
Agricultural vehicles — Mechanical connections between towed and towing vehicles — Dimensions of ball coupling device (80 mm)

Véhicules agricoles — Liaisons mécaniques entre véhicules remorqueurs et véhicules remorqués — Dimensions des dispositifs d'attelage à boule (80 mm)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: 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.

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).

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).

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.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 4, *Tractors*.

This second edition cancels and replaces the first edition (ISO 24347:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

- [Clause 3](#) “Terms and definitions” has been added and subsequent clauses have been renumbered;
- the requirements for location of the ball coupling device have been modified;
- the specifications for maximum vertical downward loads depending on the horizontal position of the ball coupling device has been added.

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.

Introduction

The aim of this document is to ensure the interchangeability of the mechanical connections on agricultural towing vehicles.

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Agricultural vehicles — Mechanical connections between towed and towing vehicles — Dimensions of ball coupling device (80 mm)

1 Scope

This document specifies the dimensional requirements and location for a ball coupling device of 80 mm nominal diameter, whose male part is fitted to an agricultural towing vehicle and female part is fitted to a towed, non-balanced vehicle which provides mechanical connection between the two vehicles. It defines vertical loading for different positions.

This document specifies a ball coupling device with either a horizontal adjustable version, or a close position version.

2 Normative reference(s)

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 500-1, *Agricultural tractors — Rear-mounted power take-off types 1, 2, 3 and 4 — Part 1: General specifications, safety requirements, dimensions for master shield and clearance zone*

ISO 500-2, *Agricultural tractors — Rear-mounted power take-off types 1, 2 and 3 — Part 2: Narrow-track tractors, dimensions for master shield and clearance zone*

ISO 5673-2, *Agricultural tractors and machinery — Power take-off drive shafts and power input connection — Part 2: Specifications for use of PTO drive shafts, and position and clearance of PTO drive line and PIC for various attachments*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1

upper location

ball coupling device location above the tractor PTO

3.2

lower location

ball coupling device location below the tractor PTO

3.3

position

horizontal distance from the centre of the ball to the end of the tractor PTO

4 Dimensions and marking

4.1 Dimensions

4.1.1 The ball coupling device shall be in accordance with [Figures 1](#) and [2](#).

Dimensions in millimetres

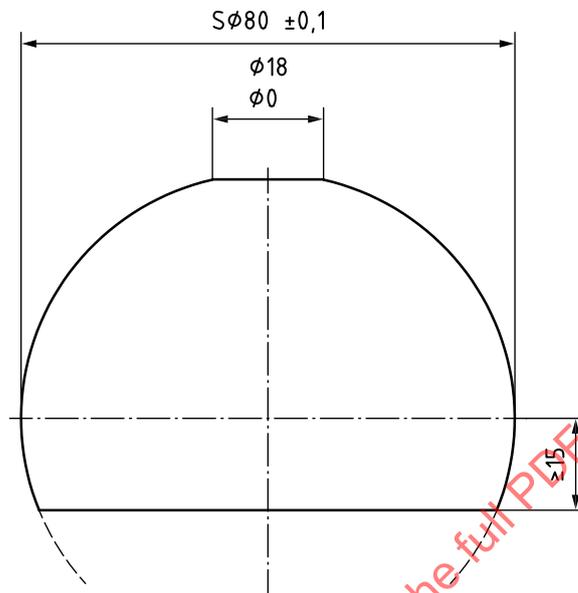
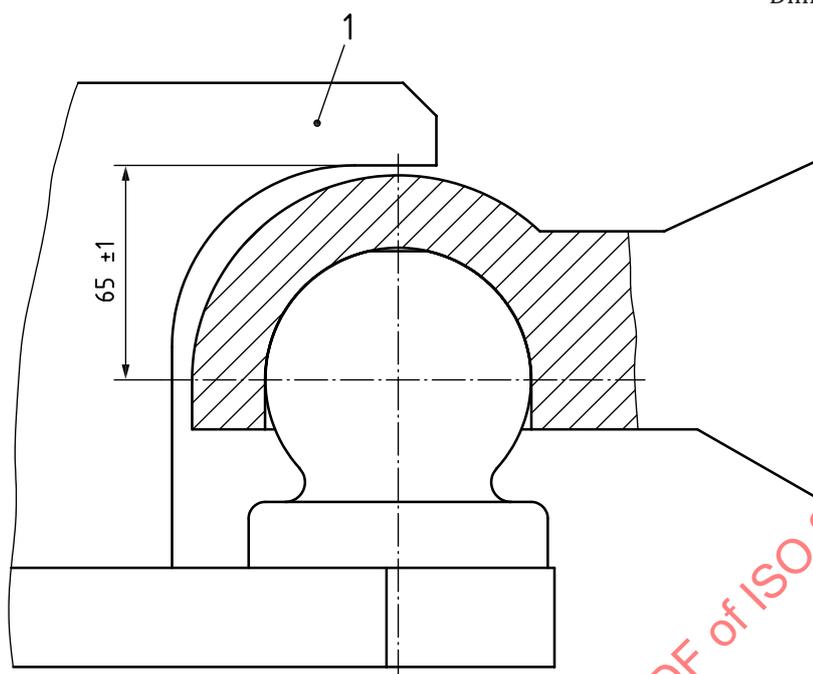


