



Standard Specification for Protective Headgear Used in Bicycling¹

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1. Scope

1.1 This specification covers performance requirements for helmets manufactured for use by adult or junior bicyclists. This specification recognizes the desirability of lightweight construction and ventilation; however, it is a performance standard and is not intended to restrict design.

1.2 All testing and requirements of this specification shall be in accordance with Test Methods F 1446, except where noted herein.

1.3 Partial utilization of this specification is prohibited. Any statement of compliance with this specification shall be a certification that the product meets all of the requirements of the specification in its entirety. A product that fails to meet any one of the requirements of this specification is considered to have failed the standard and should not be sold with any indication that it meets parts of the standard.

2. Referenced Documents

2.1 ASTM Standards:

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

3. Headforms

3.1 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.

3.2 In addition to the provisions of Test Methods F 1446, the center of gravity of the headform must be within a 10° vertical cone from the center of impact and lie within a rectangular area 28 by 12.8 mm oriented as shown in Fig. 1. The center of gravity of the drop assembly shall lie within 6.4 mm millimeters of the Z-X plane, which is defined for twin wire systems as the plane containing the axes of the two guide wires, and for monorail systems as the plane containing the design center of the headform and the axis of the monorail. The center of gravity of the drop assembly shall lie within 6.4 mm of the Y-Z plane on the side opposite the arm of the ball arm and within

21.6 mm of the Y-Z plane on the side containing the ball arm where the Y-Z plane is perpendicular to the Z-X plane and contains the design center of the headform. Please see Fig. 1. The center of the anvil must be fixed in alignment with the center vertical axis of the accelerometer.

4. Anvils and Impact Velocities

4.1 Anvils to be used for impact tests in this specification are the flat, hemispherical, and curbstone anvils, described in 16.4, and Figs. 7, 8, and 11 of Test Methods F 1446.

4.2 The helmet shall be dropped onto the flat anvil to achieve an impact velocity of 6.2 m/s (corresponding to a theoretical drop height of 2.0 m).

4.3 The helmet shall be dropped onto the hemispherical and curbstone anvils to achieve an impact velocity of 4.8 m/s (corresponding to a theoretical drop height of 1.2 m).

4.4 The impact velocity shall be measured during the last 40 mm of free-fall for each test and shall be within $\pm 3\%$ of the velocities specified in 4.2 and 4.3.

5. Marking the Test Line (Area of Required Coverage)

5.1 Place the helmet on the appropriate reference headform (see 3.1.15 of Test Methods F 1446) and preload with a preload ballast weight of 5 kg.

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

5.3 Draw a line A-B-C-D on the helmet as shown in Fig. 2. This represents the test line defined in Test Methods F 1446.

6. Conditioning, Number of Samples and Laboratory Environment

6.1 The test normally requires eight samples of each shell/liner combination.

6.2 Conditioning of the samples to be tested is described in Sections 11 and 12 of Test Methods F 1446, except that the ambient sample may be conditioned in an environment at 17 to 27°C with a relative humidity of 20 to 80 %, and the wet sample is to be submerged inverted in potable water at a temperature of 17 to 27°C to an external crown depth of at least 305 ± 25 mm.

7. Impact Sites and Projections

7.1 Impact sites are described in 18.2 of Test Methods F 1446.

¹ This specification is under the jurisdiction of ASTM Committee F-8 on Sports Equipment, and Facilities and is the direct responsibility of Subcommittee F08.53 on Headgear and Helmets.

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