



# Standard Specification for Head and Face Protective Equipment for Ice Hockey Goaltenders<sup>1</sup>

This standard is issued under the fixed designation F1587; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## INTRODUCTION

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

This performance specification for ice hockey goaltender head and face protective equipment has been prepared after consideration of head and face protection relative to the following principle risks: high-mass/low-velocity impact with respect to head protection, low-mass/high-velocity with respect to face protection (various playing situations), and fit. This performance specification may be modified as other risks are identified.

Performance requirements were determined after consideration of the state of the art of head and face protective design and manufacture. This specification was developed to address the unique demands and hazards associated with the position of ice hockey goaltender.

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.

## 1. Scope

1.1 This performance specification<sup>2</sup> covers performance requirements for ice hockey goaltender head and face protectors.

1.2 The intent of this performance specification is to reduce the risk of injury to the head and face of ice hockey goaltenders without compromising the form and appeal of the game.

1.3 This specification has requirements for: (1) materials, assembly, and design; (2) protected areas (coverage) and penetration resistance; (3) shock absorption; (4) puck impact resistance; (5) extensibility and strength of the chin strap and its attachment; and (6) optical quality.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.15 on Ice Hockey.

Current edition approved June 15, 2022. Published July 2022. Originally approved in 1995. Last previous edition approved in 2018 as F1587 – 12a (2018). DOI: 10.1520/F1587-22.

<sup>2</sup> This performance specification is subject to revision as indicated by subsequent injury statistics and subject to review at least every five years.

1.4 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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:<sup>3</sup>

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

**D2240 Test Method for Rubber Property—Durometer Hardness**

**2.2 CSA Standard:**

**CSA Z262.6-14 Specifications for Facially Featured Headforms<sup>4</sup>**

**2.3 CEN Standard:**

**BS EN 960:2006 Headforms for Use in the Testing of Protective Helmets<sup>5</sup>**

**3. Terminology**

**3.1 Definitions of Terms Specific to This Standard:**

**3.1.1 acceleration,  $a$ , of a body,  $n$ —**acceleration measured in metres per second squared.

**3.1.1.1 acceleration of a body as a result of gravity,  $n$ —**rate of change in velocity of a body that is subjected to gravity in units of  $g$  where  $g = 9.8 \text{ m/s}^2$ .

**3.1.1.2 acceleration, maximum,  $a_{max}$ ,  $n$ —**highest point on the acceleration-time curve encountered during impact measured in units of  $g$ .

**3.1.2 backplate,  $n$ —**section of a goaltender's mask 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 for the wearer to put on or remove the protector.

**3.1.3 central vertical axis,  $n$ —**line relative to the headform that lies in the median plane of symmetry and is normal to the basic plane at a point equidistant from the front and back of the headform.

**3.1.4 chip,  $n$ —**readily visible particle missing from the protector with an area bigger than  $9 \text{ mm}^2$ .

**3.1.5 collimated light source (source of illumination),  $n$ —**quartz halogen lamp (17 lux) producing a 100-mm beam at a 6-m distance that is centered on the pupils of the eyes of the headform or the midpoint between the pupils of the eyes of the headform; this centering is maintained at all times during the optical quality test.

**3.1.6 combination,  $n$ —**combined unit of a face protector placed on a head protector with which it is designed to be used.

**3.1.7 computer interface,  $n$ —**linkage between the computer, the goniometer, and the sensors that enables a fully automated measurement process via a menu-driven operation during the optical quality test.

**3.1.8 drop height,  $n$ —**vertical distance between the lowest point (impact point) of the elevated mask and the apex of the impact surface.

**3.1.9 face protector,  $n$ —**protector, either specially adapted to a helmet or forming a continuous unit, that is designed to protect the wearer's head and face, or parts thereof, against injury.