Figure 1 — Ball dimensions

**Key**

- 1 keeper shape optional

Figure 3 — Vertical location of keeper

4.1.2 The minimum clearance zone for the keeper is defined by the required movement of the ball coupling trailer shank according to 4.1.4 and the dimensioning of the ball coupling trailer shank as shown in Figure 2. It shall be considered in all rotational degrees of freedom. Figure 4 is only applicable for the close position version.

Dimensions in millimetres

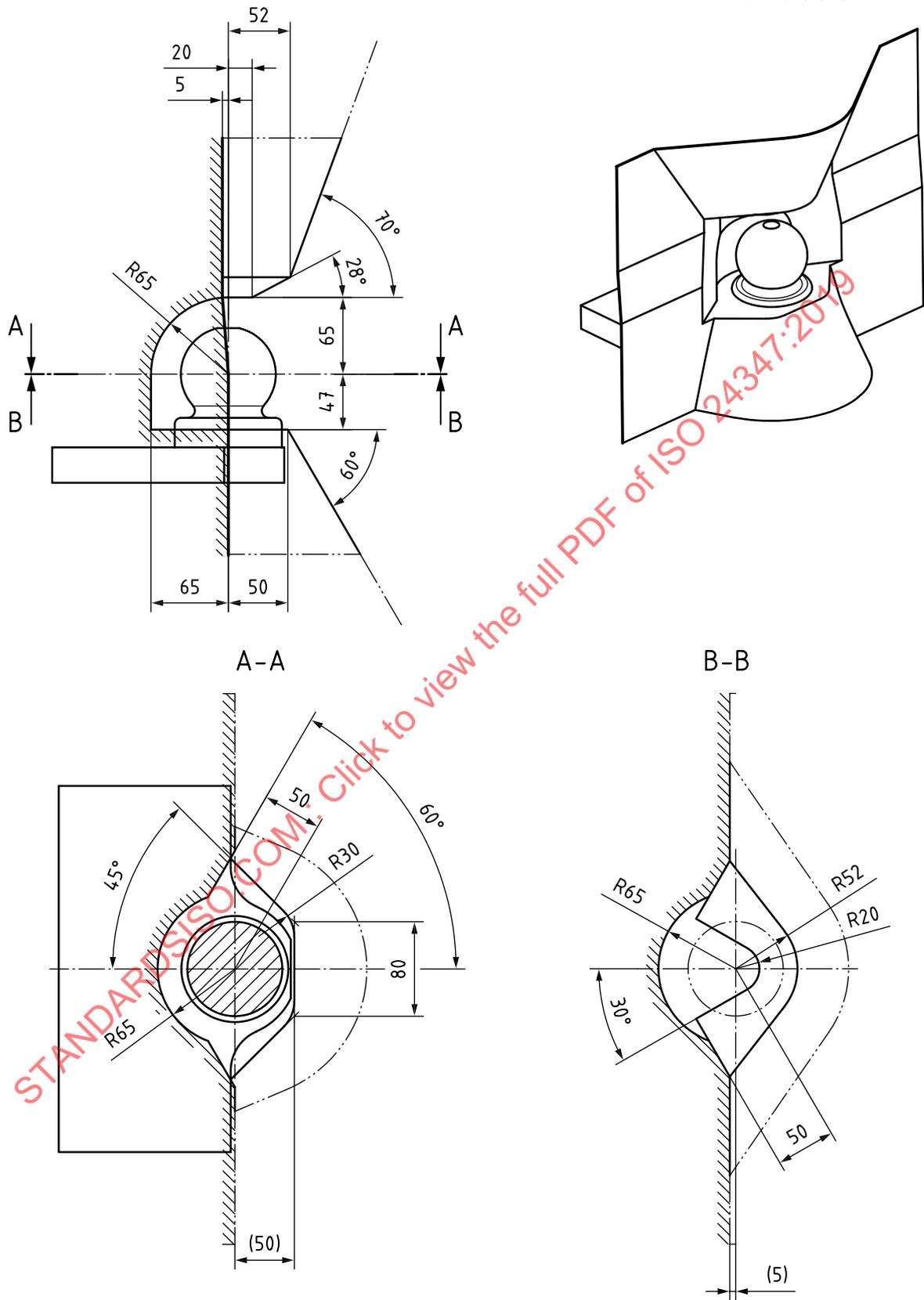


Figure 4 — Minimum clearance zone for ball coupling device (only applicable for close position version)

4.1.3 The manufacturer of the ball coupling device is responsible for both the design and the manufacturing quality of the ball coupling device such that unintentional uncoupling of the female part from the male part when subjected to the maximum design load shall be prevented. The distance between the keeper and ball centre is specified as (65 ± 1) mm (see [Figure 3](#)). For wear compensation, the keeper shall be adjustable.

