



Standard Specification for Protective Headgear Used in Horse Sports and Horseback Riding¹

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INTRODUCTION

Horse sports and horseback riding are sports with intrinsic hazards. It is recognized that it is not possible to write a protective headgear performance standard that will result in headgear 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 protective headgear is worn. It is further recognized that protective headgear must be acceptable to the user and to the regulating associations or agencies requiring its use. Acknowledging these limitations, this specification was developed using resources in medical, scientific, mechanical engineering, human factors, and biomechanical fields.

This specification incorporates many aspects of other recognized headgear 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 completed headgear to measure its ability to reduce head acceleration when impacting various shaped objects. It is known that headgear that performs well under this specification will mitigate head injury in actual use within its design limits.

1. Scope

1.1 This specification covers minimum performance criteria and describes test methods for protective headgear 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 All testing and requirements of this specification shall be in accordance with Test Methods F 1446, except where noted herein.

1.4 The values stated in SI units are to be regarded as standard.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *ASTM Standards:*

¹ This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.53 on Headgear.

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F 1446 Test Methods for Equipment and Procedures Used in Evaluating the Performance Characteristics of Protective Headgear²

3. Terminology

3.1 *Definitions*—The terms used in this specification are defined in accordance with Test Methods F 1446.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cradle, n*—the headband or other head-fitting device and those internal parts of the headgear in contact with the head.

3.2.2 *drawlace, n*—a lace used for making adjustments to the fit of the cradle on the wearer's head.

4. Headforms

4.1 Headforms to be used in this specification are as specified in Section 6 of Test Methods F 1446. The appropriate size headform shall be selected (see 3.1.7 of Test Methods F 1446) for the helmet to be tested.

5. Anvils and Impact Velocities

5.1 Anvils to be used for impact tests in this specification are the flat anvil described in 16.4.1 and Fig. 7 of Test Methods F 1446, and the equestrian hazard anvil described in Fig. 1 of

² *Annual Book of ASTM Standards*, Vol 15.07.

