INTERNATIONAL STANDARD

ISO 4040

Fifth edition
2009-02-01

Road vehicles — Location of hand controls, indicators and tell-tales in motor vehicles

Véhicules routiers — Emplacement des commandes manuelles, des indicateurs et des témoins sur les véhicules à moteur

Reference number
ISO 4040:2009(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

COPYRIGHT PROTECTED DOCUMENT

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

Published in Switzerland

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 4040 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 13, *Ergonomics applicable to road vehicles*.

This fifth edition cancels and replaces the fourth edition (ISO 4040:2001), which has been technically revised.

Introduction

There is a recognized potential for errors in the selection of controls essential to the safe operation of a vehicle if these controls are not found in similar locations in all vehicles. The standardization of these control locations is therefore considered to be a logical and beneficial design objective, especially in view of the fact that drivers have more and more opportunities to use a variety of vehicles.

Road vehicles — Location of hand controls, indicators and tell-tales in motor vehicles

1 Scope

This International Standard specifies the location of controls in motor vehicles by subdividing the space within reach of drivers into specific zones, to which certain controls essential to the safe operation of vehicles are assigned. It also specifies certain combinations of functions for multifunction controls and the degree to which certain indicators and tell-tales are to be visible.

This International Standard is applicable to hand-operated controls, to indicators and to tell-tales in all motor vehicles, excluding motorcycles and mopeds, as defined in ISO 3833.

NOTE A specification for a control indicator or tell-tale does not imply that the item needs to be fitted.

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 2575, *Road vehicles — Symbols for controls, indicators and tell-tales*

ISO 3958, *Passenger cars — Driver hand-control reach*

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

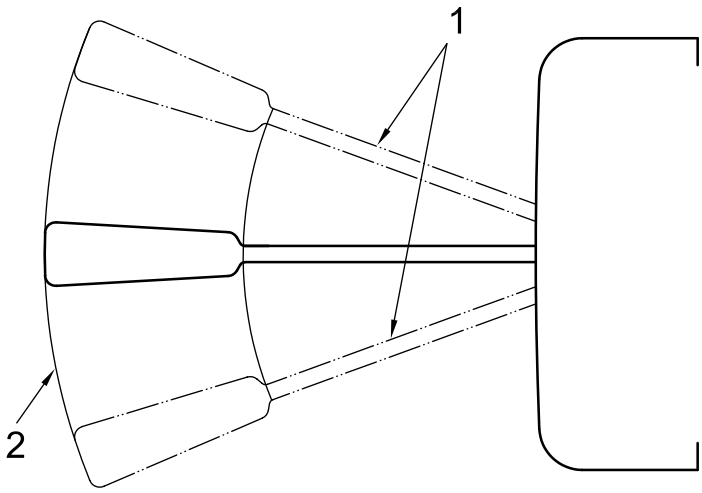
3 Terms and definitions

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

3.1
reference plane
vertical plane parallel to the longitudinal axis of the motor vehicle, passing through the steering wheel axis and within a zone 50 mm to either side of the centre of the designated seating position for the driver at the R-point as defined in ISO 6549

3.2
operational area of control
area swept by those parts of a control activated by the hand while the possible modes or positions are selected in the manner intended by the designer

EXAMPLE See Figure 1.



Key

1 extreme location of the control

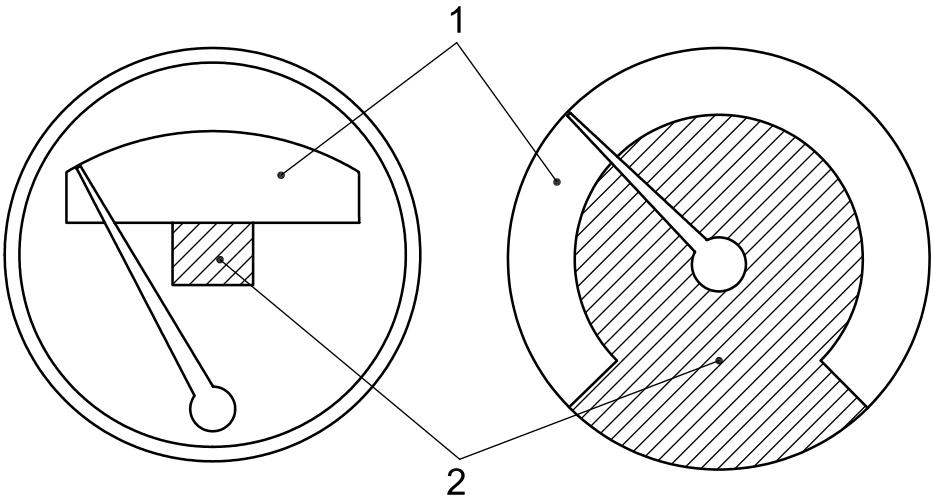
2 operational area of the control

Figure 1 — Example of operational area of a control

3.3
display area of indicator or tell-tale
area including the identification of the quantity displayed and those portions required to determine its level at any point within the usable capacity of the instrumentation

EXAMPLE See Figure 2.