4.1.4 When the specified ball coupling trailer shank is fixed to the towing vehicle attachment, the ball coupling trailer shank shall be free to turn so that the angles formed with the horizontal axis situated in the towing vehicle's longitudinal plane of symmetry and passing through the coupling centre point have the following minimum values which do not have to be reached simultaneously (see [Figure 5](#) and [Table 1](#)).

Table 1 — Minimum angles for different positions

Dimensions in degrees (°)

Angle	Close position version	Horizontal adjustable version		
		Short position	Regular position	Extended position
Angle of yaw (A)	≥ 60	≥ 60	≥ 90	≥ 90
Angle of pitch (B)	$\geq 20^{a,b}$	$\geq 20^{a,b}$	$\geq 20^{a,b}$	$\geq 20^{a,b}$
Angle of roll (C)	$\geq 20^a$	$\geq 20^a$	$\geq 20^a$	$\geq 20^a$
^a For achievement of an improved articulation an angle of 30° is recommended.				
^b Allowance should be made for the towing vehicle being up to $\pm 3^\circ$ from the horizontal, due to the front or rear tyre sizes.				

4.1.5 The yaw requirements, as shown in [Figure 4](#), [Table 1](#) and [Figure 5](#), may be exceeded when smaller tyres and/or wide track settings are used on the towing vehicle. A decal on the tractor and the tractor operator's manual should inform of this possibility, which could result in interference.

