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An American National Standard

Standard Specification for Body Protectors Used in Horse Sports and Horseback Riding[1]

This standard is issued under the fixed designation F1937; 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.

INTRODUCTION

Horse sports and horseback riding are sports with intrinsic hazards. It is recognized that it is not possible to write a body protector performance standard that will result in products that can protect against injury or death in all accidents. It is also recognized that serious injury or death can result from both low-energy and high-energy impacts, even when body protectors are worn. It is further recognized that protective body protectors must be acceptable to the user and to the regulating associations or agencies requiring their use. Acknowledging these limitations, this specification was developed using resources in medical, scientific, engineering, human factors, and biomedical fields.

This specification incorporates many aspects of other recognized body protector performance standards. This specification draws from work done by others where appropriate for this specification. These standards may be referenced. It should be noted that this specification specifies a laboratory test of a completed body protector's ability to reduce impacts.

1. Scope

1.1 This specification covers minimum performance criteria and describes test methods for body protectors for use in horse sports and horseback riding.

1.2 It is not the intention of this specification to bar from consideration materials of improved quality or performance not known at the time of development of this specification.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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.*

1.5 *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]

F1045 Performance Specification for Ice Hockey Helmets

F1446 Test Methods for Equipment and Procedures Used in Evaluating the Performance Characteristics of Protective Headgear

2.2 *BETA Standard:*[3]

BETA 1.24.4.95 Standard for Horse Riders' Body and Shoulder Protectors

2.3 *National Institute of Justice Standard:*[4]

NIJS 0101.03 Ballistic Resistance of Police Body Armor

2.4 *SAE Standard:*[5]

SAE J211 Recommended Practice for Instrumentation for Impact Tests—Requirements for Channel Class 1000

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*In addition to terms defined in Test Methods F1446, the following terms are specific to this specification:

[1] This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.55 on Body Padding.

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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 the British Equestrian Trade Association Ltd., Worthersome Grange, Bramham, Nr. Wetherby, Yorkshire, LS23 6LY.

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

[5] Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

3.1.1 *backing material*—block of non-hardening, oil-based modeling clay in contact with the back of the body protective test specimen during impact deformation testing.[6]

3.1.2 *body protector*—sleeveless garment covering defined areas of the torso and lower back and consisting of one or more layers of material and designed to reduce trauma from blunt impacts and falls.

3.1.3 *bust girth*—maximum horizontal girth measured during normal breathing with the subject standing upright and the tape-measure passed over the scapulae under the armpits and across the breasts: normal underclothing to be worn.

3.1.4 *calibration impact surface*—impact surface shall be a flat modular elastomer programmer (MEP). The MEP is 6.0 in. (152 mm) in diameter, and 1.0 in. (25 mm) thick. It is affixed to the top surface of a flat, 0.25 in. (6.35 mm) thick aluminum plate. The durometer of the MEP is 60 ± 2 Shore A.

3.1.5 *chest girth*—maximum horizontal girth measured during normal breathing with the subject standing upright and the tape-measure passed over the scapulae under the armpits and across the chest.

3.1.6 *deformation*—maximum displacement of the back surface of the body protector, during impact as defined in 9.3.

3.1.7 *depth*—depth of the depression is the distance from the original undisturbed surface of the backing material to the lowest point of the depression.

3.1.8 *impact surface*—flat anvil specified in 6.3.1.2 of Test Methods F1446 shall be used as the impact surface for the shock attenuation test (see Section 6).

3.1.9 *waist girth*—maximum horizontal girth measured during normal breathing with the subject standing upright and the tape-measure passed around the body in the plane of the waist, 2.0 in. (50 mm) above the supra-cristal plane which is at the level of the highest points of the iliac crests. The dimension of 2.0 in. (50 mm) refers to a subject of 70.0 in. (1780 mm) tall and should be scaled pro rata with the height of the actual subject.

3.1.10 *waist to waist over the shoulder length*—maximum length measured from the plane of the waist, as defined above, over the shoulder to the plane of the waist. The tape-measure crosses the shoulder at the mid point between the point of the shoulder and the junction of the shoulder to the neck. Anteriorly the tape-measure passes over the chest (or bust) to a point 3.5 in. (90 mm) lateral to the midline of the body on the plane of the waist. Posteriorly the tape-measure follows the shortest distance to a point 3.5 in. (90 mm) lateral to the midline of the body. The distances of 3.5 in. (90 mm) refer to a subject with a waist girth of 34.0 in. (860 mm) and should be scaled pro rata with the waist girth of the actual subject. Normal underclothing to be worn for the measurement.

4. General Requirements

4.1 *Materials:*

4.1.1 As defined in the ice hockey helmet Performance Specification F1045, all materials used in the fabrication of the body protector shall be known to be suitable for the intended application. All shock attenuation system materials used in the body protector shall not permanently distort during an exposure of at least 4 h to any temperature in the range from 5 ± 4 to 104 ± 4 °F (–15 ± 2 to 40 ± 2 °C), nor shall the material be significantly affected by exposure to ultraviolet radiation, water, dirt, or vibration. All materials shall be rot-resistant.

4.1.2 Materials coming into contact with the wearer's skin shall not be the type known to cause skin irritation or disease, and shall not undergo significant loss of strength, flexibility, or other physical change as a result of contact with perspiration or body oil.

4.1.3 Any material used in the construction of body protectors shall not be adversely affected by ordinary household soap and water, mild household detergent, or cleaners recommended by the manufacturer.

4.2 *Body Protector Assembly:*

4.2.1 Any optional devices fitted to the body protector shall be so designed that they are unlikely to cause any injury to the wearer or other participants during contact.

4.2.2 No rigid projections shall be on the inside of the body protector which could come in contact with the wearer's body.

4.2.3 All external projections shall be smooth and adequately faired to other surfaces.

4.3 *Extent and Form of Protective Material*—The coverage of the body protector listed in Section 5 shall protect the wearer's body to the minimum impact requirements of Section 7. The extent of protection shall include at least all of the designated areas shown in Fig. 1.

4.3.1 The body protector may have reduced thickness over the shoulder. When shoulder protectors are fitted, the body protector shoulder strap may not require any included foam.

4.4 *Attachments*—The components of the fasteners for securing attachments to the body protector shall not reduce the degree of protection afforded the wearer by the protective padding or cushioning material of the body protector.

5. Dimensioning, Sizing, and Body Coverage

5.1 The whole circumference of the torso shall be covered by the body protector.

5.2 *Dimensioning*—Body protectors shall have dimensions as shown in Fig. 1. Dimension A is the mid-value of the range of the chest circumferences the manufacturer states the body protector will fit. Dimension B is equal to $B = (-0.028)A^2 + 2.66A - 25.81$.[7] Four vertical reference lines defined in BETA 1.24.4.95 are to be used: C and C' separated by 25 % of Dimension A on the chest, and D and D' separated by 25 % of Dimension A on the back.

5.2.1 The padding shall extend for more than 45 % of Dimension B along the lines C and C' (C in Fig. 1).

5.2.2 The padding shall extend for more than 60 % of Dimension B along the lines D and D' (D in Fig. 1).

[6] A backing material found to be suitable is Roma Plastilina No. 1 modeling clay as defined in NIJS 0101.03.

[7] This formula represents the mathematically calculated anthropometric mean for the waist to waist over the shoulder length for chest sizes 21 to 48.