NOTE It need not include, for example, bezels or the manufacturer's type number.



Key

1 display area used by pointer

2 display area for other information

Figure 2 — Example of display area of indicators

3.4
steering-wheel plane
plane tangential to the upper surface of the steering-wheel rim in the design condition, as designated by the vehicle manufacturer, and with the vehicle wheels in the straight-ahead position

3.5
steering-wheel axis
line at right angles to the steering-wheel plane, passing through the centre of rotation of the steering-wheel rim

3.6
zone 1
volume to the left of the reference plane bounded by the following surfaces:

— a plane parallel to the steering-wheel plane and 20 mm above it;

— a plane parallel to the steering-wheel plane and 170 mm below it;

— a cylinder extending 100 mm beyond the periphery of the steering-wheel rim whose axis is on the steering-wheel axis;

— a cylinder lying 130 mm inside the periphery of the steering-wheel rim whose axis is on the steering-wheel axis;

— two planes intersecting along the steering-wheel axis, at 40° and 130° from the reference plane

NOTE See Figure 3.

3.7
zone 2
volume bounded by the following surfaces:

— a plane parallel to the steering-wheel plane and 20 mm above it;

— a plane parallel to the steering-wheel plane and 170 mm below it;

— a cylinder of 50 mm radius whose axis is on the steering-wheel axis

NOTE See Figure 3.

3.8
zone 3
volume to the right of the reference plane bounded by the following surfaces:

— a plane parallel to the steering-wheel plane and 20 mm above it;

— a plane parallel to the steering-wheel plane and 170 mm below it;

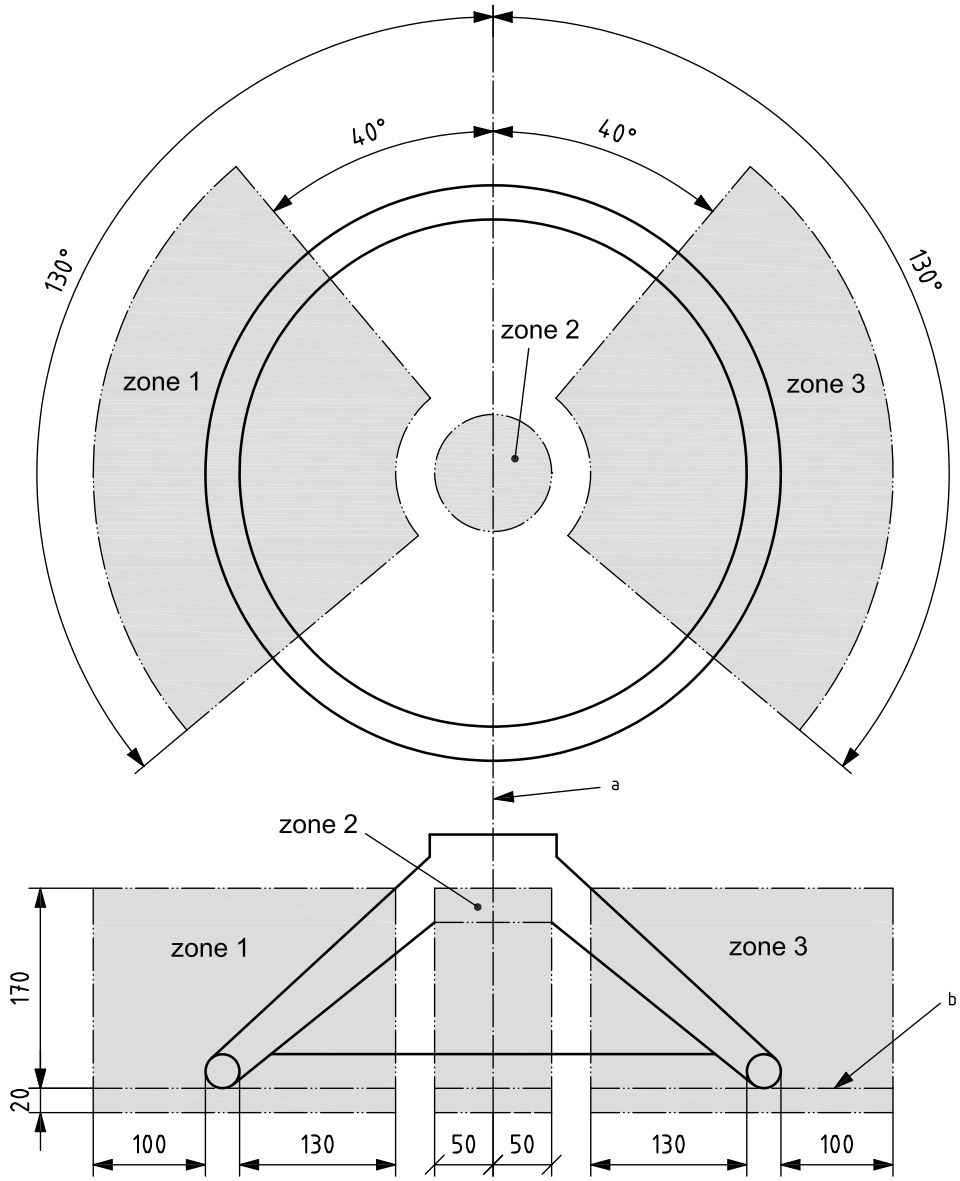
— a cylinder extending 100 mm beyond the periphery of the steering-wheel rim whose axis is on the steering-wheel axis;