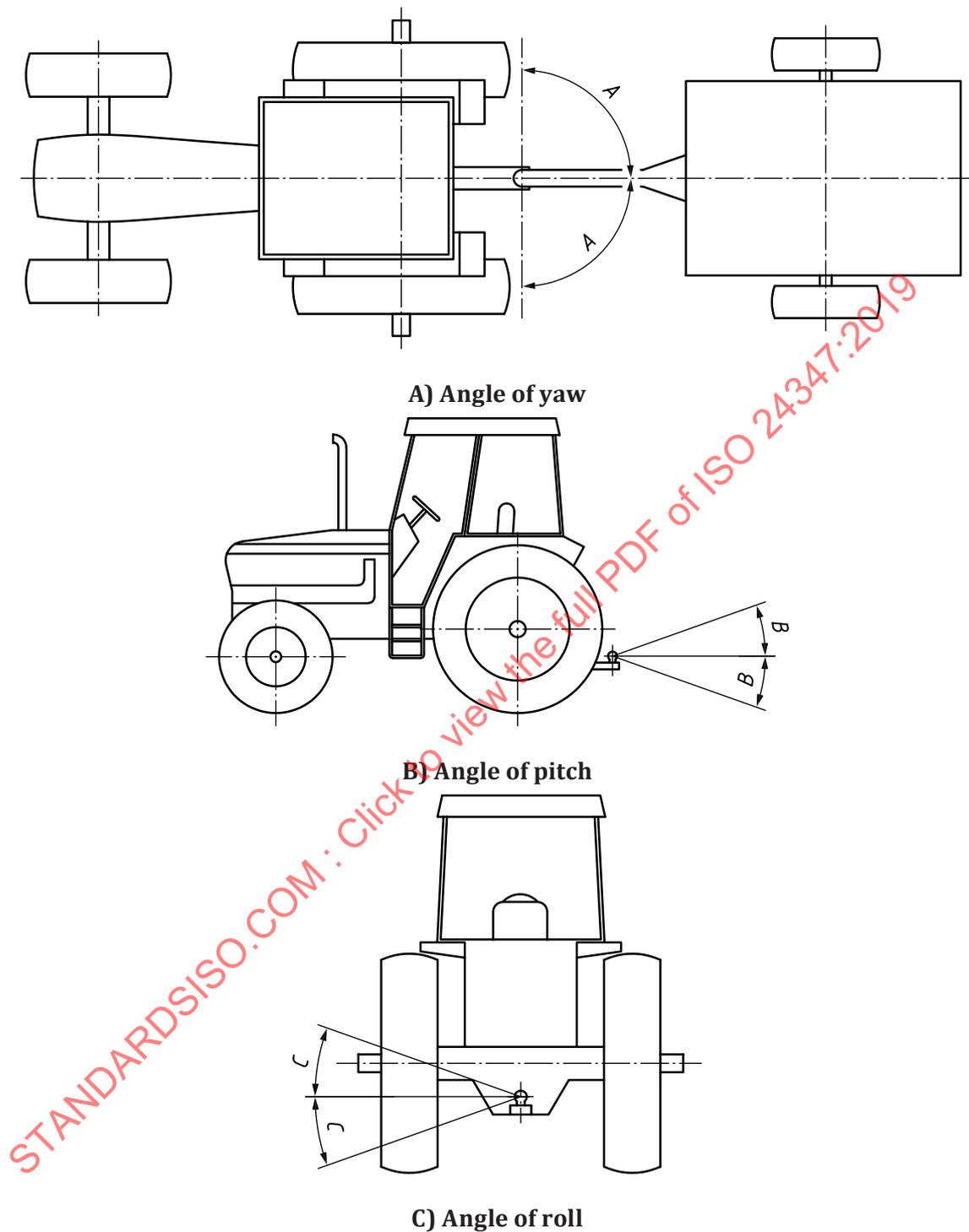


Figure 5 — Angles of yaw, pitch and roll

4.1.6 Examples of dimensions for the ball coupling trailer shank are given in [Annex A](#).

4.2 Marking

The ball coupling device shall be permanently marked “80 mm” with this marking located on the top or side of the ball coupling trailer shank. The trailer mating connection shall be permanently and visibly marked with a size identification.

