
**Agricultural vehicles — Mechanical
connections between towed and towing
vehicles —**

**Part 3:
Tractor drawbar**

*Véhicules agricoles — Liaisons mécaniques entre véhicules
remorqueurs et véhicules remorqués —*

Partie 3: Barre d'attelage du tracteur



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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 6489-3 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 6489-3:1992), which has been technically revised.

ISO 6489 consists of the following parts, under the general title *Agricultural vehicles — Mechanical connections between towed and towing vehicles*:

- *Part 1: Dimensions of hitch-hooks*
- *Part 2: Specifications for clevis coupling 40*
- *Part 3: Tractor drawbar*
- *Part 4: Dimensions of piton-type coupling*

Agricultural vehicles — Mechanical connections between towed and towing vehicles —

Part 3: Tractor drawbar

1 Scope

This part of ISO 6489 specifies the dimensional requirements and location for category 0, 1, 2, 3, 4 and 5 drawbars mounted on the rear of agricultural tractors.

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

ISO 789-1, *Agricultural tractors — Test procedures — Part 1: Power tests for power take-off*

ISO 5673-2, *Agricultural tractors and machinery — Power take-off drive shafts and power-input connection — Part 2: Specification for use of PTO drive shafts, and position and clearance of PTO drive line and PIC for different attachments*¹⁾

ISO 14396, *Reciprocating internal combustion engines — Determination and method for the measurement of engine power — Additional requirements for exhaust emission tests in accordance with ISO 8178*

3 Terms and definitions

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

3.1

tractor drawbar drawbar

mechanical connection mounted on the rear of an agricultural tractor for the mechanical coupling of an implement

NOTE A tractor drawbar can be regular non-adjustable or adjustable.

3.1.1

regular non-adjustable drawbar

fixed drawbar with no possibility for adjustment

3.1.2

adjustable drawbar

adjustable, multiple operating position drawbar providing the regular, short and extended drawbar positions

1) Under preparation.

3.1.2.1

regular drawbar position

operating position of the adjustable drawbar providing the standard dimension from drawbar pin hole to end of PTO for the type of PTO on the tractor

3.1.2.2

short drawbar position

position of the adjustable drawbar intended to connect non-PTO driven equipment that applies a high vertical load to the drawbar

3.1.2.3

extended drawbar position

position of the adjustable drawbar intended for a special PTO drive shaft condition where equal angularity of the drive shaft joints cannot be obtained using the regular drawbar position

3.2

PTO drive shaft clearance plane

imaginary plane which establishes the upper permissible limit of protrusion of the drawbar and clevis

3.3

drawbar hitch point

connection point between tractor drawbar and implement end

4 Specifications

4.1 Drawbar clevis

The drawbar clevis may be removable to allow installation of special attachments or connection to implements which have a clevis end (see Figure 3). It may also be necessary to remove the clevis to provide PTO driveshaft clearance with implements which do not meet the dimensions specified in ISO 5673-2.

4.2 Drawbar hitch point

Provisions shall be made on the tractor for the connection of the tractor drawbar to the implement, in a position with the drawbar hitch point directly in line with the longitudinal centreline of the tractor PTO.

4.3 Drawbar categories

See Table 1.