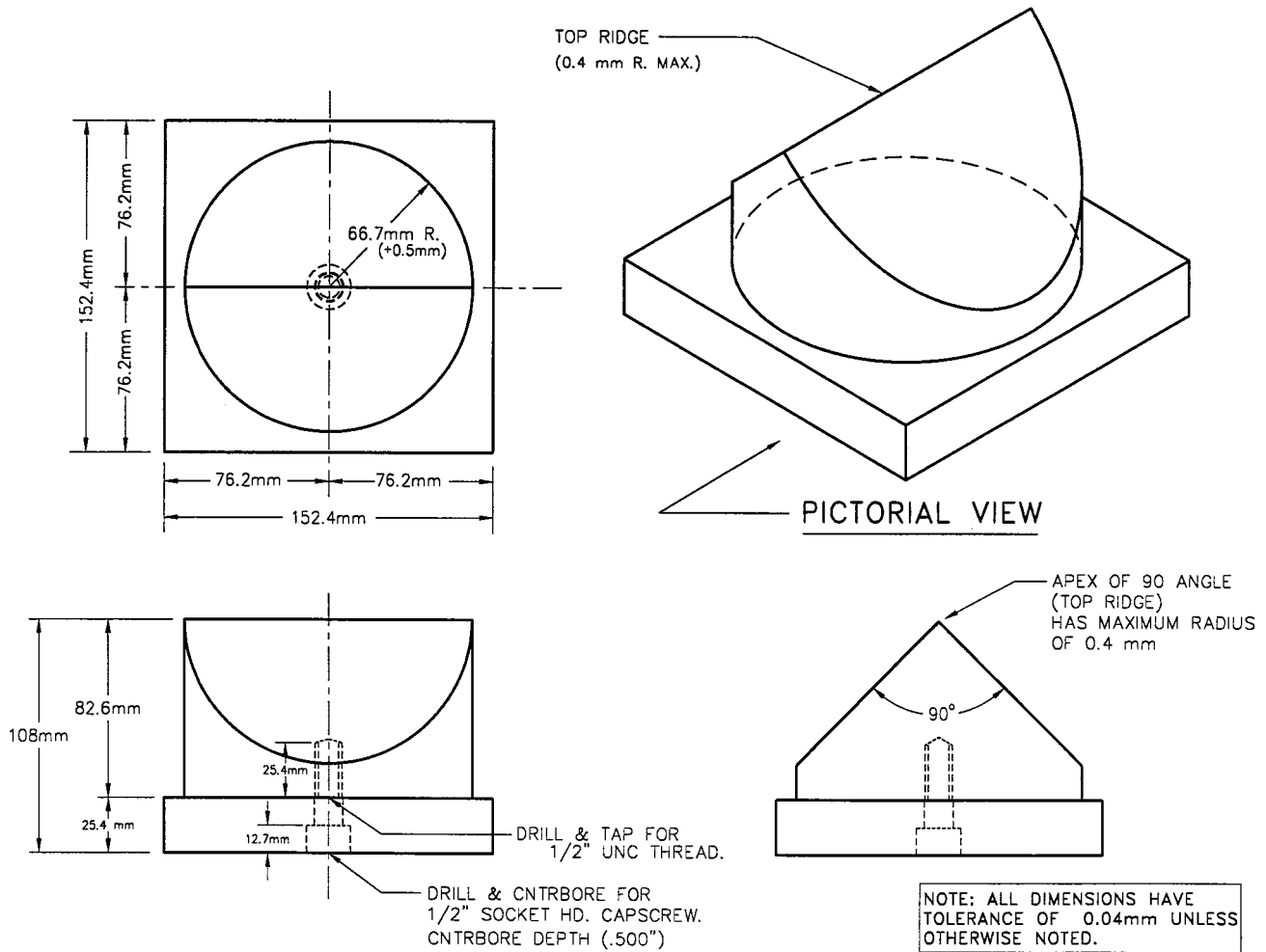


FIG. 1 Equestrian Hazard Anvil ("V" Anvil)

this specification. The circular portion of the equestrian hazard anvil shall have a radius of 66.7 ± 0.5 mm, with facial surfaces inclined at an angle of $45 \pm 2^\circ$. The edge rail at the intersection of the facial surfaces shall have a radius of 0.4 mm maximum.

5.2 The helmet shall be dropped onto the flat anvil from a theoretical drop height of 1.8 m to achieve an impact velocity of $6.0 \text{ m/s} \pm 3\%$.

5.3 The helmet shall be dropped onto the equestrian hazard anvil from a theoretical drop height of 1.3 m to achieve an impact velocity of $5.0 \text{ m/s} \pm 3\%$.

5.4 The impact velocity shall be measured during the last 40 mm of freefall for each test and shall be within $\pm 3\%$ of the velocities specified in 5.2 and 5.3.

6. Marking the Helmet

6.1 Place the helmet on the appropriate reference headform (see 3.1.13 of Test Methods F 1446) and preload with a preload ballast weight of 5 kg. If helmet includes a drawlace, undo the drawlace or secure it in the least effective position.

6.2 Position the helmet as specified by the manufacturer's head positioning index (HPI) with the brow parallel to the basic plane.

6.3 Maintaining the force and position described in this section, draw the test line on the outer surface of the helmet as

shown in Fig. 2. Helmet impacts shall be made with the flat anvil centered on or above the test line described in Fig. 2, and with no part of the top ridge of the equestrian hazard anvil extending below the test line described in Fig. 2

