

INTERNATIONAL STANDARD

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Agricultural tractors and machinery — Power take-off drive shafts and position of power-input connection

*Tracteurs et matériels agricoles — Arbres de transmission à cardans de
prise de force et position de l'arbre récepteur sur la machine*



Reference number
ISO 5673:1993(E)

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.

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.

International Standard ISO 5673 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 5673:1980), of which it constitutes a technical revision.

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Agricultural tractors and machinery — Power take-off drive shafts and position of power-input connection

1 Scope

This International Standard specifies a system to classify power take-off (PTO) drive shafts. It also specifies the position of the power-input connection (PIC) and provides application guidelines and alternative recommended requirements for yoke bores.

It applies to PTO drive shafts and PIC required for the connection of agricultural tractors to agricultural implements and machines.

This International Standard therefore provides the best possible matching conditions between different types of agricultural tractors and implements to ensure interchangeability.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 500:1991, *Agricultural tractors — Rear-mounted power take-off — Types 1, 2 and 3*.

ISO 730-1:1990, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Part 1: Categories 1, 2 and 3*.

ISO 6489-1:1991, *Agricultural vehicles — Mechanical connections on towing vehicles — Part 1: Hook type*.

ISO 6489-3:1992, *Agricultural vehicles — Mechanical connections on towing vehicles — Part 3: Tractor drawbar*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 implement drive line: Line through the shafts, universal joints, guards, connectors and fasteners provided with the implement to transmit rotational power from tractor PTO to implement PIC.

3.2 PTO drive shaft: Shaft with universal joints that connects the tractor PTO to the first implement PIC. (See figure 1.)

3.3 PTO drive shaft, form A: Drive shaft with two universal joints. (See figure 2, and detail 9 in figure 1.)

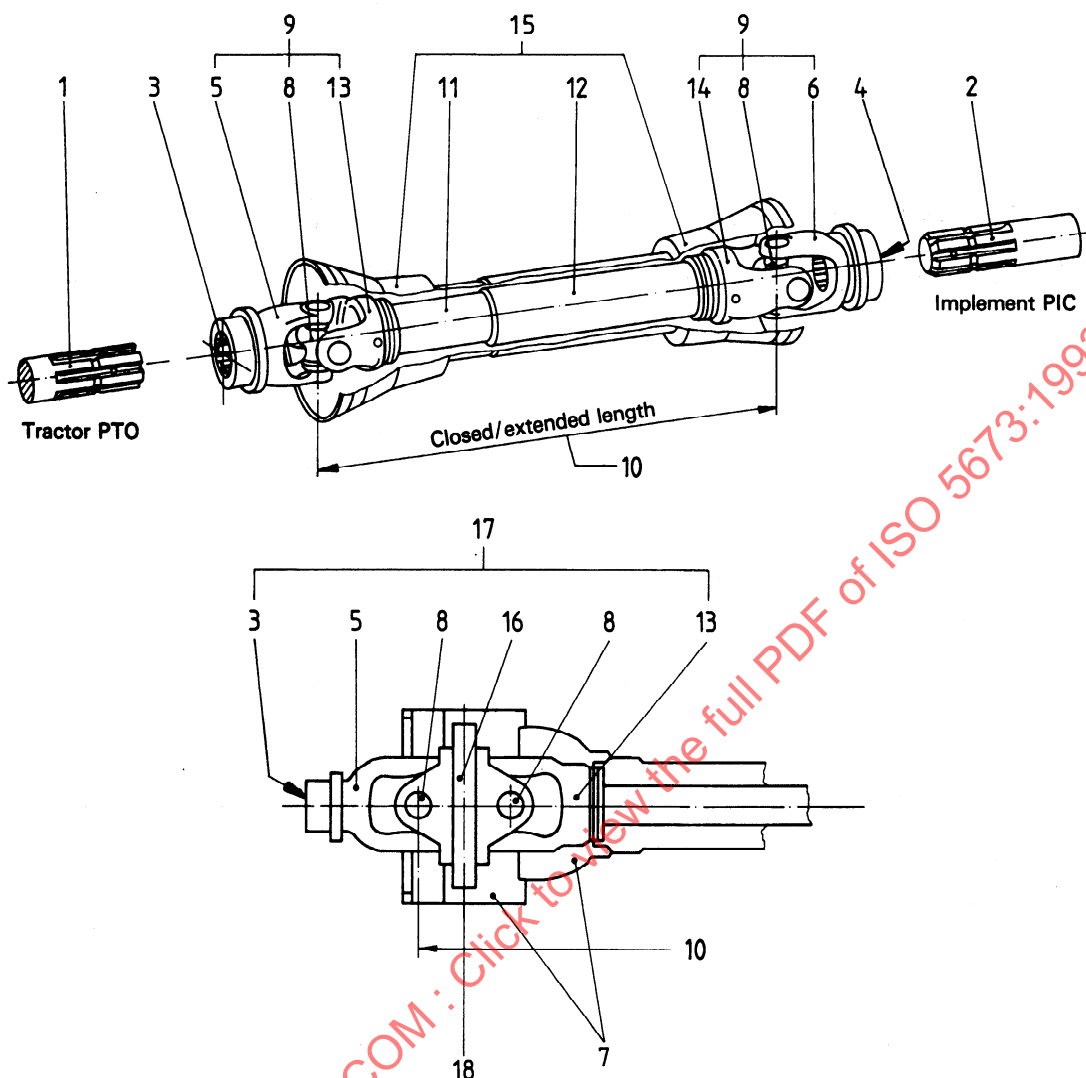
3.4 PTO drive shaft, form B: Drive shaft with one universal joint and one centred double universal joint. (See figure 3, and details 9 and 17 in figure 1.)

