INTERNATIONAL STANDARD

ISO 4513

Third edition
2010-05-15

Road vehicles — Visibility — Method for establishment of eyellipses for driver's eye location

Véhicules routiers — Visibilité — Méthode de détermination des ellipses oculaires correspondant à l'emplacement des yeux des conducteurs

Reference number
ISO 4513:2010(E)

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Published in Switzerland

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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 4513 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 17, *Visibility*.

This third edition cancels and replaces the second edition (ISO 4513:2003), which has been technically revised.

Introduction

This International Standard describes the eyellipse, a statistical representation of driver eye locations, which is used to facilitate design and evaluation of vision in motor vehicles. Examples of eyellipse applications include rearview mirror size and placement, wiped and defrosted areas, pillar size and location, and general exterior field of view. These applications are covered in other SAE and ISO practices.

This revision of the eyellipse is the most significant update to ISO 4513 since its inception. The eyellipses differ from the previous eyellipses in the following ways:

a) the axis angles in plan view and rear view are parallel to vehicle grid;

b) the side view X-axis angle is tipped down more at the front;

c) for the 95th percentile eyellipse (99th shown in parentheses):

    1) the X-axis length is 7,5 (18,9) mm longer,

    2) the Y-axis is 44,6 (63,6) mm shorter,

    3) the Z-axis is 7,4 (10,1) mm longer;

d) the centroid location is generally higher and more rearward;

e) the centroid location in side view is a function of packaging geometry (SgRP, steering wheel location, seat cushion angle, and the presence or absence of a clutch pedal);

f) the eyellipse is no longer positioned according to the driver's torso angle;

g) the eyellipse for seat tracks shorter than 133 mm in length has an X-axis length unchanged from ISO 4513:2003. The Y- and Z-axis lengths, and the centroid location, are based on the new values and equations given in this International Standard;

h) neck pivot (P) and eye (E) points are based on the previous plan view sight lines to rearview mirrors and A-pillars, but are adjusted to the shape and location of the new eyellipses.

New additions, incorporated as annexes, are summarized as follows.

a) Fixed seat eyellipses for an adult user population at a 50/50 gender mix and 95th and 99th percentile tangent cut-offs are described (see Annex B). Fixed seat eyellipses and their locating equations given in Annexes B and C are based on data for second row passenger eye locations presented by UMTRI. In addition, a procedure is provided in Annex B for locating an eyellipse in a second row seat that has adjustable seat track travel or adjustable back angle.

b) A procedure is given for calculating adjustable and fixed seat eyellipses for any user population stature and gender mix at selected percentile tangent cut-offs (see Annexes A and C).

    Tables providing comparisons between tangent cut-off eyellipses and inclusive eyellipses are given. An inclusive eyellipse can be constructed using these tables (see Annex D).

Eyellipses for Class B vehicles are unchanged from ISO 4513:2003 (see Annex E).

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1 Scope

This International Standard establishes the location of drivers' eyes inside a vehicle. Elliptical (eyellipse) models in three dimensions are used to represent tangent cut-off percentiles of driver eye locations. Procedures are provided to construct 95th and 99th percentile tangent cut-off eyellipses for a 50/50 gender mix, adult user population.

Neck pivot (P) points are defined to establish specific left and right eye points for direct and indirect viewing tasks described in SAE J1050. These P points are defined only for adjustable seat eyellipses.

This International Standard applies to Class A vehicles (passenger cars, multipurpose passenger vehicles and light trucks) as defined in SAE J1100. It also applies to Class B vehicles (heavy trucks).

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 6549, *Road vehicles — Procedure for H- and R-point determination*

SAE J1100, *Motor Vehicle Dimensions*

3 Terms and definitions

For the purposes of this document, the following terms given in ISO 6549 apply:

a) H-point;

b) seating reference point, SgRP.

For the purposes of this document the following terms given in SAE J1100 apply:

1) ball of foot reference point (BOFRP);

2) accelerator heel point (AHP);

NOTE For applications using the H-point machine described in ISO 6549, the term “operator heel point” is used instead of “accelerator heel point”.

3) Class A and Class B vehicles;

4) H-point travel path, TL23, TH21;

5) A19 — Seat track rise;