5 Location

5.1 General

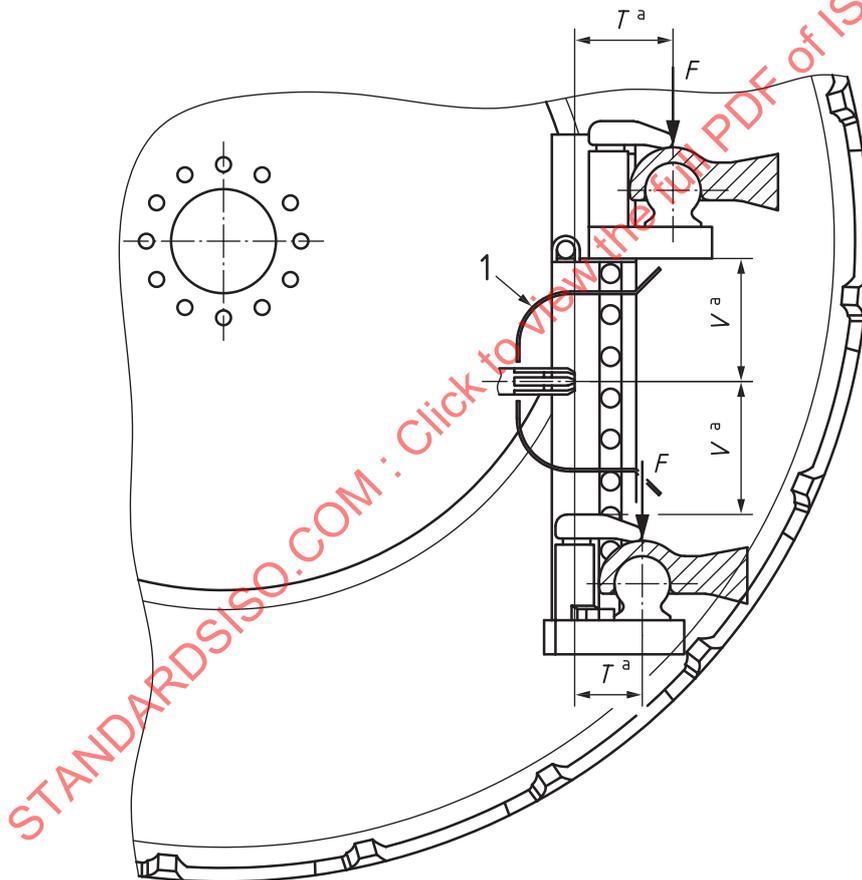
5.1.1 The ball coupling device shall be mounted in the vertical plane of the towing vehicle's longitudinal axis.

5.1.2 No part of the ball coupling or its construction, keeper-plate, etc. shall enter the clearance zone specified for the PTO in ISO 500-1 and ISO 500-2 for the PTO and in ISO 5673-2 for the PTO drive shaft.

5.1.3 The upper location shall only be available in the close position version.

5.2 Close position version

5.2.1 The location and position of the ball coupling device shall be in accordance with [Figure 6](#) and [Table 2](#).



Key

- 1 PTO clearance zone (see ISO 500-1)
- F* vertical load
- ^a See [Table 2](#) for explanation and dimension values of *T* and *V*.

Figure 6 — Location of ball coupling trailer shank in relation to PTO close position version