3.5 PTO drive shaft, form C: Drive shaft with two centred double universal joints. (See figure 4, and detail 17 in figure 1.)

3.6 closed length: Distance between the centres of the outermost journal cross-assemblies, when the PTO drive shaft is fully closed. (See figure 1.)

3.7 extended length: Distance between the centres of the outermost cross-assemblies, when the PTO drive shaft is extended to the maximum length recommended by the manufacturer. (See figure 1.)

3.8 Z-bend: Joint where the axes of PTO and PIC are parallel to each other, forming two equal-bend angles in relation to the central part of the shaft. (See figure 5.)



Key

- 1 PTO
- 2 PIC
- 3 PTO yoke bore
- 4 PIC yoke bore
- 5 PTO yoke
- 6 PIC yoke
- 7 Centred double universal joint guard
- 8 Journal cross-assembly
- 9 Universal joint
- 10 PTO drive shaft, closed and extended length
- 11 Inner shaft
- 12 Outer shaft
- 13 Inner shaft yoke
- 14 Outer shaft yoke
- 15 PTO drive shaft guard
- 16 Double yoke
- 17 Centred double universal joint
- 18 Centre of articulation of centred double universal joint

Figure 1 — Designation of PTO drive shaft details

3.9 W-bend: Joint where the axes of PTO and PIC intersect at the centre of the joint system forming two equal-bend angles. (See figure 6.)

3.10 non-rotating PTO drive-shaft guard: PTO drive-shaft guard not rotating while the shaft is rotating.

3.11 rotating PTO drive-shaft guard: PTO drive-shaft guard which can rotate with the shaft except when it comes into contact with some other object.

4 Classification of PTO drive shafts

PTO drive shafts are classified by their nominal transmitted power and by the tractor PTO in accordance with ISO 500. Sizes of PTO shafts relate to constant life conditions, nominal transmitted power and torque, and to average operating conditions. (See table 1.)

5 Yoke

5.1 Bore in PTO and PIC yoke boss

The preferred PIC yoke bore is the same as the PTO yoke bore, dimensions of which are specified in ISO 500. However, if this is not practical, other con-

figurations and sizes are acceptable. In these cases the recommended alternative sizes for the PIC are shown in table 2.

5.2 Locking device

The PTO and PIC yokes shall be fitted with locking devices to prevent axial displacement.

6 Application of PTO drive shaft

6.1 PTO drive shaft, form A

A PTO drive shaft of form A, as shown in figure 2, compensates for variations in angle and length of the connecting shafts between PTO and PIC. Equal angles in W- and Z-bends will ensure uniform transmission of rotary motion (see figures 5 and 6).

6.2 PTO drive shaft, form B

A PTO drive shaft of form B, as shown in figure 3, compensates for variations in angle and length of the connecting shafts between PTO and PIC. Rotary motion will be transmitted uniformly, as long as the single joint is aligned straight or at a very small angle.

