasternal notch to the top of the duty belt.

5.4.15 *Front Lateral Length – Seated*—The wearer shall be seated during this measurement. The measurer shall measure vertically, following the body, from the top of the wearer’s clavicle over the bust point to top of the duty belt. The wearer shall position the tape correctly over the bust point.

5.4.16 *Female Wearers Only: Front Lateral Length from the Top of the Clavicle to Bust Point – Seated*—The wearer shall be seated during this measurement. The measurer shall measure vertically, following the body, from the top of the wearer’s clavicle to the bust point. The wearer shall position the tape correctly over the bust point.

5.4.17 *Back Length*—The measurer shall measure the vertical distance from the top of the wearer’s cervicale (C7 vertebra) to the top of the duty belt in the back. See [Fig. 5](#) and [Fig. 6](#).

5.4.18 *Female Wearers Only: Type of Bra*—The measurer shall ask the wearer to specify the type of bra typically worn as either (1) sports bra or (2) non-sports bra.

## 5.5 Documentation:

5.5.1 For each individual being measured, the following information shall be recorded on a data sheet: information about the wearer, the measurer, the specific body armor model or supplier, and clothing worn during measurement and the actual measurements. A sample data sheet for recording the above information for male wearers is provided in [Appendix X1](#). A sample data sheet for recording the above information for female wearers is provided in [Appendix X2](#).

5.5.2 It is recommended that purchasers (agencies or individuals) require suppliers to perform measurements as specified in this practice and to provide a data sheet for each wearer containing the details shown in [Appendix X1](#) or [Appendix X2](#) as a part of the purchase agreement for body armor.

## 6. Procedures When Using a Tape Measure

6.1 *Chest/Bust Girth*—With the wearer’s arms raised slightly away from the sides, the measurer shall wrap the tape around the torso horizontally under the arms and aligned with the chest/bust girth marker. The measurer should stand behind the wearer to take the measurement, and the wearer should position the tape correctly across the front of the chest. Once the tape is in place,

the wearer shall lower the arms to his or her sides, and the measurement shall be taken, ensuring that the tape is snug around the torso. Refer to Fig. 1 and Fig. 2 for the location of this measurement.

6.2 Torso Girth—With the wearer standing, the measurer shall wrap the tape around the torso at the largest circumference below the rib cage and near the waist, keeping the tape horizontally level. Once the tape is in place, the measurement shall be taken ensuring that the tape is snug around the torso and that the wearer is breathing normally and keeping the torso muscles relaxed. Refer to Fig. 1 and Fig. 2 for the location of this measurement.

6.3 Chest Width—With the wearer standing with arms down at sides, the measurer shall measure the horizontal distance straight across the front of the chest between the front break-points. Refer to Fig. 3 for the location of this measurement.

6.4 Chest Width, Shooting Stance—With the wearer positioned in the shooting stance, the measurer shall measure the horizontal distance straight across the front of the chest at the front break-point.

6.5 Underarm Vertical Length—With the wearer in a seated position and the right arm slightly raised to the side, the measurer shall place a plastic ruler under the arm where the arm joins the torso, ensuring the ruler is horizontally level. The wearer shall lower the right arm trapping the ruler. The top of the ruler corresponds to the armpit location. The measurer shall measure the vertical length straight from the armpit to the top of the duty belt. Refer to Fig. 4 and Fig. 5 for the location of this measurement.

6.6 Front Center Length – Standing—The measurer shall measure vertically from the bottom of the wearer’s suprasternal notch to the top of the duty belt. Refer to Fig. 4 and Fig. 5 for this measurement location.

6.7 Front Center Length – Seated—The wearer shall be seated during this measurement. The measurer shall measure vertically, following the body, from the bottom of the wearer’s suprasternal notch to the top of the duty belt.

6.8 Back Length—The measurer shall measure the vertical distance from the top of the wearer’s cervicale (C7 vertebra) to the top of the duty belt in the back. See Fig. 4 and Fig. 5.

#### 6.9 Documentation:

6.9.1 For each individual being measured, the following information shall be recorded on a data sheet: information about the wearer, the measurer, the specific body armor model or supplier, clothing worn during measurement, and the actual measurements. A sample data sheet for recording the above information for male wearers is provided in Appendix X1. A sample data sheet for recording the above information for female wearers is provided in Appendix X2.

