

Motorcycles — Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles

Part 1: Definitions, symbols and general considerations

ICS 43.140

National foreword

This British Standard is the UK implementation of ISO 13232-1:2005+A1:2012. It supersedes BS ISO 13232-1:2005, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee AUE/14, Motor cycles and mopeds.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 26 January 2006

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ISBN 978 0 580 73994 1

Amendments/corrigenda issued since publication

Date	Comments
31 August 2012	Implementation of ISO amendment 1:2012

INTERNATIONAL STANDARD

ISO
13232-1

Second edition
2005-12-15

Motorcycles — Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles —

Part 1: Definitions, symbols and general considerations

*Motorcycles — Méthodes d'essai et d'analyse de l'évaluation par la
recherche des dispositifs, montés sur les motorcycles, visant à la
protection des motocyclistes contre les collisions —*

Partie 1: Définitions, symboles et généralités



Reference number
ISO 13232-1:2005(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13232-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 22, *Motorcycles*.

This second edition cancels and replaces the first version (ISO 13232-1:1996), which has been technically revised.

ISO 13232 consists of the following parts, under the general title *Motorcycles — Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles*:

- *Part 1: Definitions, symbols and general considerations*
- *Part 2: Definition of impact conditions in relation to accident data*
- *Part 3: Motorcyclist anthropometric impact dummy*
- *Part 4: Variables to be measured, instrumentation and measurement procedures*
- *Part 5: Injury indices and risk/benefit analysis*
- *Part 6: Full-scale impact-test procedures*
- *Part 7: Standardized procedures for performing computer simulations of motorcycle impact tests*
- *Part 8: Documentation and reports*

Introduction

ISO 13232 has been prepared on the basis of existing technology. Its purpose is to define common research methods and a means for making an overall evaluation of the effect that devices which are fitted to motorcycles and intended for the crash protection of riders, have on injuries, when assessed over a range of impact conditions which are based on accident data.

It is intended that all of the methods and recommendations contained in ISO 13232 should be used in all basic feasibility research. However, researchers should also consider variations in the specified conditions (for example, rider size) when evaluating the overall feasibility of any protective device. In addition, researchers may wish to vary or extend elements of the methodology in order to research issues which are of particular interest to them. In all such cases which go beyond the basic research, if reference is to be made to ISO 13232, a clear explanation of how the used procedures differ from the basic methodology should be provided.

ISO 13232 was prepared by ISO/TC 22/SC 22 at the request of the United Nations Economic Commission for Europe Group for Road Vehicle General Safety (UN/ECE/TRANS/SCI/WP29/GRSG), based on original working documents submitted by the International Motorcycle Manufacturers Association (IMMA), and comprising eight interrelated parts.

This revision of ISO 13232 incorporates extensive technical amendments throughout all the parts, resulting from extensive experience with the standard and the development of improved research methods.

In order to apply ISO 13232 properly, it is strongly recommended that all eight parts be used together, particularly if the results are to be published.

Motorcycles — Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles —

Part 1: Definitions, symbols and general considerations

1 Scope

This part of ISO 13232 provides the definitions, abbreviations, symbols and other general considerations used in all parts of ISO 13232, which specifies the minimum requirements for research into the feasibility of protective devices fitted to motorcycles, which are intended to protect the rider in the event of a collision.

ISO 13232 is applicable to impact tests involving:

- two-wheeled motorcycles;
- the specified type of opposing vehicle;
- either a stationary and a moving vehicle or two moving vehicles;
- for any moving vehicle, a steady speed and straight-line motion immediately prior to impact;
- one helmeted dummy in a normal seating position on an upright motorcycle;
- the measurement of the potential for specified types of injury by body region;
- evaluation of the results of paired impact tests (i.e. comparisons between motorcycles fitted and not fitted with the proposed devices).

ISO 13232 does not apply to testing for regulatory or legislative purposes.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13232-2, *Motorcycles — Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles — Part 2: Definition of impact conditions in relation to accident data*

AIS-90:1990, Association for the Advancement of Automotive Medicine (AAAM) Des Plaines, IL, USA *The abbreviated injury scale, 1990 revision*

UN/ECE/TRANS/WP.29/78/Rev 1/Amend.2: 1999, *The consolidated resolution on the construction of vehicles (R E 3), Rev 1*

3 Terms and definitions

3.1 General terms

3.1.1 motorcycle MC

two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm³ or whatever the means of propulsion a maximum design speed exceeding 50 km/h

[Adapted from UN/ECE/TRANS/WP.29/78/Rev 1/Amend.2: 1999]