Table 1 — Drawbar categories

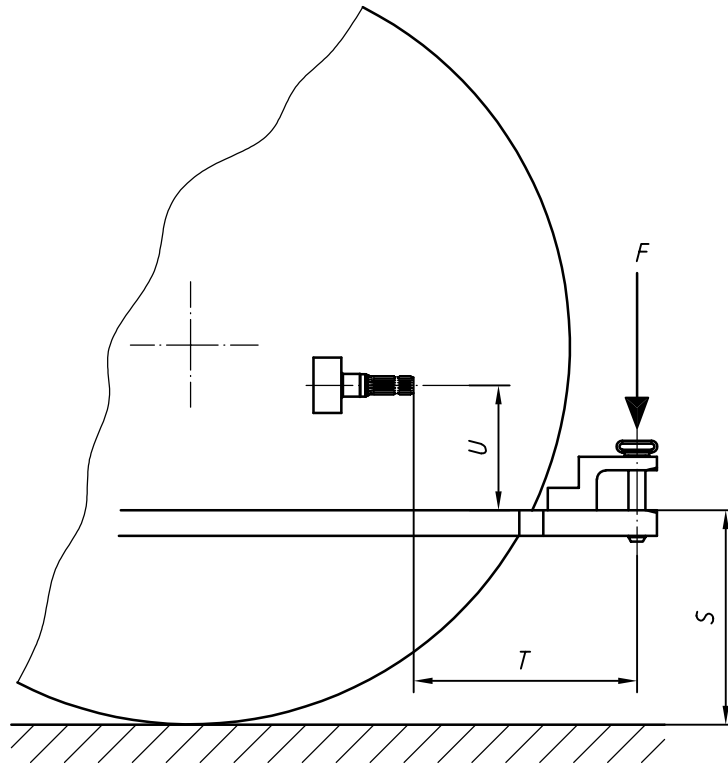
Values in kilowatts

Drawbar category	PTO power ^a at rated engine speed
0	≤ 28
1	≤ 48
2	≤ 115
3	≤ 185
4	≤ 300
5	≤ 500

^a Determined in accordance with ISO 789-1 or OECD code 1 or 2. If PTO power is not available, use 86 % of engine power as determined using ISO 14396.

4.4 Drawbar location and position

The drawbar location and position shall conform to Figure 1 and Tables 2 and 3.



Key

F vertical load

NOTE Tables 2 and 3 explain the symbols and give the dimension values.

Figure 1 — Drawbar location and position

Table 2 — Drawbar location — Values of the dimensions S and U

Dimensions in millimetres

Dimension	Drawbar category					
	0	1	2	3	4	5
Height of drawbar ^a , S	220 to 420	330 to 500	330 to 500	380 to 560	380 to 560	400 to 600
U ^b min.	200	220	250	260	280	310

^a The S dimension should be met for normal agricultural applications. On tractors especially designed for high ground clearance, such as working in standing vegetable crops or sugar cane, S may exceed the maximum. On tractors designed for low ground clearance, such as lawn mowing or ground care, which require a low centre of gravity, S may be less than the minimum.

^b The values given apply to new tractor types designed after the publication of this part of ISO 6489.

Table 3 — Drawbar position — Values of the dimension T

Dimensions in millimetres

PTO type ^a	$T \pm 10$		
	Short drawbar position	Regular drawbar position	Extended drawbar position
1 and 2	250	400 ^b	550
3	350	500	650

^a See ISO 500-1 for identification of PTO type.
^b A 350 mm position may be provided to accommodate older implements which use a type 1 PTO.

4.5 Drawbar dimensions

The drawbar dimensions shall conform to Figure 2 and Table 4.