6.4 Measure peripheral vision as described in 14.2 and Fig. 4 of Test Methods F 1446.

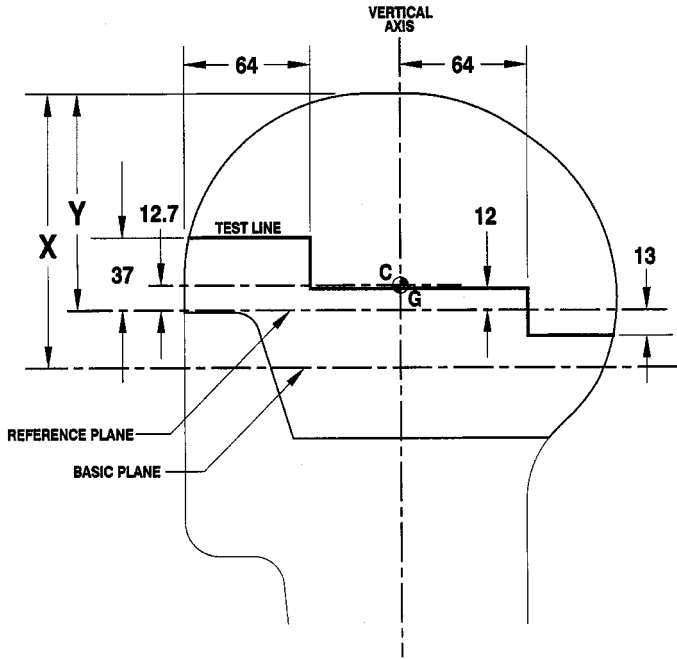
7. Conditioning and Number of Samples

7.1 Requirements for the number of each model and size to be tested are described in 10.2 of Test Methods F 1446.

7.2 Conditioning of samples to be tested is described in Sections 11 and 12 of Test Methods F 1446.

8. Impact Sites

8.1 Each helmet shall be impacted at each of four sites; two sites upon the flat anvil and two sites upon the equestrian hazard anvil. The impact sites shall be centered on or anywhere above the center of impact line defined in Section 6. Impact centers shall be separated by a distance not less than one fifth of the circumference of the helmet. If there are any projections in the test area, at least one projection of each type shall be impacted. At least one impact shall be at the center of impact line at the front, rear, or side of the helmet.



Headform Code Letter	Dimension X, mm	Dimension Y, mm
A	114	90.0
E	122	96.0
J	130	102.5
M	136	107.0
O	140	110.0

FIG. 2 Headform Basic Data

9. Testing Schedule

9.1 Retention system testing (see Section 11) shall be completed prior to impact testing.

10. Peak Acceleration and Time Duration Requirements

10.1 The peak acceleration (g max) of the impulse during the impact shall be measured with equipment described in Section 16 of Test Methods F 1446.

10.2 The peak acceleration from any impact shall not exceed 300 g.

11. Retention System Testing

11.1 *Dynamic Loading Test*—Place the helmet on the appropriate size headform on the test device described in Section 15 and in Fig. 5 of Test Methods F 1446. The entire support assembly, excluding the drop mass, shall have a total mass of 7.0 ± 0.3 kg.

11.1.1 Place the twin bar (jaw) system with rod and drop weight attached within the fastened retention system, and mark its position.

11.1.2 Drop a 7.5-kg sliding weight a distance of 0.5 m, and record the dynamic extension of the retention system.

11.1.3 Measure the elongation as the vertical displacement of the dynamic test apparatus, between the initial position before drop and the maximum extension during drop. The retention system shall remain intact, and elongation shall not exceed 30 mm.

11.2 *Helmet Stability Test*—The helmet stability test described in Test Methods F 1446, Section 20 and Fig. 13, shall be conducted on one ambient sample that has not been previously tested. The test shall be conducted using a 4-kg drop mass from a height of 0.6 m.

12. Labels and Warnings

12.1 In addition to the labeling requirements outlined in Section 9 of Test Methods F 1446, the helmet shall have the following additional information:

- 12.1.1 This helmet designed only for equestrian use.
- 12.1.2 Uncoded month and year of manufacture.
- 12.1.3 Size or size range of the helmet.
- 12.1.4 The number designation of this specification.
- 12.1.5 Warning that the helmet should not be worn before carefully reading the attached fitting and care instructions.
- 12.1.6 Any other warnings, cautions, or instructions desired by the manufacturer.

13. Keywords

13.1 equestrian; horseback riding; horse driving; protective headgear

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