— a cylinder lying 130 mm inside the periphery of the steering-wheel rim whose axis is on the steering-wheel axis;

— two planes intersecting along the steering-wheel axis at 40° and 130° from the reference plane

NOTE See Figure 3.

Dimensions in millimetres



a Steering-wheel axis.

b Steering-wheel plane.

Figure 3 — Location of zones

3.9
visible
seen with either eye, not necessarily with both eyes simultaneously, from all positions within the 95th percentile eyellipses, with the gear selector in top gear or drive position and the steering wheel in the straight-ahead position adjusted in accordance with the manufacturer's specification

NOTE See ISO 4513.

3.10
head movement
movement required to overcome a geometric obstruction

NOTE For the purposes of this International Standard, this does not include movement when the target is more than 30° from the line of sight.

3.11
identification
symbol in accordance with ISO 2575, written label or some portion of the pointer and scale by which a driver can distinguish the characteristic displayed by the control, indicator or tell-tale

3.12
passive restraint readiness indicator
tell-tale or indicator indicating a malfunction that will prevent or impede the operation of a passive restraint in the designed manner, or indicating that the passive restraint is disabled

3.13
stalk control
rigid, elongated control device with a visible length at least five times as great as the smallest cross-sectional dimension

NOTE This device can be fixed or movable and located on the steering column or instrument panel. The operational area is located within reach of the driver (see 4.1 and ISO 3958).

3.14
operational surface
area on the control surface for the user to grasp or touch in order to activate the controlled function

3.15
secondary operational surface
operational surface mounted on, and external to, another operational surface

NOTE This does not include buttons on the end of a stalk control (see Figure 4).

4 Requirements for location of controls

4.1 For passenger cars, the controls listed in 4.2 to 4.9 shall be located within the restrained reach of drivers as defined in ISO 3958.

For commercial vehicles and buses, these controls shall be located within reach of drivers wearing a lap belt, with unrestrained reach as defined in ISO 3958.

4.2 The operational areas of the following controls shall be located in zone 1:

— head lamp beam switching (high beam, main beam to low beam, dipped beam);

— head lamp optical warning (momentary high beam warning);

— turn signals (see 4.7).

4.3 The operational area of the master lighting control shall be located:

— to the left of the reference plane for left-hand drive vehicles, or

— to the right of the reference plane, if panel mounted, for right-hand drive vehicles.

4.4 A portion of the operational area of a control for the audible warning (horn) shall be located either in zone 1 or zone 2.

Additional audible warning controls may be located elsewhere, or may have operational areas extending beyond these zones.

4.5 The operational area of the hand-operated parking brake shall be located:

— to the right of the reference plane for left-hand drive vehicles, or

— to the left of the reference plane for right-hand drive vehicles.