Table 2 — Close position — Values of the dimensions T and V

Dimensions in millimetres

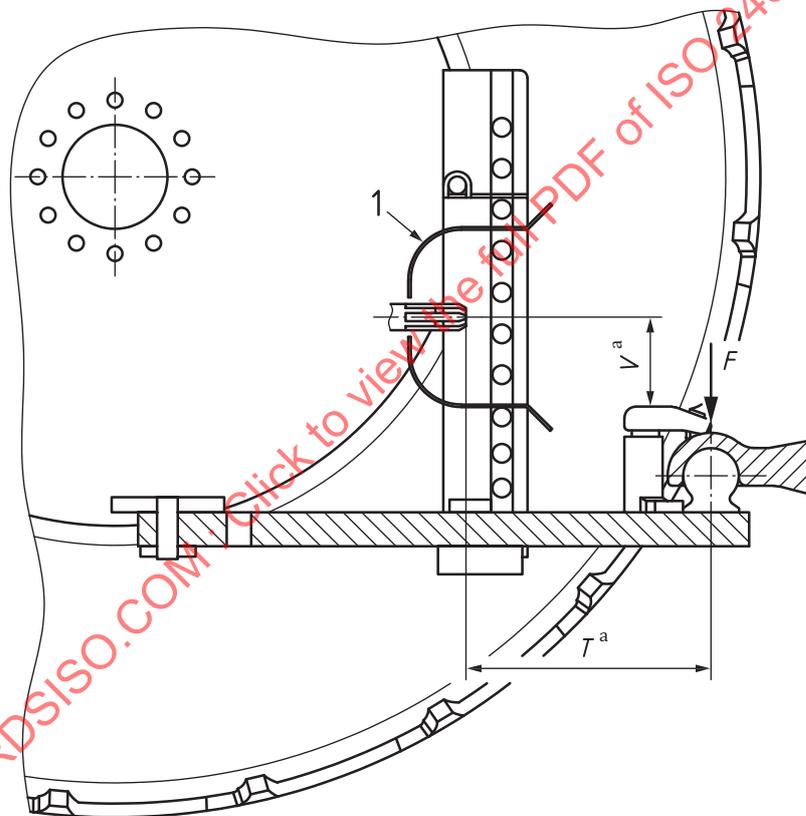
PTO Type ^a	T (see Figure 6)	V min.
1 and 2	50 to 250	120
3 and 4	50 to 250	145

^a See ISO 500-1 for identification of PTO type.

5.3 Horizontal adjustable version

5.3.1 The location and position of the ball coupling device shall be in accordance with [Figure 7](#) and [Table 3](#).

Dimensions in millimetres



Key

1 PTO clearance zone (see ISO 500-1)

F vertical load

^a See [Table 3](#) for explanation and dimension values of T and V .

Figure 7 — Location of ball coupling trailer shank in relation to PTO for the horizontal adjustable version

Table 3 — Ball position of the horizontal adjustable version — Values of the dimensions T and V
Dimensions in millimetres

PTO Type ^a	$T \pm 10$ (see Figure 7)			V^b min.
	short position ^c	regular position	extended position	
1 and 2	250	400	550	100
3 and 4	350	500	650	120

^a See ISO 500-1 for identification of PTO type.
^b For applications without using PTO driveline V , dimensions could be reduced.
^c For PTO operation a constant velocity drive shaft is required.

6 Vertical load

6.1 Maximum static vertical downward load for close position version

The maximum static vertical downward load for close position version is 40 kN. If the configuration of the implement induces high dynamic vertical loads on the ball coupling, the static load should be reduced. Proper ballasting of the tractor is required to maintain stability when the load is applied to the tractor ball coupling.

6.2 Maximum static vertical downward load for horizontal adjustable version

The maximum static vertical downward loads which the implement imposes on the tractor ball coupling shall be in accordance with Table 4. If the configuration of the implement induces high dynamic vertical loads on the ball coupling, the static load should be reduced. Proper ballasting of the tractor is required to maintain stability when the loads specified in Table 4 are applied to the tractor ball coupling.

Table 4 — Maximum static vertical downward load

Values in kilonewtons

PTO Type	Short position	Regular position	Extended position
1 and 2	27	18	13
3 and 4	33	22	16

6.3 Uploading

It is not a recommended practice for towed vehicles to impose upward loads on the ball coupling.

Annex A (informative)

Examples of ball coupling trailer shank configurations and dimensions

See [Figures A.1](#) to [A.4](#).

