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Road vehicles — Coupling balls for caravans and light trailers — Dimensions

Véhicules routiers — Boules d'attelage pour caravanes et remorques légères — Caractéristiques dimensionnelles

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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

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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 1103 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 4, *Caravans and light trailers*.

This fourth edition cancels and replaces the third edition (ISO 1103:1996), which has been technically revised.

Road vehicles — Coupling balls for caravans and light trailers — Dimensions

1 Scope

This International Standard lays down the dimensions necessary for the compatibility of mechanical coupling devices between light trailers or caravans and towing vehicles, when the latter are fitted with a coupling ball. The clearance space around the coupling ball is intended to allow coupling and decoupling of towed vehicles, as well as safe operation during coupling and uncoupling of mechanical devices.

This International Standard applies to coupling balls designed to couple caravans and light trailers of categories O_1 and O_2 [1)] to vehicles of categories M or N. It does not necessarily apply to special trailers drawn by special vehicles.

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 1176:1990, *Road vehicles — Masses — Vocabulary and codes*

ISO 1302:2002, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 3853:1994, *Road vehicles — Towing vehicle coupling device to tow caravans or light trailers — Mechanical strength test*

UN-ECE Regulation No.26, *Uniform provisions concerning the approval of vehicles with regard to their external projections*

UN-ECE Regulation No.55, Revision 1:2001, *Uniform provisions concerning the approval of mechanical couplings components of combinations of vehicles*

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1) Definitions from UN-ECE Regulation No.13, incorporating the 06 series of amendments:

— Category O_1: Single-axle trailers, other than semi-trailers, with a maximum mass not exceeding 0,75 t;

— Category O_2: Trailers with a maximum mass not exceeding 3,5 t other than trailers of category O_1;

— Category M: Motor vehicles with at least 4 wheels designed and made for the transport of passengers;

— Category N: Motor vehicles with at least 4 wheels designed and made for the carriage of goods.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1176 and ISO 3853 and the following terms and definitions apply.

3.1
coupling ball
ball composed of two parts, a spherical surface and a cylindrical surface, which can be one-piece or assembled

3.2
spherical surface
portion of the sphere whose upper and lower parts are limited by two horizontal planes that intersect the sphere, forming circular upper and lower surfaces

3.3
cylindrical surface
part of the cylinder delimited on its upper extremity by a radius that connects to the spherical surface, and on its lower part by a horizontal plane, forming a circular surface

3.4
kerb mass
mass of the vehicle when it is loaded under loading conditions indicated in ISO 1176:1990, 4.6

NOTE The loading condition indicated in ISO 1176 includes the mass of the equipment designed by the manufacturer and the spare wheel.

3.5
design mass
kerb load increased by the mass of passengers (taking 68 kg per passenger) and the mass of luggage in the boot (taking 7 kg per passenger)

4 Recommendations

4.1 Load conditions — Distribution of the design load

Loading condition and load distribution shall be in accordance with UN-ECE Regulation No.55, Revision 1:2001, Annex 7, Appendix 1.

In the case of M1 category vehicles, the vehicle mass at which the positioning of the ball shall be measured shall be either the maximum permissible mass distributed between the axles, as declared by the towing vehicle manufacturer, or the kerb mass, as defined in 3.4, plus:

a) two masses, each of 68 kg, positioned in the outer seating position of each row of seats, with the seats in the rearmost adjustable position for normal driving and travel, and with the masses located:

   — for original equipment, coupling devices and components submitted for approval by the towing vehicle manufacturer, approximately at a point located at 100 mm in front of the “R” point for adjustable seats and 50 mm in front of the “R” point for other seats, the “R” point being determined according to UN-ECE Regulation No.14, Revision 4:2006, paragraph 5.1.1.2, or

   — for coupling devices and components submitted for approval by an independent manufacturer and intended for replacement market fitting, approximately at the position of a seated person;

b) in addition, for each mass of 68 kg, an additional mass of 7 kg allowance for personal luggage shall be distributed evenly in the luggage area of the vehicle.