If space is needed, the hand-operated parking brake may be located to the left of the reference plane for left-hand drive vehicles, or to the right of the reference plane for right-hand drive vehicles.

4.6 The windscreen washer and wiper control may be located on either side of the reference plane. If there are two or more stalks in zone 3 (other than the gear selector), the windscreen washer and wiper shall be controlled by that stalk with an operational area closest to the steering-wheel rim (see 4.7).

4.7 It is strongly recommended that the requirements of 4.2 and 4.6 be applied to both left- and right-hand drive vehicles. However, some countries have a long-standing practice in right-hand drive vehicles of mirror-imaging (about the reference plane) the controls covered by those requirements. In those countries only, 4.2 and 4.6 may be applied to right-hand drive vehicles by substituting zone 3 for zone 1 in 4.2, and zone 1 for zone 3 in 4.6.

4.8 The rotary (e.g. key) ignition switch control shall be located to the right of the reference plane for left- and right-hand drive vehicles. For commercial vehicles and buses, the ignition switch control may be located outboard of the reference plane, so that it can be operated from outside the vehicle.

NOTE When starting the vehicle from outside, there are additional safety precautions to be considered.

4.9 All or part of the hazard warning control shall be located inboard of the reference plane. For commercial vehicles, the hazard warning control may be located outboard of the reference plane, so that it can be operated from outside the vehicle.

5 Requirements for combining functions into multifunction controls

5.1 The following pairs of functions shall be operated by the same control:

— windscreen wiping on/off and windscreen washing on/off (if power-operated);

— optical warning and headlight-beam switching.

5.2 The master light control shall not be operated by the same control as that of any of the following functions:

— audible warning;

— windscreen wiping;

— windscreen washing;

— turn signal direction indicator.

A combination of the master light (see Table 1) function with these functions is allowed, providing one of the modes to be avoided for the function is chosen for the master light function.

5.3 For commercial vehicles, the turn signal and retarder functions should not be operated by the same control.

6 Requirements for display visibility

6.1 The display area of any type of speedometer shall be visible without head movement (see example in Figure 2).

6.2 The identification and those parts of the display area required to indicate that 25 % or less of the maximum stored fuel is available shall be visible, without head movement, on the fuel level indicator (see Figure 2).

The remaining parts of the display area shall also be visible; however, for these, head movement is permitted.

6.3 The indication and those parts of the display area required to indicate a critical condition shall be visible without head movement for the following indicators:

— engine oil pressure;

— engine coolant temperature;

— air brake reservoir pressure indicator.

The remaining parts of the display area shall also be visible; however, for these, head movement is permitted.

6.4 The identification of the following indicators shall be visible without head movement, except for commercial vehicles and buses, for which head movement is permitted:

— battery charging condition;

— automatic transmission (if mounted on the instrument panel or steering column).

The remaining parts of the display area shall also be visible; however, for these, head movement is permitted.

6.5 The following tell-tales shall be visible without head movement, except for commercial vehicles and buses, for which head movement is permitted:

— brake;

— parking brake;

— high/main beam;

— turn signal direction indicator;

— seat-belt warning;

— passive restraint readiness indicator (driver only);

— engine oil pressure;

— engine coolant temperature;

— fuel level;

— battery charging;

— automatic transmission (if mounted on the instrument panel or steering column).

The other parts of the display area shall also be visible; however, for these, head movement is permitted.

6.6 If, for any of the following functions, there is a master tell-tale which meets the requirements of 6.5 and which is illuminated simultaneously with it, the individual tell-tale need not be visible without head movement:

— brake;

— passive restraint readiness indicator(s);

— engine oil pressure;

— engine coolant temperature;

