BS EN 17950:2024

BSI Standards Publication

Protective helmets — Test methods — Shock absorption including measuring rotational kinematics

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The UK participation in its preparation was entrusted to Technical Committee PH/6, Head protection.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Protective helmets - Test methods - Shock absorption including measuring rotational kinematics

Casques de protection - Méthodes d'essai - Absorption des chocs avec mesure de la cinématique de rotation

Schutzhelme - Prüfverfahren - Stoßdämpfung einschließlich Messung der Rotationskinematik

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European foreword

This document (EN 17950:2024) has been prepared by Technical Committee CEN/TC 158 “Head protection”, the secretariat of which is held by SIS.

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of an identical text or by endorsement, at the latest by January 2025, and conflicting national standards shall be withdrawn at the latest by January 2025.

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Introduction

0.1 Purpose and background

The test method described in this document is designed to measure translational and rotational kinematics from any helmeted dynamic event such as an impact to an object. Statistics from bike, ski, equestrian, and other accidents show that oblique impacts, resulting in a combination of translational and rotational kinematics of the head, are more frequent than pure translational impacts. EN 13087-2, *Protective helmets — Test methods — Part 2: Shock absorption* measures only the translational motion in impacts against flat, hemispherical or curb stone anvils. A test method that measures the translational and rotational kinematics is therefore important and much needed.

As this document specifies the measuring the translational and rotational kinematics, it is possible to use this document as a complementary test method to EN 13087-2 when performing tests to measure shock absorption of helmets.

This document does not replace EN 13087-2.

0.2 Background to the design of the test method

Preliminary discussions to start work on the test method specified in this document started in 2006. In 2013, the responsible working group within CEN/TC 158 Head protection, *Headforms and test methods*, accelerated the work on the design of the test method.

Extensive efforts to ensure the soundest state-of-art test method have been made by:

— gathering data and scientific evidence from the widest range of scientific sources possible;

— performing multiple round robin tests;

— organizing numerous physical and online working group meetings in which a multitude of alternatives were analysed and discussed exhaustively before finally opting for the final design specified in this document;

— ensuring that experts within the field of biomechanics and brain understanding are members of the working group.

As part of the CEN standardization process, the content of this document has been further scrutinized and refined by other stakeholders and experts in the member countries of CEN.

0.3 Headform

A new headform without a neck for rotational impact tests has been developed for the test method specified in this document. The main reasons for developing a new type of headform are described below:

a) analysis of the inertial properties (mass, moment of inertia and centre of gravity) of the existing EN 960 and Hybrid III headforms showed values that were very different from the values found in literature from measurements of the human head. This is not surprising as the EN 960 headform includes parts of a rigid neck, and the Hybrid III headform was developed for frontal car collisions and not for helmet testing;

b) the new test method requires that the outer surface of the headform that comes in contact with the helmet has more humanlike properties. Specifically, the coefficient of friction between the headform and the inner surface in a helmet needs to be specified. Neither the EN 960 headform nor the Hybrid III headform has the coefficient of friction specified for the headform specification in this document.

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