INTERNATIONAL STANDARD

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Road vehicles — Pedestrian protection — Head impact test method

Véhicules routiers — Protection des piétons — Méthode d'essai de choc de la tête du piéton

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 14513 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 10, *Impact test procedures*.

Introduction

The intent of this International Standard is to help reduce pedestrian head injuries by providing a standardized test method which will allow different test organizations to use the results from pedestrian impact tests conducted by other organizations. The test method specified applies to adults, but it is anticipated that biomechanical data for children will later be studied in order to determine the potential for child pedestrian protection.

Road vehicles — Pedestrian protection — Head impact test method

1 Scope

This International Standard specifies a test method to simulate the head impact of an adult pedestrian to the bonnet top of passenger vehicles or light truck vehicles of up to 3,5 t (GVM), as defined in ISO 3833.The impact device to be used in this test method will be robust for a vehicle impact velocity of up to 11 m/s. The test method specified addresses the reduction of an adult pedestrian head injury risk; it does not test for injuries to other regions of the pedestrian. The evaluation of injury risk to other pedestrian body regions should be determined using other test methods. This test method does not consider downward pitching of the vehicle due to pre-impact braking. This test method and the corresponding HIC measurement utilizes a free flight head form impactor and does not consider the kinematics of the pedestrian body as a whole, nor does it consider the subsequent post-impact kinematics and potential injury risk.

NOTE The test method covers an adult pedestrian head in a simulated impact with a motorized road vehicle. Research suggests vehicle safety improvements in vehicle derived from such pedestrian impact tests may be beneficial also to bicyclists in vehicle front impact.

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 3784, *Road vehicles — Measurement of impact velocity in collision tests*

ISO 3833, *Road vehicles — Types — Terms and definitions*

ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

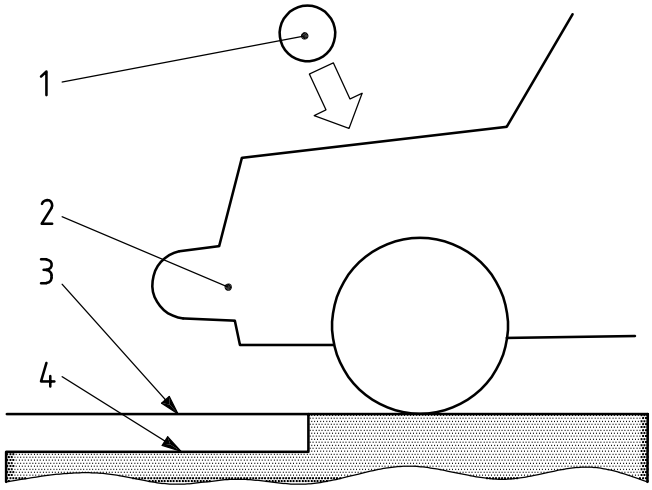
3 Terms and definitions

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

3.1
normal ride attitude
the vehicle attitude in driving order positioned on the ground, with the tires inflated to recommended pressures, the front wheels in the straight-ahead position, with maximum capacity of all fluids necessary for operation of the vehicle (with all standard as provided by the vehicle manufacturer), with one adult male 50th percentile dummy or an equivalent mass placed on the driver's seat and with one adult male 50th percentile dummy or an equivalent mass placed on the passenger's seat, and the suspension set in normal running conditions specified by the manufacturer (especially for vehicles with an active suspension or a device for automatic leveling)

3.2
ground reference plane
a horizontal plane, either real or imaginary, that passes through all tire contact points of a vehicle while the vehicle is in its normal ride attitude (see Figure 1)

NOTE If the vehicle is resting on the ground, then the ground plane and the ground reference plane are one and the same. If the vehicle is raised off the ground such as to allow extra clearance below the bumper, then the ground reference plane is above the ground plane.



Key

1 impactor
2 vehicle
3 ground reference plane
4 ground

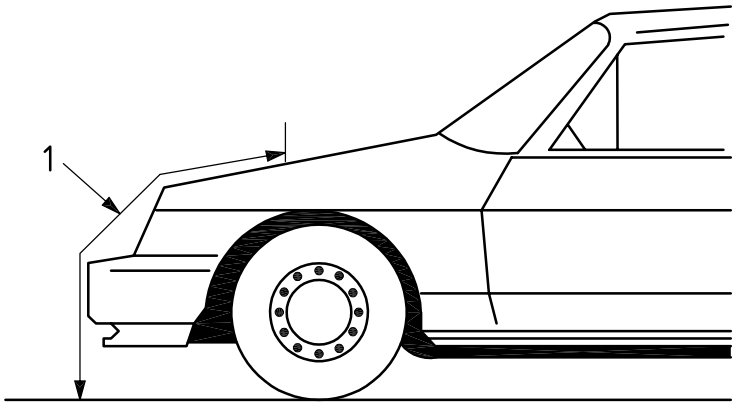
Figure 1 — Configuration of ISO head impact test method

3.3
bonnet top
the outer structure that includes the upper surfaces of the bonnet (hood) and of the wings (outer fenders), the scuttle (cowl top) and the lower edge of the windscreen

3.4
wrap around distance
the geometric trace described on the top of the bonnet by one end of a long flexible tape, the other end held in contact with the ground reference plane when it is held in a vertical fore and aft plane of the vehicle and traversed across the front of the bonnet and bumper of the vehicle, when it is in the normal ride attitude (see Figure 2)

NOTE The tape is held taught throughout the operation with one end held in contact with the ground reference plane, vertically below the front face of the bumper and the other end held in contact with the bonnet top. The length of the tape is the same as values of wrap around distance required in 5.2.

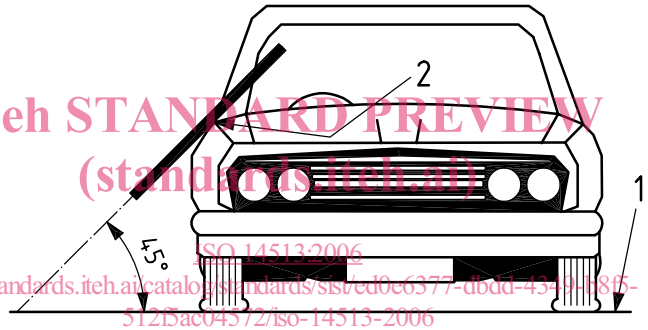
3.5
bonnet side reference line
the geometric trace of the highest points of contact between a straight edge and the side of a bonnet, when the straight edge, held parallel to the lateral vertical plane of the vehicle and inclined inwards at 45° is traversed down the side of the bonnet, while maintaining contact with the surface of the body shell (see Figure 3)



Key

1 wrap around distance

Figure 2 — Determination of wrap around distance



Key

1 straight line reference

2 bonnet side reference line

Figure 3 — Determination of bonnet side reference line

3.6
head injury criterion
HIC
a calculated value describing the injury risk to pedestrian head colliding with a vehicle, and calculated from the head resultant acceleration time history

4 Test equipment

4.1 Impact test site

The test shall be conducted on a flat, smooth and hard surface with a slope not exceeding 1 %.

4.2 Head form impactor

Head form impactor described in Clause 5 shall be used in this test method.