6.9.2 It is recommended that purchasers (agencies or individuals) require suppliers to perform measurements as specified in this practice and to provide a data sheet for each wearer containing the details shown in Appendix X1 or Appendix X2 as a part of the purchase agreement for body armor.

### **7. Comparison of Wearer Measurement and Body Armor Measurements Procedures When Using a Sizing Vest**

7.1 Introduce the individual being fitted for body armor to the sizing vests and the options for flat panel or shaped (that is, structured) vests.

7.1.1 Explanation should be given regarding flat panel and shaped vests and which may be more appropriate based on the body shape of the wearer.

7.2 Overview: The measurer will base the selection of the sizing vest on measurement of the torso girth, the chest/bust girth, or a combination of the two.

7.2.1 It would be advantageous to be able to compare how closely the dimensions of an armor will match the dimensions of the wearer prior to manufacturing or procuring the armor. There are six wearer measurements that can be compared to corresponding armor measurements, and this section provides a tool for making that comparison.

6.1.2 The measurements that can be directly compared for a wearer and his/her body armor are noted below:

6.1.2.1 Chest width, shooting stance:

6.1.2.2 Front center length—seated:

6.1.2.3 Front lateral length—seated:

6.1.2.4 Underarm vertical length, adjusted (that is, the measured underarm vertical length minus 3 in.):

6.1.2.5 Back width (same as chest width):

6.1.2.6 Back Length:

7.2.2 It is recommended that the comparison of a wearer's measurements and armor measurements be used as part of the procurement process for purchasing new or replacement armor. Prior to making the decision to purchase a specific armor model, the purchaser (agency or individual) could require the body armor supplier to measure the wearer as specified in Section Measure the torso girth of the individual according to 56.2 of this practice and provide the required measurement comparison data as specified in this section.

7.3 Use the appropriate measurement(s) above and the manufacturer's sizing vest instructions to select the sizing vest most likely to fit the individual.

7.4 Put the sizing vest on the individual, ensuring that the front panel and back panel are properly adjusted on the torso.

7.5 *Method: Check the Fit of the Sizing Vest on the Individual:*

7.5.1 The top edge of the front panel at center front should be at the bottom of the suprasternal notch, and the top edge of the back panel at center back should be at the top of the wearer's cervicale (C7 vertebra). Adjust the shoulder straps, as necessary.

7.5.2 *Wearer Measurements*—These measurements shall be copied from the wearer measurement sheet onto the comparison of wearer measurements and armor measurements sheet, except for With the wearer positioned in the shooting stance, underarm vertical length, adjusted. (Underarm vertical length, adjusted is derived from the underarm vertical length, portion of which is on the wearer measurement sheet.) See the vest between the raised **Appendix X3** for a sample comparison of wearer measurements and armor measurements sheet. Arms should touch the arms but not interfere with the shooting stance.

7.5.2.1 If the vest is too wide between the raised arms, step down to the next smaller sizing vest, and go back to **7.5.1**.

7.5.2.2 If the vest is too narrow between the raised arms, step up to the next larger sizing vest, and go back to **7.5.1**.

7.5.3 The front and back panels should overlap on the sides at least two inches, unless the agency mandates otherwise.

7.5.3.1 When the sizing vest has a width tape on the side, use the width tape to determine the panel width to achieve the required overlap.

7.5.3.2 When the sizing vest does not have a width tape on the side and the overlap needs to be adjusted, step up or down, as appropriate, to the next size back panel.

NOTE 2—It is acceptable to use a smaller front panel and a larger back panel and vice versa.

7.5.4 Document the front panel size and the back panel size on the manufacturer's sizing form.

7.5.5 *Armor Measurements*—These measurements shall be taken on the front and rear armor panels in the locations corresponding to where the measurements are made on the wearer's body. See With the wearer in a seated position, use the length tape at the bottom front of the sizing vest and find where the tape Fig. 7 and Fig. 8. These measurements shall be documented on the comparison sheet: the duty belt meet.