3.1.2 opposing vehicle OV

saloon type passenger car, into which the MC is impacted

3.1.3 leg protective device

device which is intended to reduce the frequency of leg bone fractures

3.1.4 structural element of the MC

any substantially rigid component of the MC

EXAMPLE forks, brake assembly, frame

3.1.5 head protective device

device which is intended to reduce the frequency or severity of head concussive injuries

3.1.6 fitted to the motorcycle

attached in a permanent manner to a structural element of the motorcycle

3.1.7 crash protection

reduction of the frequency or severity of rider injuries during impacts

3.1.8 rider

operator of a motorcycle

3.1.9 baseline MC

MC which has not been fitted with a protective device

3.1.10 modified MC

MC which has been fitted with a protective device

3.1.11 paired comparison

testing and comparing results between two or more identical MCs with the only experimental variable between or among them being the presence of the proposed protective device

3.1.11.1

single paired comparison

paired comparison which includes only one test with a modified MC and only one test with a baseline MC

3.1.11.2

multiple paired comparison

paired comparison which includes more than one test with modified MCs, all with the same modification, and an equal number of tests with baseline MCs

3.1.11.3

group of tests

all of the tests with the baseline MC and with the modified MC, in a paired comparison which involves more than two tests

3.1.12

impact conditions

impact variables

five variables which characterize and define the positions, orientations and velocities of the MC and OV immediately prior to impact in a full-scale impact test, a computer simulation of an impact, or in MC/OV accident data

3.1.12.1

relative heading angle

rha

angle between the MC x axis and the OV x axis measured in a clockwise direction from the MC x axis as viewed from above, immediately prior to first MC/OV contact

3.1.12.2

OV impact speed

OVS

magnitude of the OV velocity relative to the ground, immediately prior to first MC/OV contact

3.1.12.3

MC impact speed

MCS

magnitude of the MC velocity relative to the ground, immediately prior to first MC/OV contact

3.1.12.4

OV contact point (for full-scale tests or computer simulations)

OVCP

target or measured point on the periphery of the OV, when viewed from above

[see ISO 13232-2]

3.1.12.5

OV contact point

for accident analysis, point representing the region of main and presumably initial structural damage to the OV in a given accident with an MC

3.1.12.6

MC contact point

MCCP

for full-scale tests or computer simulations, target point on the MC for the main impact with the OV, being the foremost point, the rearmost point or the midpoint along the MC overall length

3.1.12.7

MC contact point

for accident analysis, point representing the region of main and presumably initial structural damage to the MC in a given accident with a passenger car

3.1.13

first MC/OV contact

first instant in time when a part of the MC or the dummy contacts the OV

3.1.14

time of first MC/OV contact

time zero (for film analysis)

first frame on the high speed film which shows contact between a part of the MC or the dummy and the OV, or the frame immediately before where the first light emission from a contact sensing system occurs, whichever is sooner

3.1.15

time of first MC/OV contact

for electronic data, instant of initial contact between a part of the MC or the dummy and the OV, sensed by a contact switch and indicated by an electronic pulse on one of the data channels

3.1.16

first helmet/OV contact

first frame on the high speed film which shows contact between the helmet and the OV

3.1.17

primary impact period

time period from 0,050 s before first MC/OV contact until 0,500 s after first MC/OV contact

3.1.18

secondary impact period

time period from 0,500 s until 3,000 s after first MC/OV contact

3.1.19

entire impact sequence

time period from 0,050 s before until 3,000 s after first MC/OV contact

3.1.20 axis systems

3.1.20.1

vehicle axis system

mutually perpendicular set of three axes fixed in the plane of symmetry of the vehicle, with the x axis in the direction of forward straight line motion, the z axis downward parallel to gravity, and the y axis directed toward the right side of the vehicle

3.1.20.2

specimen axis system

mutually perpendicular set of three axes fixed in the specimen, with the axial axis parallel to the axis of symmetry or longest dimension of the specimen

3.1.20.3

inertial axis system

mutually perpendicular set of three axes fixed to the ground, with the x axis parallel to the pre-impact path of the MC, the z axis downward parallel to gravity, and the y axis to the right of the pre-impact path of the MC

3.1.20.4

head axis system

mutually perpendicular set of three axes fixed to the head, with x axis forward and horizontal in the mid-sagittal plane, the z axis downward in the mid-sagittal plane, and the y axis toward the right side of the head, and with the origin located at the Hybrid III head centre of gravity

3.1.20.5

dummy axis system

mutually perpendicular set of three axes fixed in each component of the dummy, with the x axis in the forward (anterior) direction, the y axis toward the right side of the dummy, and the z axis in the downward direction, and, in