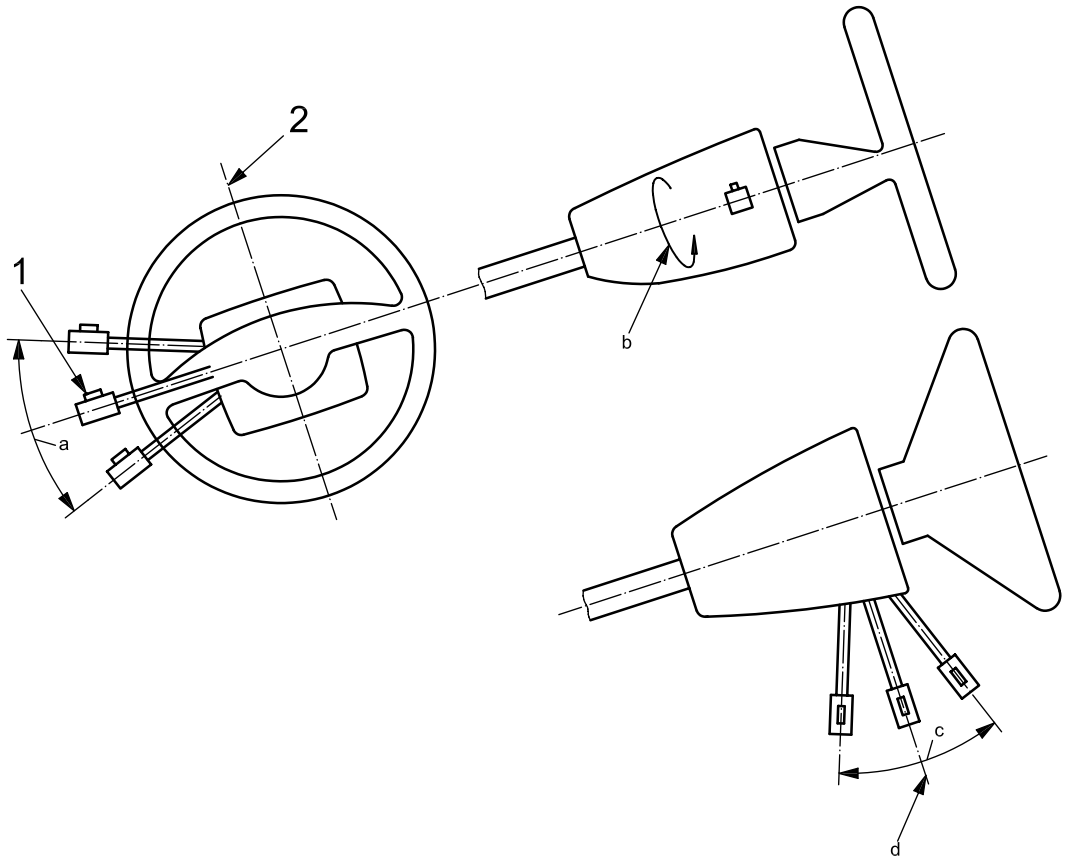
— battery charging;

— parking brake.

6.7 When both an indicator and a tell-tale are fitted, it is only necessary to comply with the specifications of one or other of 6.2, 6.3, 6.4 or 6.5 for each function.

7 Requirements for modes of operation for stalk controls

For those functions operated by stalk controls mounted on or near the steering column (see Figure 4), the preferred modes of operation and those to be avoided are given in Table 1.



Key

1 secondary operational surface

2 steering-wheel vertical centreline

a Approximately parallel to steering-wheel plane.

b Rotation approximately about axis of control.

c Approximately parallel to steering-wheel axis.

d Directed towards steering-wheel axis (push, includes buttons on end of control).

Figure 4 — Modes of operation for stalk controls

Table 1 — Modes of operation for stalk control functions

Function	Preferred Mode	Modes to be avoided	Secondary operational surfaces to be avoided
Master lighting switch	None	None	Secondary touch or proximity operational surfaces not protected from inadvertent operation (i.e. shielding, recessing, sequencing, etc.)
Headlight beam switching (high beam, main beam to low beam, dipped beam)	Approximately parallel to the steering-wheel axis	Directed towards the steering-wheel axis	All
Audible warning (horn)	None	Approximately parallel to the steering-wheel plane Rotation approximately about the axis of the control	All
Windscreen wiper	None	Approximately parallel to the steering-wheel axis Directed towards the steering-wheel axis NOTE These do not preclude the automatic operation of wipers when washers are activated.	Secondary touch or proximity operational surfaces not protected from inadvertent operation (i.e. shielding, recessing, sequencing, etc.) For ON/OFF only
Windscreen washer	Directed towards the steering-wheel axis or Approximately parallel to the steering-wheel axis	None	All
Direction indication (turn signals)	Approximately parallel to the steering-wheel plane	All others	All
Optical warning (momentary high beam warning)	Approximately parallel to the steering-wheel axis	Directed towards the steering-wheel axis Rotation approximately about the axis of the control	All

Bibliography

[1] ISO 3833, *Road vehicles — Types — Terms and definitions*

[2] ISO 4513, *Road vehicles — Visibility — Method for establishment of eyellipses for driver's eye location*

ICS 43.040.30

Price based on 10 pages