EESTI STANDARD EVS-EN 960:2006

Kaitsekiivrite katsetamiseks kasutatavad peakujud

Headforms for use in the testing of protective helmets

EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 960:2006 sisaldab Euroopa standardi EN 960:2006 ingliskeelset teksti. Käesolev dokument on jõustatud 30.08.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 960:2006 consists of the English text of the European standard EN 960:2006. This document is endorsed on 30.08.2006 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This European Standard specifies the dimensional and constructional details of headforms for use in the testing of protective helmets.	**Scope:** This European Standard specifies the dimensional and constructional details of headforms for use in the testing of protective helmets.

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English Version

Headforms for use in the testing of protective helmets

Fausses têtes à utiliser lors des essais de casques de protection

Prüfköpfe zur Prüfung von Schutzhelmen

This European Standard was approved by CEN on 18 May 2006.

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Contents

Page

Foreword

This document (EN 960:2006) has been prepared by Technical Committee CEN/TC 158 "Head protection", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

This document supersedes EN 960:1994.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 89/686/EEC.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

In preparing this revision of EN 960 it was decided to address several areas of concern, which had arisen during the life of the previous version of this European Standard, namely:

— dimensional errors are present;

— several desirable definitions, characteristics and headform markings are missing;

— it is impossible to verify or demonstrate compliance of a headform with the standard because of the absence of tolerances associated with the specified dimensions;

— the method of dimensioning the headforms, whilst essential to enable manufacture of the original wooden headforms, does not facilitate a straightforward method of tolerancing these dimensions.

It was also acknowledged that headforms are specified, in various helmet standards, for tests where other than a full headform is required. Accordingly, in this revision, “half headforms” and “three-quarter headforms” have been specified, in addition to “full headforms”.

Half headforms are usually rigidly mounted (not falling), so consequently their mass is not important and is, therefore, not specified in this European Standard.

Three-quarter headforms are also used rigidly mounted, but are often used in a falling headform and helmet assembly arrangement for shock absorption tests, where they are typically supported by means of a ball joint and cantilever. In such cases, the falling mass comprises that of the headform and of the supporting system. Some helmet standards specify total falling mass, whereas some specify only the mass of the headform. For this reason, only the dimensions, not the masses, of the three-quarter headforms are specified in this European Standard. It is to be hoped that in future revisions, mass will also be agreed.

The opportunity has been taken to specify more adequately the centre of gravity and the geometric centre of headforms, including the nomination of which of these characteristics is more appropriate to the different types of headform specified and to whether the headforms are intended to be used rigidly mounted or in guided fall or in free fall.

Whilst, in the past, the nominal sizes of headforms have been specified in multiples of ten millimetres (50, 51, 52 etc.), the actual circumferences are closer to five millimetres greater or less than nominal. In this revision therefore, the size designations have been specified according to the actual nominal circumference, in increments of ten millimetres (505, 515, 525 etc.).

Helmets for children have been available for a number of years but headforms to test them are not specified in EN 960:1994. Following searches of the literature it was found that smaller headforms were specified in other publications. However, when comparing the dimensions given for these headforms with those specified for the headforms in EN 960, it was quite obvious that these smaller headforms were not specified as comprehensively as those in EN 960. Hence, incorporation of these data would be neither straightforward nor consistent. It was decided therefore, to develop, from the existing EN 960 dimensions, the specification for five new, smaller, headforms below size 495.

In order to overcome the problems of tolerancing, it was decided to replace the existing dimensioning system with a spherical coordinate system. Namely, using point ‘R’ (the geometric centre) as the datum and then specifying the radius of points on the outer surface of the headform at various angles measured from point ‘R’. Appropriate tolerances have then been assigned to the radius and to the angles.

As part of the process, linear regression lines through the existing data sets for head sizes A to Q were established and the spherical coordinates were specified from the equations of these regression lines. The coordinates of the new, smaller heads, sizes 445 to 485, were derived by simple scaling of the corresponding points of head size 495 in proportion to the respective circumferences.

Partly because of the impossibility of assigning these smaller heads code letters less than A (the other end of the alphabet was considered and dismissed), it was decided to abandon the code letter system of identification. Further, the concept of 'internal circumference of a helmet' was removed. Instead, headforms have now been classified only according to a size designation, which corresponds to their circumference.

During this revision the opportunity was taken to correct obvious errors present in the existing tables, which evidence themselves on the headforms as spurious bumps and depressions. Also, the data points were smoothed where obvious discontinuities occurred and the protruding chin was removed.

Whilst, ideally, the dimensions of headforms already in existence, which 'satisfy' EN 960:1994, should comply with the dimensions given in this revision, because of the preceding paragraph, there are a few points which fall outside of the tolerances specified.

The spherical coordinates of head sizes 445 to 645 are given in the normative Annex A. The equations, which define the radii of the spherical coordinates in terms of headform circumference and vertical and horizontal angles, are given in the informative Annex B.

The first international draft standard for headforms was ISO/R1511:1970, followed many years later by ISO/DIS 6220:1983. Both of these documents were based upon the British Standard, BS 1869:1960, which itself was developed from the first set of test headforms produced by the UK Transport and Road Research Laboratory in the 1950s. The TRRL headforms were designated solely by their size, given in inches. The increment between each size was one eighth of an inch.

During the drafting of BS 1869, the concept of code letters was introduced, but unfortunately, errors of transposition from the TRRL data were made, which resulted in incorrect dimensions being specified and the inclusion of headform code letter H, circumference 565 mm. This headform was also specified in R1511, but subsequently dropped from ISO/DIS 6220 and EN 960:1994. The dimensional errors however, were carried forward through R1511, ISO/DIS 6220 and EN 960:1994.

A summary of this brief history is tabulated in informative Annex C.

1 Scope

This European Standard specifies the dimensional and constructional details of headforms for use in the testing of protective helmets.

2 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

2.1
headform
three dimensional approximation of part, or all, of the human head, excluding facial features and pinnae. Three general forms are characterized in this European Standard, viz:

— full headform - extends from the crown downwards to below the chin and includes part of the neck;

— three-quarter headform - extends from the crown downwards at the sides and rear to below the level of the basic plane;

— half headform - extends from the crown downwards at the sides and rear to approximately the level of the basic plane

2.2
size designation
circumference of a given headform, expressed in mm, as shown in Table 1

2.3
circumference, C
for a given headform, the length of its periphery, measured at the level of the reference plane

2.4
AA' plane
for a given headform, the horizontal transverse plane located at a vertical distance 12,7 mm above and parallel to the reference plane

NOTE This plane is deemed to correspond to the level of the lower edge of the headband of a helmet. It is the basis upon which the size designation of a helmet may be specified.

2.5
reference plane
for a given headform, when erect, the horizontal plane located at a vertical distance 'y' measured down the central vertical axis from the centre of the crown

NOTE All horizontal datum levels are quoted relative to this plane.

2.6
central vertical axis
vertical axis lying along the intersection of the vertical longitudinal plane and the vertical transverse plane

2.7
crown
area on the upper, outer surface of a headform, centred on the central vertical axis

2.8
vertical longitudinal plane
for a given headform, the vertical plane of symmetry, perpendicular to the reference plane and located mid-way between the left hand and right hand extremities of the headform