SLOVENSKI STANDARD
SIST EN 13087-2:2000

01-september-2000

Varovalne ļ elade - Preskusne metode - 2. del: Absorpcija udarca

Protective helmets - Test methods - Part 2: Shock absorption

Schutzhelme - Prüfverfahren - Teil 2: Stoßdämpfung

Casques de protection - Méthodes d'essai - Partie 2: Absorption des chocs

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Ta slovenski standard je istoveten z: **EN 13087-2:2000**

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ICS:

13.340.20 Varovalna oprema za glavo Head protective equipment

SIST EN 13087-2:2000 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13087-2

March 2000

ICS 13.340.20

English version

Protective helmets - Test methods - Part 2: Shock absorption

Casques de protection - Méthodes d'essai - Partie 2: Absorption des chocs

Schutzhelme - Prüfverfahren - Teil 2: Stoßdämpfung

This European Standard was approved by CEN on 14 January 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

This European Standard 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(s).

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

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

This European Standard is the second Part of EN 13087, which supports essential requirements of EU Directive(s), and consists of ten Parts as follows:-

Part 1 : Conditions and conditioning
Part 2 : Shock absorption
Part 3 : Resistance to penetration
Part 4 : Retention system effectiveness
Part 5 : Retention system strength
Part 6 : Field of vision
Part 7 : Flame resistance
Part 8 : Electrical properties
Part 9 : Mechanical rigidity
Part 10 : Resistance to radiant heat

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Introduction

This standard is intended as a supplement to the specific product standards for protective helmets (helmet standards). This method or other test methods may be applicable to complete helmets or parts thereof, and may be referenced in the appropriate helmet standards.

Performance requirements are given in the appropriate helmet standard, as are such prerequisites as the number of samples, preconditioning, preparation of samples for the tests, sequence and duration of testing and assessment of test results. If deviations from the test method given in this standard are necessary, these deviations will be specified in the appropriate helmet standard.

1 Scope

The European Standard describes methods of test for protective helmets. The purpose of these tests is to enable assessment of the performance of the helmet as specified in the appropriate helmet standard.

This European Standard specifies the method for determination of shock absorption.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 960:1994	Headforms for use in the testing of protective helmets.
EN 13087 –1	Protective helmets -Test methods - Part 1: Conditions and conditioning
ISO 6487	Road vehicles - Measurement techniques in impact tests - Instrumentation

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions used in this standard may be found in the appropriate helmet standard.

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4 Prerequisites

In order to implement this European Standard, at least the following parameters need to be specified in the appropriate helmet standard:-

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a) performance requirements
b) number of samples
c) preparation of samples
d) sequence of conditioning
e) sequence of tests
f) method of test - 5.2 or 5.3
g) sizes of headforms
h) type of striker or anvil
i) fitting instructions
j) number and location of impact points on helmets
k) for each impact, the impact energy, including tolerance, of the falling mass for the falling mass method, or the impact speed, including tolerance, of the helmet/headform assembly for the falling headform method.

5 Test methods

5.1 General

Testing shall be performed in the ambient conditions specified in EN 13087-1. When the test method specifies that the helmet shall be fitted to a headform, this shall be done in accordance with the appropriate helmet standard. Two test methods are specified. The appropriate helmet standard will state which of these methods is applicable. Annex A refers to the uncertainty of measurement

5.2 Falling mass method

5.2.1 Principle

A specified striker is allowed to fall with specified energy on to a helmet which is fitted to a rigidly mounted headform. The transmitted force is measured by means of a force transducer located beneath the headform.

5.2.2 Apparatus

5.2.2.1 Base

The base shall be solid, made of steel or a combination of steel and concrete and have a mass of not less than 500 kg. At least the uppermost 25 mm shall consist of steel, which shall be firmly attached to the concrete if present. No part of the base and headform mounting assembly shall have a resonant frequency liable to affect the measurements.

Note: See 5.2.2.6.2 regarding frequency response.

5.2.2.2 Test headforms

The headforms shall comply with EN 960 : 1994, 2.2, 4.1, 4.2, 4.3.1. The sizes to be used are specified in the helmet standard, but shall be selected from sizes A, E, J, M and O. When in the upright position, the headform shall be positioned so that its central vertical axis coincides with those of the force transducer and striker.

5.2.2.3 Striker

Two types of striker are specified - a flat one and a hemispherical one. The type of striker to be used is specified in the appropriate helmet standard.

The striker shall be made of steel and have a mass of (5 ±0,05) kg.

The flat striker shall have a flat striking face of diameter (100 ±2) mm, with the edge of its circumference radiused to nominally 2 mm.

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The hemispherical striker shall have a hemispherical striking face of radius (50 ±1) mm.

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5.2.2.4 Guidance system

Means shall be provided for the striker to be dropped in free or guided fall.