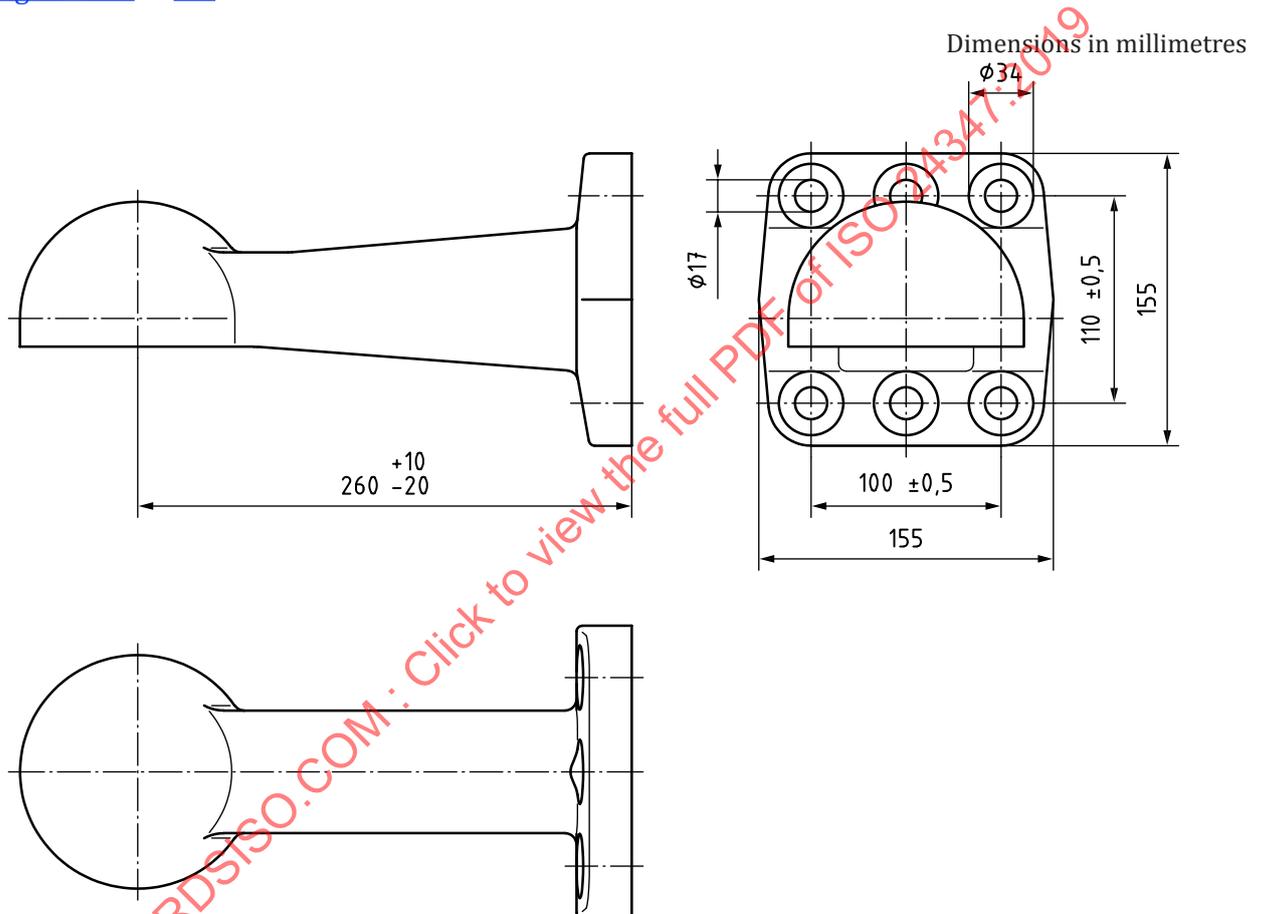


Figure A.1 — Ball coupling trailer shank with bolted flange connection option 1