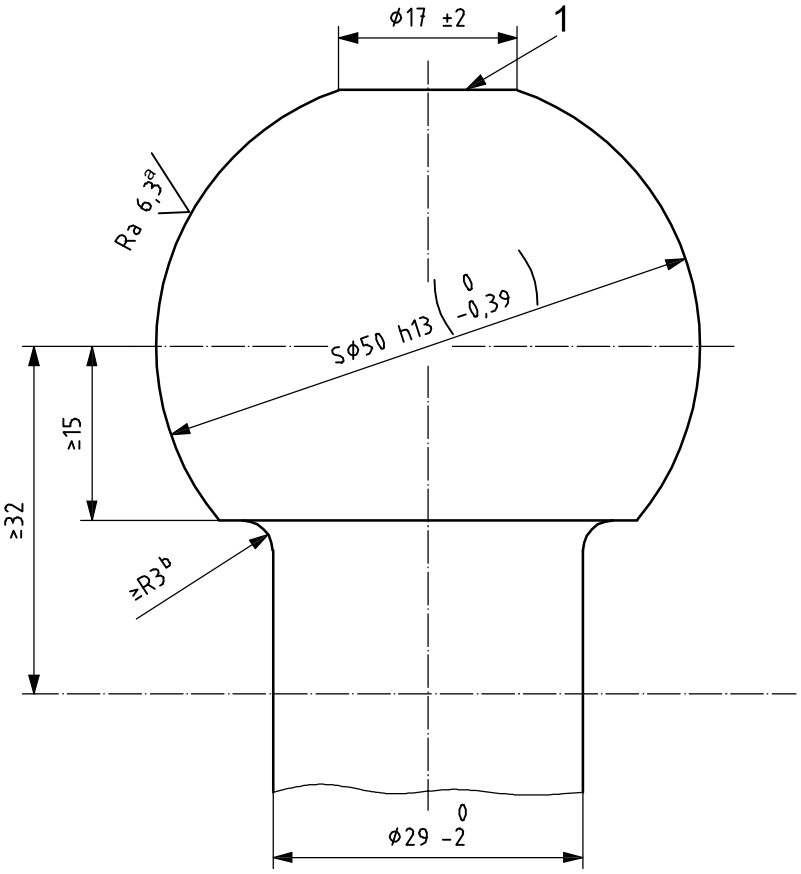
In the case of N1 category vehicles, the towing vehicle mass at which this height shall be measured shall be the maximum permissible mass, distributed between axles as declared by the towing vehicle manufacturer.

4.2 Dimensional characteristics

4.2.1 General

The dimensions of the coupling ball shall comply with those specified in Figure 1 and the requirements in 4.2.2 and 4.2.3, including those related to using conditions.

Dimensions in millimetres
Surface roughness in micrometres



Key

1 ISO mark

a Corresponds to the class of roughness N 9, as stipulated in ISO 1302:2002.

b Not necessary if the ball is in two parts.

Figure 1 — Dimensions of the coupling ball

4.2.2 Flat circular surface

The connecting radius between the spherical surface and the cylindrical surface shall be tangential both to the cylindrical surface and to the horizontal lower surface of the ball, as defined in 3.1.

The spherical surfaces, as defined in 3.2, can be circular rings when the ball is composed of two assembled parts.

4.2.3 Ball neck

The diameter of the neck of the ball shall be between 27 mm and 29 mm, down to a horizontal plane situated at not less than 32 mm below the centre of the sphere.

4.3 Installation dimensions

4.3.1 Positioning

The axis of the ball neck passes through the centre of the ball and shall be vertical down to a horizontal plane located not less than 32 mm below the centre of the ball.

