



Standard Specification for Headgear Used in Soccer¹

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INTRODUCTION

Soccer is a sport with inherent risks. Participation in the sport implies acceptance of risk of injury.

This specification was developed to address forces of some of the incidental (non-ball) head impacts that may occur while engaging in soccer. Although headgear satisfying this specification may provide limited protection against heading impacts which are generally sub-concussive, heading impacts are not addressed by this specification. In addition, the issue of multiple sub-concussive impacts is not addressed here. Note—Protection provided by headgear satisfying this specification is not equivalent to the protection provided by rigid “helmets” used in many other sports activities. Headgear that meets these standard specifications may not provide significant protection in some head impact situations.

This specification is intended to be used with other standards and documents listed in the Referenced Documents.

1. Scope

1.1 This specification defines performance requirements for headgear used for participation in the sport of soccer. The technical requirements in this specification do not address the administrative requirements of soccer governing bodies, so it should not be assumed that any headgear satisfying this specification will be acceptable for use in sanctioned soccer events.

1.2 This specification is intended to reduce the forces from external physical sources reaching the defined impact area of the head in impacts that may occur in the sport of soccer. No headgear can provide protection against all impacts, foreseeable or not. This specification does not address the potential for injury from any type of impact. The tests specified in this specification are laboratory simulation tests only, and do not purport to create situations identical to the impacts that may occur during the playing of soccer.

1.3 All testing and requirements of this specification shall be in accordance with Test Methods F1446, except where noted herein. In the event of a discrepancy between the requirements of this specification and those of Test Methods F1446, this specification shall prevail.

1.4 Partial utilization of this specification is prohibited. Any statement of compliance with this specification shall be a

certification that the headgear meets all of the requirements of this specification in its entirety. Headgear that fails to meet any one of the requirements of this specification is considered to have failed the specification and should not be sold with any indication that it meets parts of the specification.

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

1.6 *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.*

1.7 *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

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 F08.53 on Headgear and Helmets.

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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.

2.2 Other Documents:³

49 CFR Part 572, Subpart E Anthropometric Test Dummies Procedures for Assembly, Disassembly, and Inspection (PADI) of the Hybrid III 50th Percentile Dummy's Nine Accelerometer Array Head (NAAH) with Redundant Head C. G. Accelerometers

3. Terminology

3.1 Definitions:

3.1.1 *impact area*—the region of the headform within which the center of each impact footprint must fall. **F1446**

4. Significance and Use

4.1 The purpose of this specification is to provide reliable and repeatable test methods for the evaluation of headgear for soccer. Headgear satisfying this specification is intended to reduce forces reaching the head in some of the impacts that may occur in soccer.

5. Apparatus

5.1 Apparatus used for this testing shall be in accordance with Test Methods **F1446** except as noted herein.

5.2 *Test Headforms*—Test headforms used with this specification shall be the 50th percentile Hybrid III adult male head and neck assembly, including the upper and lower neck adjusting brackets and all associated hardware. The equipment shall be as defined in the United States of America Code of Federal Regulations (49 CFR Part 572, Subpart E). A complete listing of all parts and components which make up the head and neck assembly is found in **Appendix X1**; see also Procedures for Assembly, Disassembly, and Inspection (PADI) of the Hybrid III 50th Percentile Dummy's Nine Accelerometer Array Head (NAAH) with Redundant Head C.G. Accelerometers.

5.2.1 The test headform shall be mounted to a standard monorail or twin-wire system or similar system, as shown in Test Methods **F1446**. Mass of the entire drop system shall be $8.8 \text{ kg} \pm 5\%$ ($19.4 \text{ lb} \pm 5\%$). Accelerometer instrumentation shall be installed into the test headform to measure resultant linear accelerations of the test headform as specified in the section on Accelerometer of Test Methods **F1446**.

5.2.2 The headform center of gravity shall fall within 5° of the vertical axis through the point of impact when the test headform assembly is in the impact position, as described in the Appendix of Test Methods **F1446**.

5.3 *Steel Post Anvil*—The steel post anvil used in this specification is to represent a nominal 7.62 cm (3 in.) diameter steel post. The anvil shall consist of a 7.62 cm (3 in.) diameter steel bar ($\pm 5\%$) that is welded (or securely attached to similarly minimize vibration between the bar and the plate) in a horizontal position to a steel plate.

5.4 *Headform Anvil*—The headform anvil is a 50th percentile Hybrid III headform and neck assembly as defined in **5.2**. The headform anvil shall be oriented such that the forehead is in an upright target position. The lower neck bracket shall be

mounted to a rigid structure. The headform anvil shall be positioned such that the only impact between the drop headform and the impact anvil is at the selected impact location, with no other parts of the headform and anvil coming into contact with each other during the initial impact. The headform anvil need not be instrumented.

5.5 *MEP Anvil*—The MEP anvil shall be as defined in the section on Modular Elastomer Programmer (MEP) of Test Methods **F1446**. The MEP anvil shall be positioned with its upper surface horizontal, such that the only impact between the drop headform and the impact anvil is at the selected impact location, with no other parts of the headform and anvil coming into contact with each other during the initial impact.

6. Equipment Calibration and System Checks

6.1 Instrumentation used in testing shall be calibrated according to the requirements of Test Methods **F1446** and 49 CFR Part 572, Subpart E.

6.2 The 50th percentile Hybrid III adult male test headform used with this specification shall pass a system check according to the procedures described in **Appendix X2**. Duration of the system check cycle shall be no more than 12 months.

6.3 *Instrumentation System Check*—The system instrumentation shall be checked before and after each series of tests by dropping the Hybrid III head and neck assembly (see **5.2**) onto the MEP pad (see section on Modular Elastomer Programmer (MEP) of Test Methods **F1446**) at an impact velocity of $2.8 \text{ m/s} \pm 2\%$. The head and neck assembly shall be oriented such that the neck of the Hybrid III headform is at a $24^\circ \pm 1^\circ$ downward angle relative to the horizontal and the forehead shall contact the center of the MEP pad. The peak acceleration obtained during this impact shall be $112 \text{ g} \pm 8 \text{ g}$. Three such impacts at intervals of $75 \text{ s} \pm 15 \text{ s}$ shall be performed before and after each series of tests. If the average peak acceleration obtained in the pretest impacts differs by more than 5% from the average peak acceleration obtained in the post test impacts, recalibration of the instruments and transducers must be carried out, and all data obtained during that series of impact tests shall be discarded.

7. Samples for Testing

7.1 *Conditions and Attachments*—Headgear shall be tested complete, in the condition as offered for sale. They must satisfy all requirements of this specification with or without any included attachments.

7.2 *Number of Samples*—A test series requires 12 samples of each size headgear and shall be tested according to the following schedule (see **Table 1**).

8. Conditioning Requirements

8.1 *Ambient Condition*—Four samples of each size headgear shall be conditioned at the ambient condition defined in ASTM Test Methods **F1446**.

8.2 *Low Temperature*—Three samples of each size headgear shall be conditioned at the low temperature conditions as defined in Test Methods **F1446**.

³ Available from National Highway Traffic Safety Administration (NHTSA), 400 7th St., NW, Washington, DC 20590.