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**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*



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 35, *Lighting and visibility*.

This fourth edition cancels and replaces the third edition (ISO 4513:2010), which has been technically revised.

The main changes are as follows:

- added references to the annexes;
- the variables have been modified;
- editorial changes.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document 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 document;
- h) neck pivot (P) and eye (E) points are based on the previous plan view sight lines to rear-view 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 formulae 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](#)).

For historical background of ISO 4513 see [Annex F](#).



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

## 1 Scope

This document 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's 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 document 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 terms and definitions given in ISO 6549, SAE J1100 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1 eyellipse

contraction of the words “eye” and “ellipse” used to describe the statistical distribution of eye locations in a three-dimensional space located relative to defined vehicle interior reference points

Note 1 to entry: See [Figure 1](#).