The theoretical geometric position of the ball centre defined by the towing device manufacturer shall be situated in a 5 mm radius sphere. The centre of this sphere is defined by the vehicle manufacturer or bodybuilder in relation to the fixing point of the towing device. Further information is given in ISO 3853:1994, 7.2.

The centre of the sphere shall be located at a distance from the ground between 350 mm and 420 mm when it complies with the method described in Clause 5, except for N2, N3 and off road[2)] vehicles.

4.3.2 Clearance space around the coupling ball

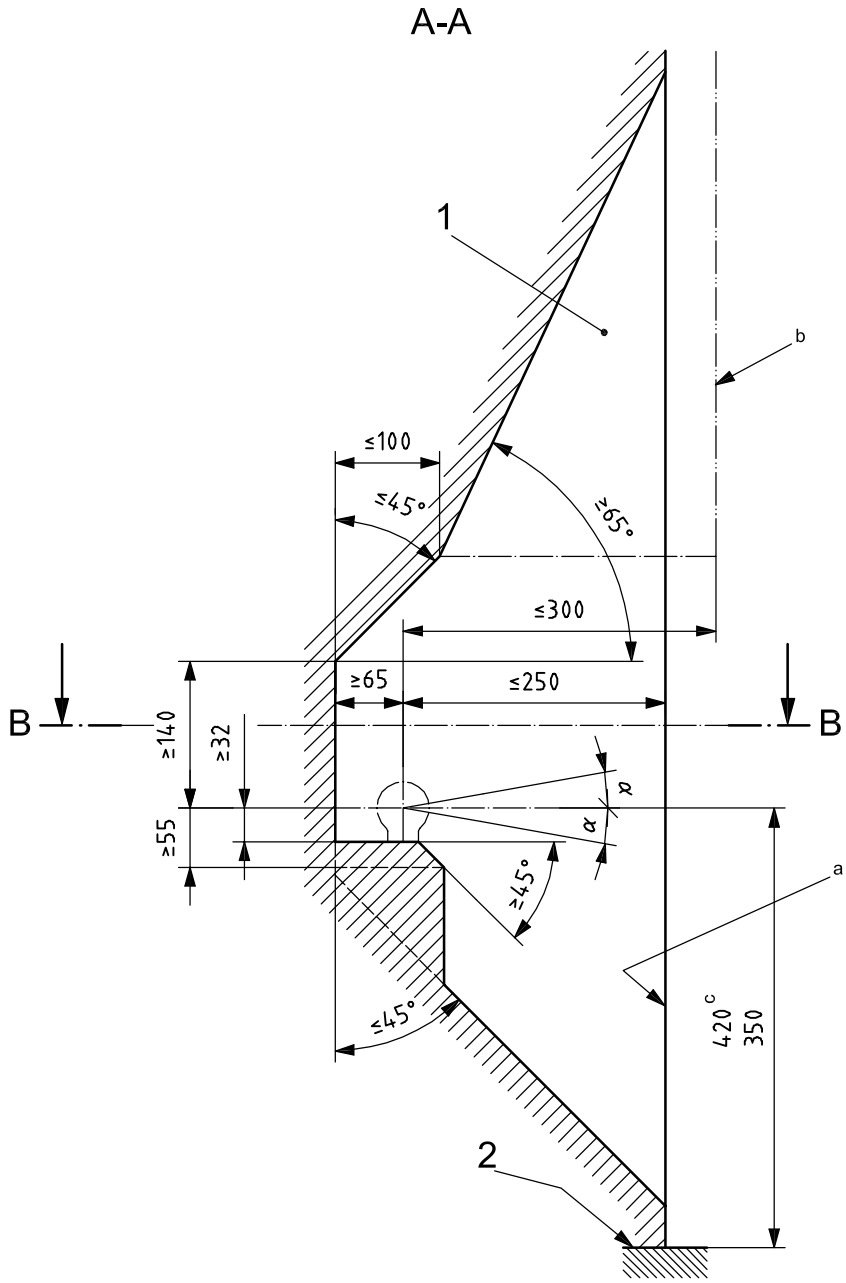
a) The clearance space to be maintained around the coupling ball shall be as indicated in Figure 2. This clearance space is provided to allow normal coupling and uncoupling operations with angles $\alpha < 10°$ and $\beta < 60°$. It shall be possible to handle the coupling head or any device adaptable to the ball in the clearance space defined in Figures 2 a) and 2 b). This clearance space enables displacements of the coupling head up to $\alpha = 25°$ and $\beta = 60°$.

