



Standard Specification for Head and Face Protective Equipment for Ice Hockey Goaltenders¹

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INTRODUCTION

Ice hockey is a contact sport with intrinsic hazards. Participation in this sport implies acceptance of some risk of injury. The purpose of protective equipment is to reduce this risk. The use of protective equipment will not eliminate all injuries, but should substantially reduce the severity and frequency of injury.

This specification was developed to address the unique demands and hazards associated with the position of goaltender in ice hockey. Two types of protectors are designated. Both types are subject to impact resistance and shock attenuation requirements. Type I protectors are subject to hockey stick blade penetration resistance requirements over their entire area of coverage. Type II protectors are subject to hockey puck penetration resistance requirements within the area of the field of vision, and hockey stick blade penetration resistance requirements over the remainder of the area of coverage. It is recommended that Type II protectors be used only by players 18 years of age and older.

This specification is intended to be used with other standards, listed in Section 2, which contain details of required test procedures.

1. Scope

1.1 This standard covers specifications and conformity assessment methods for new head and face protectors for ice hockey goaltenders, as offered for initial sale.

1.2 This specification is intended to reduce the risk of injury associated with playing the position of goaltender in ice hockey.

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

2. Referenced Documents

2.1 This standard is intended to be used with the following standards:

2.2 ASTM Standards:

F 513 Safety Specification for Eye and Face Protective Equipment for Hockey Players²

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

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *back plate*—a section of a goaltender's head and face protector that covers the posterior of the wearer's head, in a style of protector in which a front section and a rear section of the protector move relative to each other in order for the wearer to put on or remove the protector.

3.1.2 *neck strap*—a strap that is affixed to the two sides of the helmet and passes under the mandible in close proximity to the neck.

3.1.3 *shell*—the material that gives the helmet its form.

4. Types of Protectors

4.1 *Type I*—Combination head, eye, and face protectors that meet requirements for ice hockey stick blade penetration over the entire area of coverage.

4.2 *Type II*—Combination head, eye, and face protectors that meet requirements for ice hockey puck penetration resistance over the area of the field of vision and that meet requirements for ice hockey stick blade penetration resistance over the remainder of the area of coverage.

5. Performance Requirements

5.1 *Optical Requirements*—Optical requirements shall be as stated in 6.3 through 6.4.9 of Specification F 513.

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

5.2 *Headform Drop Impact Shock Attenuation Test Requirements:*

5.2.1 *Ambient Condition Impacts*—The average peak *g* of each set of three impacts delivered to the seven specified test locations shall not exceed 275 *g*.

5.2.2 *High- and Low-Temperature Condition Impacts*—For the two impacts delivered to each of the two ambient condition test locations with the highest average peak *g*, no single impact shall exceed 300 *g*.

5.2.3 *Shock Attenuation Impact Damage*—The protector shell shall not suffer any full thickness fractures as a result of impact testing. Shock-absorbing components (including padding and chin cups) shall not suffer any full thickness fractures as a result of impact testing. A protector shall fail if any means of attachment of any component to any other component, or any closure or retention device, breaks or fails to maintain attachment as a result of shock attenuation testing.

5.3 *Puck Impact Test Requirements:*

5.3.1 *Failure Conditions (All Protectors):*

5.3.1.1 *Assembly Integrity*—A protector shall fail if any means of attachment of any component to any other component, or any closure or retention device (excluding positioning devices such as “j” or “s” hooks), breaks or fails to maintain attachment as a result of puck impact testing.

5.3.1.2 *Impact Damage*—The protector shell shall not suffer any full thickness fractures as a result of impact testing. Shock-absorbing components (including padding and chin cups) shall not suffer any full thickness fractures as a result of impact testing.

5.3.1.3 *Facial Contact*—No unpadded portion of the head and face protector shall contact the headform before, during, or after puck impact testing.

5.3.2 *Failure Conditions (Clear Shield Components)*—A protector shall fail if any full thickness fractures occur as a result of puck impact testing.

5.3.3 *Failure Conditions (Wire Mesh Components)*—A protector shall fail if any weld completely separates or if any fractures in the wire between any two welds occurs as a result of puck impact testing. A protector shall fail if fragments of the wire coating with a total area greater than 9 mm² have completely separated from the wire.

5.4 *Penetration Resistance Test Requirements:*

5.4.1 *Type I Protectors*—It shall not be possible to touch the test headform to the curved end of the test stick blade within the required area of coverage, excluding the ear opening, with the test blade oriented in any manner.

