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An American National Standard

Standard Specification for Body Protectors Used in Equine Racing[1]

This standard is issued under the fixed designation F2681; 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

Equine racing is a sport with intrinsic hazards. It is recognized that serious injury or death can result from both low-energy and high-energy impacts, even when body protectors are worn. It is also recognized that body protection must be acceptable for the sport, the user, and to the regulating associations or agencies requiring their use. This specification has been developed with an emphasis on providing comfortable, nonrestrictive impact protection in a lower weight garment. Injuries will not be prevented by protective padding in accidents involving severe torsion, flexion or crushing of the body. Acknowledging these limitations, this specification was developed using resources in the medical, scientific, engineering, human factors, and biomedical fields, as well as resources from equine competitors and professional Standardbred drivers and Thoroughbred jockeys. This specification draws from work done by others where appropriate for this specification, and 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 equine racing in a controlled environment.

NOTE 1—It is recognized that it is not possible to write a body protector performance standard that will result in products that can protect against all types of injury or death in an accident.

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

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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~~ safety, health, and ~~health~~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]

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

2.2 *BSI Standards:*[3]

EN 13158:2000 Protective clothing – protective jackets, body and shoulder protectors for horse riders – Requirements and test methods

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[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 British Standards Institute (BSI), 389 Chiswick High Rd., London W4 4AL, U.K., http://www.bsi-global.com.

2.3 *SAE Standards*[4]

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:*

3.1.1 In addition to terms defined in Test Methods F1446, the following terms are specific to this specification.

3.1.2 *body protector, n*—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 impacts and falls.

3.1.3 *calibration impact surface, n*—flat modular elastomer programmer (MEP), as specified in Test Methods F1446.

3.1.4 *equine racing, n*—any event or activity on a flat dirt, grass, or synthetic surface track that emphasizes the horse's and rider's or driver's ability to complete a designated distance or course in as short a time as possible (for example, Standardbred, Thoroughbred, and Quarter Horse racing).

3.1.5 *impact surface, n*—flat anvil, as specified in the Apparatus section of Test Methods F1446, used as the impact surface for the shock attenuation test (see 7.2).

3.1.6 *padding, n*—any material or structure designed to absorb or distribute, or both, impact energy.

3.1.7 *spherical impactor, n*—spherical impactor, as specified in Test Methods F1446, used for the impact attenuation system check (see 10.1) and impact test procedures (see 11.2).

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 All materials used in the fabrication of the body protector shall be known as suitable for the intended application. All padding 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 -15 ± 2 to 40 ± 2°C, nor shall the material be significantly affected by exposure to ultraviolet radiation, water, dirt, or vibration.

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

4.1.3 Adhesive materials used to attach padding or straps to the body protector shall be of a formulation that will not alter the chemical or physical properties of the materials to an extent as to reduce their protective qualities.

4.1.4 The manufacturer of the body protector shall provide written documentation to the testing laboratory indicating that the materials used in the body protector fulfill the requirements of 4.1.1 – 4.1.3.

4.2 *Body Protector Assembly:*

4.2.1 Any optional devices provided by the manufacturer of the body protector and 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. If the manufacturer provides optional devices then the body protector shall be tested with the optional devices fitted to the body protector.

4.2.2 Any unfaired projection extending more than 7 mm from the body protector outer surface shall break away or collapse when impacted with forces equivalent to those produced by the impact tests described in 11.2 of this specification. There shall be no fixture on the inner surface of the body protector projecting more than 2 mm from the inner surface of the body protector toward the wearer's body.

4.3 *Extent and Form of Padding*—The coverage of the body protector listed in Section 6 shall be capable of being evaluated according to 11.2 and shall meet the impact requirements of Section 5. The extent of coverage shall include at least all of the designated areas shown in Fig. 1.

NOTE 2—The body protector may have reduced padding thickness over the shoulder, and it does not require padding in areas outside the test area defined in Fig. 1.

4.4 *Attachments*—The components of the fasteners for securing attachments to the body protector shall not reduce the impact attenuation properties of the body protector.

5. Performance Requirements

5.1 *General*—Body protectors shall be capable of meeting the requirements in this specification throughout their full range of adjustment.

5.2 When tested in accordance with 11.1, the force to separate any closures shall not be less than 50 N. This requirement shall be met at ambient temperature 21 ± 3°C and at a relative humidity of 50 ± 15 %.

[4] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://www.sae.org.