Dimensions in millimetres

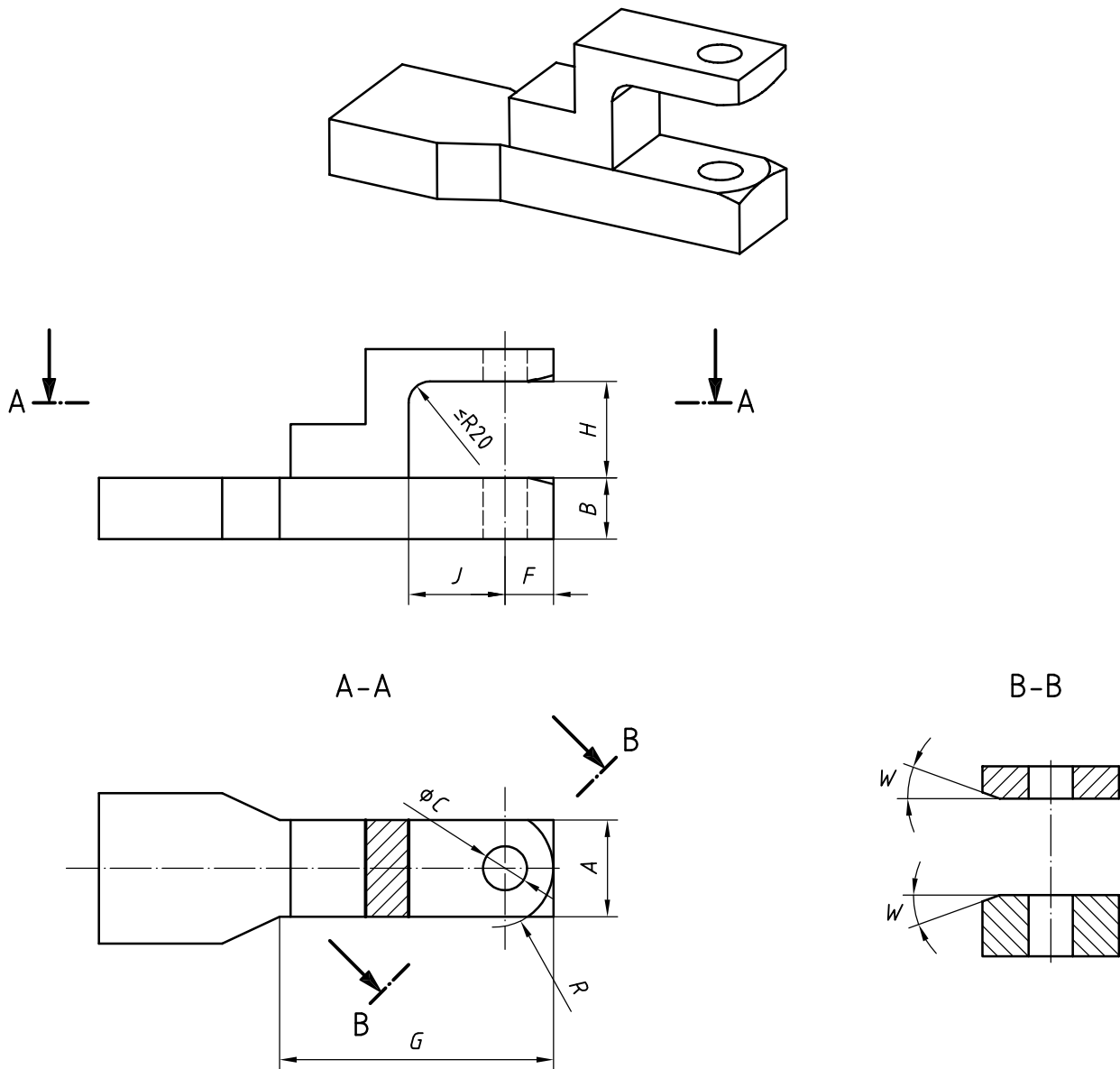


Figure 2 — Tractor drawbar and clevis

Table 4 — Tractor drawbar and clevis — Dimension values

Dimensions in millimetres

Dimension		Drawbar category					
		0	1	2	3	4	5
Drawbar width, A^a	max.	60	67	90	90	130	160
Drawbar thickness, B	max.	20	36	52	57	64	80
Pin hole diameter, C	$\begin{smallmatrix} +0,80 \\ -0,25 \end{smallmatrix}$	20	33	33	41	52,5	72,5
Pin diameter, $C1$	min.	18	30	30	38	50	70
F	max.	30	40	45	45	65	80
G^b	min.	140	210	210	210	210	210
Height, H	min.	50	70	70	90	90	100
Throat depth, J	min.	50	70	80	80	90	110
End radius of drawbar and clevis, R^c	max.	35	40	55	55	80	95
W^c	min.	20°	20°	20°	20°	15°	15°

^a The drawbar pin handle, retention devices, or clevis may extend beyond width A , but must not interfere with the implement articulation angles specified in Clause 6.

^b G is the distance over which the specified dimensions A and B shall be maintained.

^c The profile shown in Figure 2 represents the maximum envelope for the drawbar and clevis. The radius R and angle W may differ from the values given so long as the maximum envelope is not exceeded.

5 Vertical drawbar load

The maximum static vertical loads which the implement imposes on the tractor drawbar shall be in accordance with Table 5 for the regular, short and extended drawbar positions. If the configuration of the implement induces high dynamic vertical loads on the drawbar, the static load should be reduced to keep the dynamic load under control. Proper ballasting of the tractor is required to maintain stability when the loads specified in Table 5 are applied to the tractor drawbar.