5.4.2 *Type II Protectors*—It shall not be possible to touch the face of the headform to the test puck disk within the area of the field of vision provided by the protector. Do not touch the test headform with the curved end of the test stick blade within the remainder of the required area of coverage, excluding the ear opening, with the test blade oriented in any manner.

5.5 *Neck Strap Retention*—When tested in accordance with 8.5, the force to separate the strap shall be not less than 110 N (24.7 lbf) nor greater than 500 N (112.4 lbf), and the maximum displacement of the strap shall not exceed 25.4 mm (1.0 in.) at

a load of 110 N. Retention system requirements shall be met at the ambient conditions specified in 12.1 of Test Method F 1446.

6. General Requirements

6.1 *Component Assemblies*—A goaltender head and face protector may be assembled from a separate helmet and face protector provided that the combination meets all of the requirements of this specification, and provided that the components are designed to be compatible without modification.

6.2 *Materials:*

6.2.1 The design of protectors and the choice of materials shall be such as to combine mechanical strength and durability consistent with the intended use of the equipment.

6.2.2 Materials coming into contact with the wearer shall not be a type that is 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 the wearer.

6.3 *Finishes*—All parts shall be well finished and free of any sharp edges or other irregularities that would present the potential hazards of scratching or cutting the wearer or an opposing player. Wire components shall have a protective coating.

6.4 *External Projections*—In protectors that incorporate a back plate, the edge of the front section, which extends over the back plate, shall not project more than 25.4 mm (1 in.) beyond the adjacent edges of the back plate, as measured along a square-ended 12.7-mm (0.5-in.) diameter cylindrical rod, when the rod end is inserted behind the projecting edge of the front section, and along the inner surface of the front section, until the end of the rod is flush with the outer edge of the back plate.

6.5 *Padding*—Padding or cushioning material shall be incorporated in such a way as to cover all hard surfaces that could otherwise come into contact with the wearer’s head. The method of securing padding shall not fail to maintain the padding material in position under normal conditions of heat, cold, moisture, or force distortion by the wearer.

6.6 *Assembly*—The methods of assembling protector components shall be such as to prevent disengagement of the components from each other and from the test headforms as a result of the tests performed under this specification.

6.7 *Access*—All protectors shall be so constructed that access to the wearer’s face is provided, without the use of tools, and without causing movement to the cervical spine, in the event of injury. The access provided shall be sufficient for the administration of cardiopulmonary resuscitation to the wearer.

6.8 Protectors should be designed to minimize rotation on the head under the normal stresses encountered in use.

6.9 *Welded Wire Components*—All wire ends shall terminate at the perimeter of the wire component and must overlap the shell material of the protector in such a way as to prevent stick or puck entry between components.

6.10 *Area of Coverage:*

6.10.1 Area of coverage measurements shall be made with the protector mounted in accordance with the protector manufacturer’s instructions on an ISO DIS 6220 Size A, E, J, or M reference headform, properly sized in accordance with 3.1.7 of Test Method F 1446.

6.10.2 The extent of protection shall include at least all of the hatched area shown in Fig. 1. The hatched area shall correspond with the headform size with which the protector is to be tested.

6.10.3 No ear aperture shall have any dimension exceeding 38 mm (1.5 in.). The ear aperture shall be completely surrounded by the helmet. This part of the helmet shall also have protective padding. The distance from any edge of an ear aperture to any edge of the helmet shall not be less than 20 mm (0.8 in.).

6.11 *Retention System*—Protectors shall incorporate a neck strap.

7. Test Specimen Preparation and Test Schedule

7.1 Three complete, head and face protector specimens shall be required for testing.

7.2 Test specimens shall be unused and packaged for U. S. retail sale, including all labels, instructions, and auxiliary hardware.

7.3 Specimens shall be assembled for testing in accordance with the instructions provided.

7.4 Specimens shall be adjusted and mounted on the appropriate test headform specified in the test procedures in accordance with the instructions provided for proper fit.

7.5 Specimens designated in the test schedule for ambient and low temperature tests shall be conditioned prior to each specified test at the applicable conditioning environments specified in 12.1 and 12.2 of Test Method F 1446. Condition specimens designated for high temperature shock attenuation tests at a temperature of $30 \pm 2^\circ\text{C}$ ($86 \pm 3.6^\circ\text{F}$) for not less than 24 h. Each test must begin within 1 min after removal from the conditioning environment. The helmet must be returned to the conditioning environment within 3 min or be

reconditioned for 5 min for each minute it is out of the conditioning environment.