b) The clearance space may be occupied by removable equipment, such as a spare wheel. It is recommended that such equipment be mounted to one side of the coupling, to allow adequate access and reduce the risk of (hand) injuries to users during coupling and uncoupling.

c) When a trailer is not coupled to the towing vehicle, the mounted towing bracket and coupling ball shall not obscure the mounting space provided for the rear registration plate, nor affect the visibility of the rear registration plate of the towing vehicle. If coupling balls or other items do obscure the registration plate, they shall be removable or repositionable without the use of tools, except for example an easily operated (i.e. an effort not exceeding 20 Nm) release key which is carried in the vehicle. When such parts are dismantled, the parts of the coupling device that are still mounted on the vehicle shall comply with UN-ECE Regulation No.26, dealing with exterior edges.

2) Category G, as defined in UN-ECE Regulation No.03.

Dimensions in millimetres



Key

1 clearance space

2 ground

α displacement of coupling head

a Vertical plane limited by height and width of vehicle.

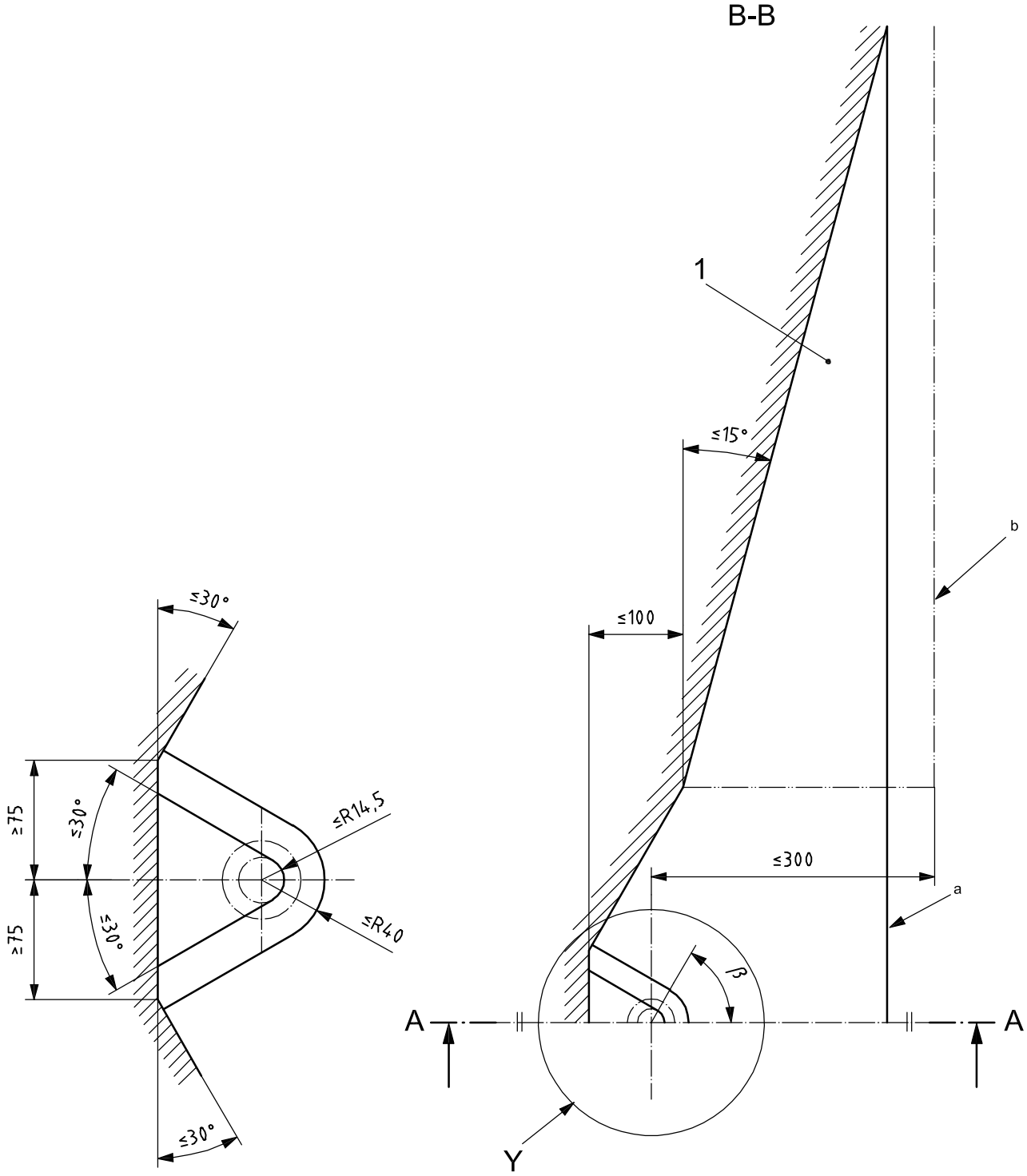
b See 4.3.2.