**3.1.10 fastening system,  $n$ —**devices used to connect the components of a helmet.

**3.1.11 goaltender mask,  $n$ —**face protector intended for goaltenders that consists of: (1) a front portion to cover part of the face and jaw, (2) a covering for the eyes and face (face protector), and (3) a backplate.

**3.1.12 goniometer,  $n$ —**positioning device that moves the headform such that the angular rotation and movement in both the horizontal and vertical directions enable a spherical scan to be made of the fields of vision as seen through a face protector or visor.

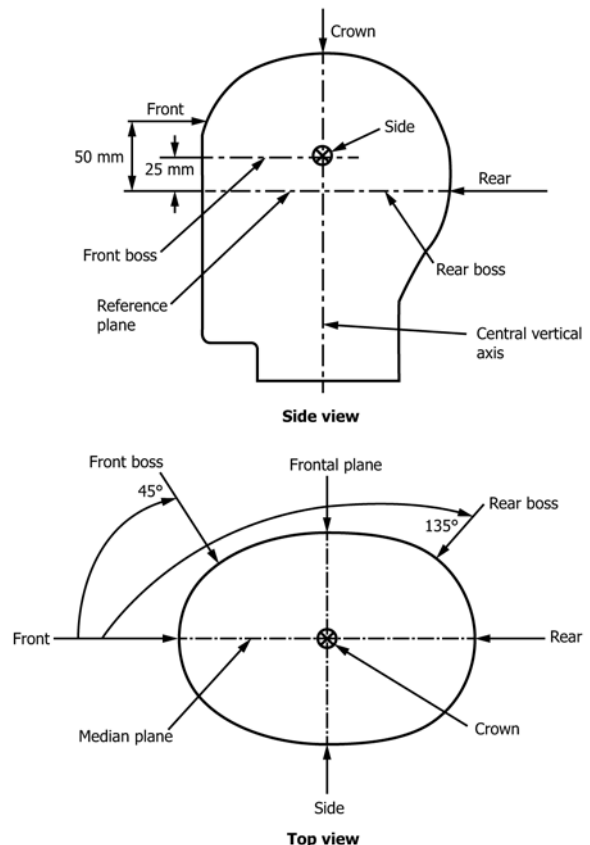
**3.1.13 helmet,  $n$ —**device worn on the head that is intended to reduce the risk of head injury to ice hockey participants. Helmets can include: (1) a shock-attenuating system, (2) a retention system, and (3) manufacturers' attachments.

**3.1.14 helmet-positioning index, HPI,  $n$ —**vertical distance measured at the median plane from the front edge of the helmet to the reference plane when the helmet is placed on the reference headform. In the case of a mask with an opening in which a face protector is attached, the top front edge of the opening shall be used.

**3.1.15 impact sites:—**

**3.1.15.1 non-prescribed,  $adv$ —**any impact site, except the six prescribed sites, on or above the test line and at least one fifth of the circumference of the headform from any prior impact site.

**3.1.15.2 prescribed,  $adv$ —**see Fig. 1.



NOTE 1—The impact direction is perpendicular to the surface of the headform for all impact sites.

**FIG. 1 Prescribed Impact Sites**

<sup>4</sup> Available from the Canadian Standards Association, 178 Rexdale Blvd., Toronto, ON M9W 1R3 Canada.

<sup>5</sup> Available from BSI Customer Services, 389 Chiswick High Rd., London W4 4AL United Kingdom.

(1) *front, adv*—located on the median plane and 50 mm above the anterior intersection of the median and reference planes.

(2) *front boss, n*—point on a plane 45° in a clockwise direction from the anterior intersection of the median and reference planes and 25 mm above the reference plane.

(3) *side, n*—located on the frontal plane and 25 mm above the point of intersection of the reference plane and the frontal plane.

(4) *rear boss, n*—point on 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 shall be delivered on the back plate, 19 mm from any edge.

(5) *rear, n*—point at the posterior intersection of the median and reference planes.

(6) *crown, n*—point at the intersection of the median and frontal planes.