7.6 *Test Schedule*—The three specimens shall be subjected to the following test sequences:

7.6.1 All specimens and replacement face protector components:

- 7.6.1.1 General requirements inspection (6.3-6.6).
- 7.6.1.2 Instructions and labeling inspection (Section 9).
- 7.6.1.3 Penetration resistance tests at ambient conditions (8.4).

7.6.1.4 Neck strap retention tests (8.5).

7.6.2 *Specimen 1:*

- 7.6.2.1 Puck impact 8.3.4.1 (low-temperature conditions).
- 7.6.2.2 Ambient condition shock attenuation tests.

7.6.3 *Specimen 2:*

- 7.6.3.1 Puck impact 8.3.4.2 (low-temperature conditions).
- 7.6.3.2 Low-temperature condition shock attenuation tests.

7.6.4 *Specimen 3:*

- 7.6.4.1 Puck impact 8.3.4.3 (low-temperature conditions).
- 7.6.4.2 High-temperature condition shock attenuation tests.

8. Test Methods

8.1 *Optical Tests*—Perform optical tests in accordance with 8.1 to 8.2.11 of Specification F 513.

8.2 *Shock Attenuation Tests*—Perform headform drop impact shock attenuation tests in accordance with Test Method F 1446 with the procedures modified in accordance with this specification.

8.2.1 *Shock Attenuation Test Impact Sites*—The locations of the impact sites are defined in 8.2.1.1-8.2.1.6. All distances in this section are chord distances measured on the headform.

8.2.1.1 *Front*—Located in the median plane and 50 mm (2 in.) above the intersection of the anterior intersection of the median and reference planes.

8.2.1.2 *Front Boss*—A point in a plane 45° from the median plane as measured in a clockwise direction, and 25 mm (1 in.) above the reference plane.

8.2.1.3 *Side*—Located 25 mm above the point of intersection of the reference plane and the coronal plane.

8.2.1.4 *Rear Boss*—A point in a plane 135° in a clockwise direction from the anterior intersection of the median and reference planes on the reference plane. If the protector is a mask with a back plate, the impact must be delivered on the back plate, 19 mm (0.75 in.) from any edge.

8.2.1.5 *Rear*—A point at the posterior intersection of the median and reference planes.

8.2.1.6 *Crown*—A point at the intersection of the median and coronal planes.

8.2.2 *Impact Surface*—The impact surface will be the flat anvil specified in Test Method F 1446.

8.2.3 *Impact Velocity*—The impact velocity will be 3.96 ± 0.08 m/s. This is equivalent to the terminal velocity of an object in free fall from a 0.8-m height at the standard acceleration of gravity (9.80665 m/s²).

8.2.4 *Shock Attenuation Test Schedule:*

8.2.4.1 *Ambient Condition Impacts*—The ambient condition impact specimen will be impacted at all six sites defined in 8.2.1. Impact each site three times. The time between successive impacts at each site will be 75 ± 15 s.

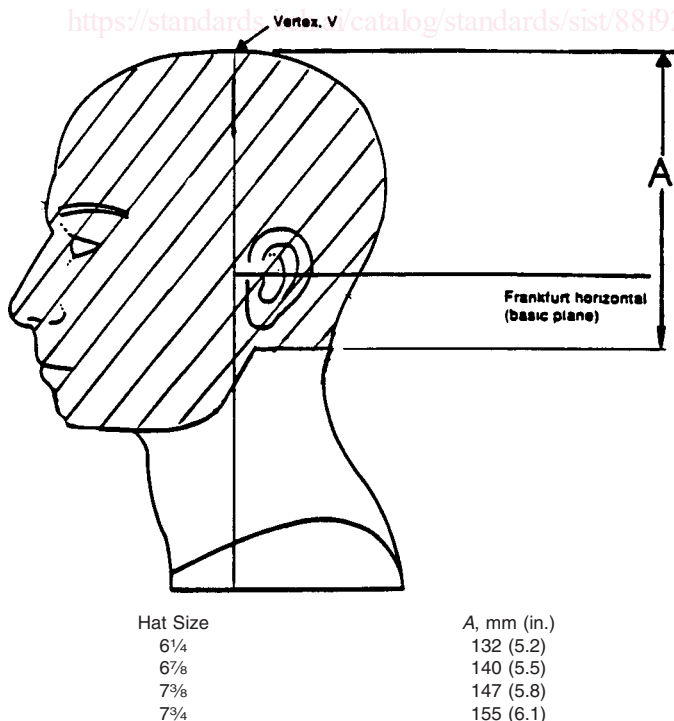


FIG. 1 Area of Coverage