c See 4.3.1.

a) Profile view (section AA)

Figure 2 (*continued*)

Dimensions in millimetres



Key

1 clearance space

β displacement of coupling head

a Vertical plane limited by height and width of vehicle.

b See 4.3.2.

b) View from above (section BB)

Figure 2 — Clearance space around the coupling ball

5 Checking procedure for the positioning of the ball

The procedure described below shall be used to check the distance between the centre of the sphere and the ground specified in 4.3.1.

a) The vehicle shall be at rest on a horizontal flat and rigid surface.

b) The steered wheels shall be parallel to the longitudinal median plane of the vehicle.

c) The pressure of the tyres shall be adjusted to the pressure recommended by the manufacturer for the specified loading condition.

d) The load of the vehicle shall conform to the load specified in 4.1.

e) The brakes shall not be run and the transmission shall be in the neutral position, or in “N” or “P” positions for the vehicles equipped with an automatic or semi-automatic transmission.

f) The vehicles equipped with hydro pneumatic, hydraulic or pneumatic suspension or a device for automatic adjustment according to the load shall be tested in the conditions specified by the manufacturer.

6 Marking

Coupling balls complying with the requirements of this International Standard shall have the marking “ISO 50” applied on the flat circular surface of diameter (17 ± 2) mm, as defined in Figure 1. This marking only implies dimensional conformity with Figure 1.

If necessary, this marking may be complemented by a marking ensuring traceability and by the marking prescribed in ISO 3853.

Coupling balls which do not conform totally to this International Standard shall have the marking indicating the diameter of the spherical surface.

Bibliography

[1] ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

[2] ISO 2958, *Road vehicles — Exterior protection for passenger cars*

[3] UN-ECE Regulation No.03, *Uniform provisions concerning the approval of retro-reflecting devices for power-driven vehicles and their trailers*

[4] UN-ECE Regulation No.13, *Uniform provisions concerning the approval of vehicles with regard to braking, incorporating the 06 series of amendments*

[5] UN-ECE Regulation No.14, Revision 4:2006, *Uniform provisions concerning the approval of vehicles with regard to safety-belt anchorages, ISOFIX anchorages systems and ISOFIX top tether anchorages*

[6] UN-ECE Regulation No.23, Revision 2:2003, *Uniform provisions concerning the approval of reversing lamps for power-driven vehicles and their trailers*

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