Table 5 — Maximum vertical load on the drawbar, F

Values in kilonewtons

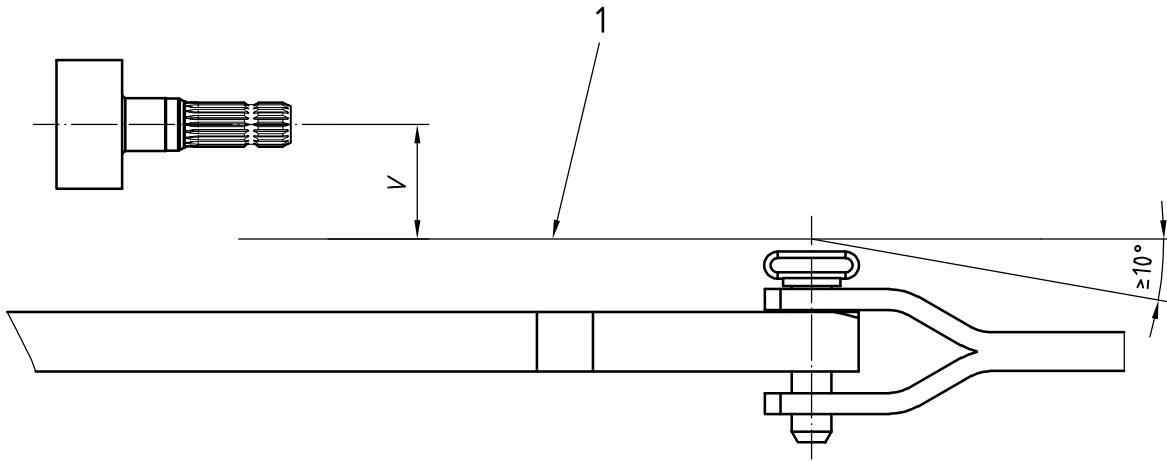
Drawbar category	Max. static vertical load, F		
	Short drawbar position	Regular drawbar position	Extended drawbar position
0	7	5	3,5
1	12	8	6
2	22	15	11
3	27	18	13
4	33	22	16
5	45	30	—

6 PTO drive shaft clearance

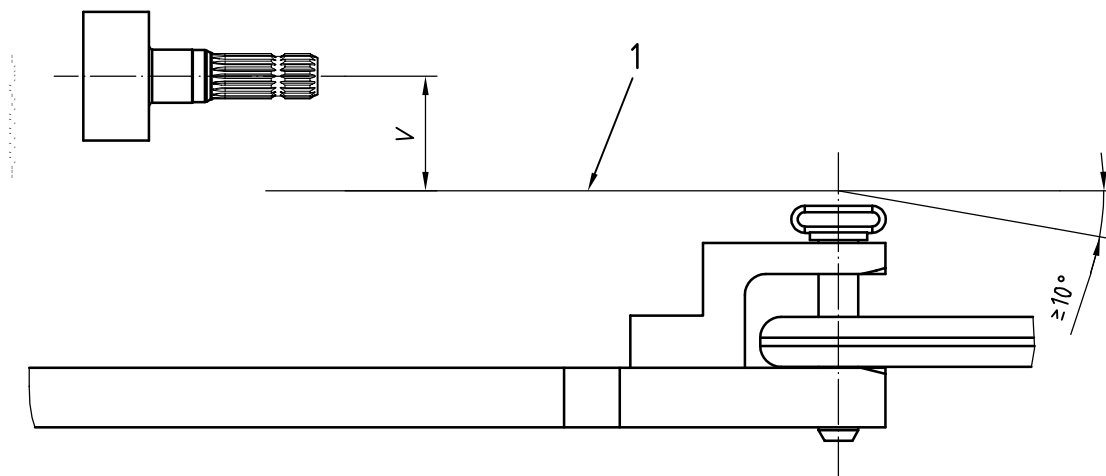
The clearance dimensions given for the PTO in this part of ISO 6489 and for the PIC in ISO 5673-2 provide clearance between the PTO drive shaft and the drawbar clevis. See Figure 3 and Table 6. Clearance is provided when the fore-aft pitch between the implement and tractor is less than 20° for drawbar categories 0, 1, 2, and 3; and is less than 15° for drawbar categories 4 and 5.

To provide adequate articulation between the tractor and implement, it is recommended the implement end be designed to allow $\pm 20^\circ$ of fore-aft pitch and $\pm 20^\circ$ of side-to-side roll between the tractor and the implement.

(For category 4 and 5 drawbars the roll and pitch should be $\pm 15^\circ$). The maximum roll and pitch angles do not need to be met simultaneously.



a) clevis removed from the drawbar



b) clevis attached to the drawbar

Key

V PTO drive shaft clearance

1 clearance plane

NOTE For PTO drive shaft clearance values, see Table 6.

Figure 3 — PTO drive shaft clearance plane

Table 6 — PTO drive shaft clearance plane — Values of the PTO drive shaft clearance, V

Dimensions in millimetres

Dimension	Drawbar category					
	0	1	2	3	4	5
PTO drive shaft clearance, V , min.	100	100	100	110	120	130

Bibliography

- [1] OECD code 1, *OECD standard code for the official testing of agricultural and forestry tractor performance*
- [2] OECD code 2, *OECD restricted standard code for the official testing of agricultural and forestry tractor performance*

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