3.1.15.3 *puck impact sites, n*—for testing face protectors, see Fig. 2.

(1) *side impact, n*—point halfway between the mouth level and the eye level in the horizontal plane, 25° to the median plane and in the direction of the axis formed by the intersection of the median plane and the frontal plane.

(2) *eye impact, n*—point in the horizontal plane 25° to the median plane and in the direction of the eye.

(3) *mouth impact, n*—point in the intersection between the horizontal plane and the median plane in the direction of the center of the mouth.

3.1.16 *laser, n*—luminous device used for alignment of the sensors.

3.1.17 *liner, n*—material inside the shell for the purpose of shock absorption or comfortable fit or both.

3.1.18 *model, n*—category of products that have the same essential characteristics (essential characteristics include materials, dimensions, construction, retention system, and protective padding).

3.1.19 *natural frequency, n*—frequency at which a system will tend to oscillate when displaced from its static equilibrium position.

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

3.1.21 *no-contact zone, n*—designated zone of the headform where contact is not permitted during the puck impact resistance test (see 4.8 and Fig. 3).

3.1.22 *orbit, n*—the bony cavity containing the eyeball and other associated tissues.

3.1.23 *outer covering (shell), n*—outer material that gives the mask its form.

3.1.24 *peripheral field of vision, n*—projection outward of all retinal points (the nervous layer of the eye) at which visual sensations can be initiated (Fig. 4).

3.1.24.1 *inferior (downward), adv*—angle in the vertical plane measured downward from the horizontal plane.

3.1.24.2 *nasal, adv*—angle in the horizontal plane measured from the primary position of gaze to the left for the right eye and from the primary position of gaze to the right for the left eye.

3.1.24.3 *superior (upward), adv*—angle in the vertical plane measured upward from the horizontal plane.

3.1.24.4 *temporal, adv*—angle in the horizontal plane measured from the primary position of gaze to the right for the right eye and from the primary position of gaze to the left for the left eye.

3.1.25 *permanent marking, n*—information that remains legible and cannot be removed in its entirety under conditions of normal use (see Section 7).

3.1.26 *photosensors, n*—sensors 5 mm in diameter centered in the pupils of the headform covered by a 5-mm translucent lens of 8-mm radius of curvature, convex forward.

3.1.26.1 *Discussion*—(1) The photosensors are cosine corrected, for example, provided with diffusing covers that are a means of correcting the light-sensitive surface for wide angles of incidence. (2) Light contact with the sensors produces an electrical signal that is fed into a computer interface.

3.1.27 *planes, n*—see Fig. 5.

3.1.27.1 *basic plane of the human head, n*—plane that is located at the level of the external upper borders of the ear canal (external auditory meatus) and the inferior margins of the orbits of the eyes.

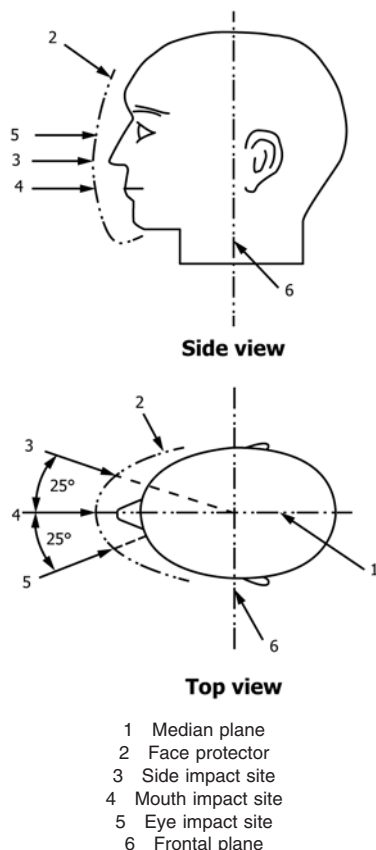


FIG. 2 Puck Impact Sites for Testing Face Protectors