The guidance system shall be such as to ensure that the striker:

- shall be positioned above the headform so that its central axis coincides with the central vertical axis of the force transducer and
- falls on to the required impact point with an impact speed of not less than 95% of that which would theoretically obtain for a free fall.

5.2.2.5 Means to measure impact speed

Unless free fall is employed, means shall be provided to measure the striker speed at a distance of not more than 60 mm prior to impact, to within an accuracy of ±1%.

The impact speed shall be measured during the commissioning of the apparatus. It need not be done for each impact, but has to be sufficiently regular to comply with 5.2.2.4.

5.2.2.6 Instrumentation to record and analyse the data

5.2.2.6.1 Force transducer

The non-inertial force transducer shall be firmly attached to the base and arranged so that its sensitive axis coincides with the vertical axis passing through the centre of gravity of the headform and the centre of the striker. The transducer shall be capable of withstanding a compressive force of 40 kN without damage.

5.2.2.6.2 Signal conditioning instrumentation

The instrumentation shall provide for the complete measuring channel to have a frequency response in accordance with channel frequency class (CFC) 600 of ISO 6487. If digital sampling is employed, a sample rate of at least 6 kHz shall be used. The required low pass filter may be included within the computer software.

Means shall be provided to record the maximum force transmitted during impact, to the nearest 10 N.

5.2.3 Procedure

Within 1 minute of its removal from conditioning (this time applies to temperature conditioning only), fit the helmet to the appropriate headform in the manner in which it is intended to be worn on the head and allow the striker to fall on to the specified impact point. The impact energy shall be as specified in the appropriate helmet standard.

If the design of the helmet permits direct contact between the striker and the headform, the test shall not be performed and the result shall be declared a failure.

5.2.4 Test Report

Record and report the maximum force transmitted during the impact to the nearest 10 N.

5.3 Falling headform method

5.3.1 Principle

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The helmet to be tested is fitted to a headform and the assembly is allowed to fall with specified speed on to a rigidly mounted anvil. The deceleration of the headform is measured by means of a tri-axial accelerometer located within the headform.

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5.3.2 Apparatus

5.3.2.1 Base

The base shall be solid, made of steel or a combination of steel and concrete and have a mass of not less than 500 kg. At least the uppermost 25 mm shall consist of steel, which shall be firmly attached to the concrete if present. No part of the base and anvil assembly shall have a resonant frequency liable to affect the measurements.

Note: See 5.3.2.6.2 regarding frequency response.

5.3.2.2 Anvil

Two types of anvil are specified - a flat one and a kerbstone one. Both shall be made of steel. The anvil to be used is specified in the appropriate helmet standard.

The flat anvil shall have a flat impact face of diameter (130 ±3) mm, with the edge of its circumference radiused to nominally 2 mm.

The kerbstone anvil shall have two faces, each inclined at (52,5 ±2,5)° to the vertical and meeting along a striking edge with a radius of (15 ±0,5) mm. The height shall be not less than 50 mm and the length not less than 125 mm.

5.3.2.3 Guidance system

Means shall be provided for the headform/helmet assembly to be dropped in free or guided fall.

The guidance system shall provide for the positioning of any impact point on the helmet vertically above the anvil, within a radius of 10 mm. It shall be such as to ensure that the headform/helmet assembly falls on to the anvil with an impact speed of not less than 95% of that which would theoretically obtain for a free fall. Its characteristics shall not affect the measurement of acceleration of the headform/helmet assembly.

5.3.2.4 Means to measure impact speed

Unless free fall is employed, means shall be provided to measure the headform/helmet assembly speed at a distance of not more than 60 mm prior to impact, to within an accuracy of ±1%.

5.3.2.5 Test headforms

The headforms shall comply with EN 960 : 1994, 2.1, 3, 4. The sizes to be used are specified in the helmet standard, but shall be selected from sizes A, E, J, M and O.

5.3.2.6 Instrumentation to record and analyse the data

5.3.2.6.1 Accelerometer

The tri-axial accelerometer shall be firmly attached to the headform near to its centre of gravity.

Note: ISO 6487 recommends that the Z axis of the accelerometer should coincide with the vertical axis passing through the centre of gravity of the headform, whilst the X axis corresponds with the longitudinal axis and the Y axis with the transverse axis.

The mass of the accelerometer and its mounting shall not exceed 50 g.

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The accelerometer shall be capable of withstanding a maximum acceleration of 2 000 *g* without damage.

5.3.2.6.2 Signal conditioning instrumentation

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The instrumentation shall provide for each complete measuring channel to have a frequency response in accordance with channel frequency class (CFC) 1000 of ISO 6487. If digital sampling is employed, a sample rate of at least 6 kHz per channel shall be used. The required low pass filters may be included within the computer software.

Means shall be provided to record the maximum deceleration during impact versus time , to the nearest 1 g and 0.1 ms, respectively.