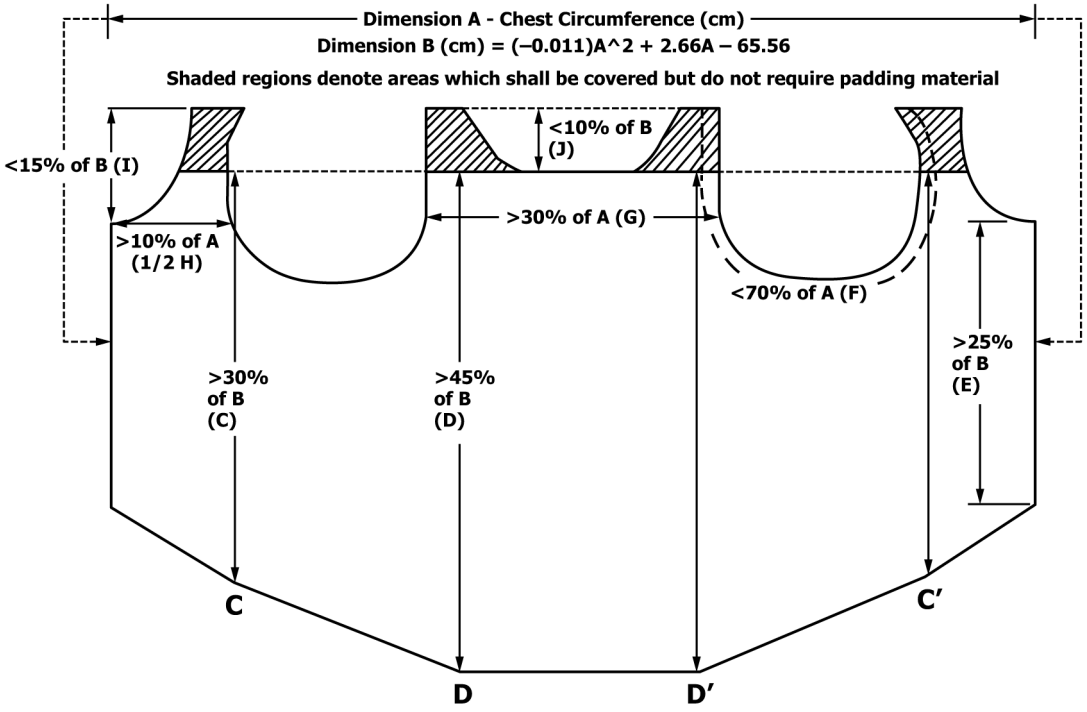

FIG. 1 Dimensional Coverage Requirements

5.3 The velocity of any test impact shall be 3.15 m/s ± ~~2%.~~ 2 %. The peak acceleration of any test impact shall not exceed 300 g, when conditioned as described in 9.1 and when tested in accordance with 11.2.

6. Dimensioning, Sizing and Body Coverage

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

6.2 All measurements shall be taken from the edge of the padding material to the edge of the padding material as designated in 6.3. The outer material that holds the padding material shall not be considered to be padding material.

6.3 *Dimensioning*—Body protectors shall have dimensions as shown in Fig. 1. Dimension A shall be the mid-value of the range of the chest circumference, in centimetres, that the manufacturer states the body protector will fit. Dimension B shall be reported in centimetres and defined by the following equation:

$$B = (-0.011)A^2 + 2.66A - 65.56 \quad (1)$$

which represents the mathematically calculated anthropometric mean for the waist to waist over the shoulder length for chest sizes of 53 to 122 cm.

6.3.1 Four vertical reference lines, as defined in EN 13158:2000, are to be used: C and C' separated by ~~25%~~ 25 % of Dimension A on the chest, and D and D' separated by ~~25%~~ 25 % of Dimension A on the back.

6.3.2 The padding shall extend for more than ~~30%~~ 30 % of Dimension B along the lines C and C' (C in Fig. 1).

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

6.3.4 The padding shall extend for a length greater than ~~25%~~ 25 % of Dimension B in the center front (E in Fig. 1).

6.3.5 The armhole circumference shall be measured by placing the armhole opening over the test device shown in Fig. 2. The point at which the armhole opening circumference contacts the cone measurement device at all points around the circumference of the armhole shall be considered to be the armhole circumference. The circumference of the armhole shall be less than ~~70%~~ 70 % of Dimension A (F in Fig. 1).

6.3.6 The minimum width of padding across the back between the armholes shall be more than ~~30%~~ 30 % of Dimension A (G in Fig. 1).

6.3.7 The minimum width of padding across the chest between the armholes shall be more than ~~20%~~ 20 % of Dimension A (H in Fig. 1).

6.3.8 The maximum vertical dimension (depth) of the front neck opening shall be less than ~~15%~~ 15 % of Dimension B (I in Fig. 1).

6.3.9 The maximum vertical dimension (depth) of the back neck opening shall be less than ~~10%~~ 10 % of Dimension B (J in Fig. 1).

6.3.10 The test area shall consist of the area bounded by dimensions A, C, C', D and D' as shown in Fig. 1.