Table 1 — Classification of PTO drive shafts

Size	Nominal torque N·m			Nominal transmitted power kW		
	PTO of type			PTO of type		
	1 (540 r/min)	2 (1 000 r/min)	3 (1 000 r/min)	1 (540 r/min)	2 (1 000 r/min)	3 (1 000 r/min)
1	100	—	—	6	—	—
2	160	100	—	9	11	—
3	250	160	—	14	17	—
4	400	250	250	23	26	26
5	630	400	400	36	42	42
6	1 000	630	630	57	66	66
7	—	1 000	1 000	—	105	105
8	—	1 600	1 600	—	167	167

Table 2 — Recommended alternative PIC yoke bores

Size	PIC yoke bore diameter, mm		
	1	PTO of type	
		2	3
1	20; 25	—	—
2	20; 25; 30	—	—
3	25; 30	20; 25; 30	—
4	25; 30	25; 30	40
5	—	30	40
6	—	—	45
7	—	—	45
8	—	—	45

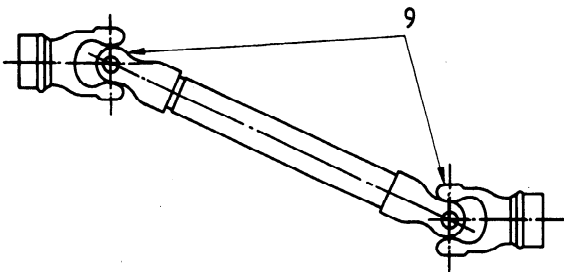


Figure 2 — PTO drive shaft, form A

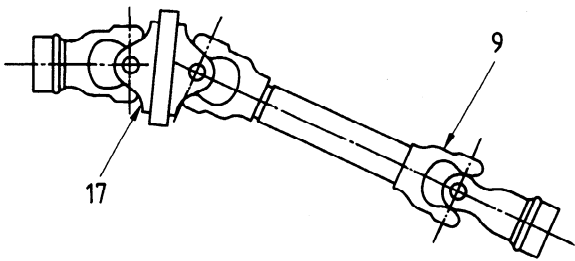


Figure 3 — PTO drive shaft, form B

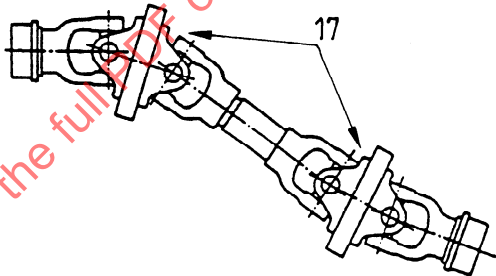


Figure 4 — PTO drive shaft, form C

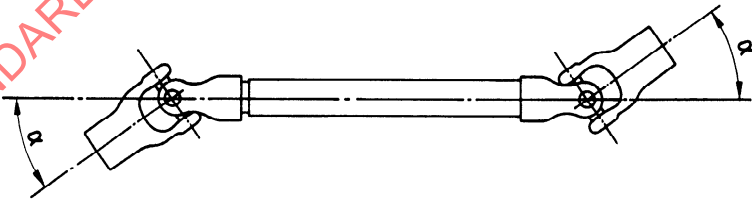


Figure 5 — Z-bend

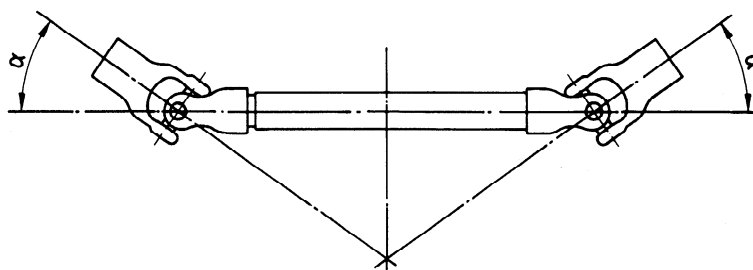


Figure 6 — W-bend

6.3 PTO drive shaft, form C

A PTO drive shaft of form C, as shown in figure 4, compensates for variations in angle and length of the connecting shafts between PTO and PIC. Rotary motion is transmitted uniformly, even if different, or spatial, bend angles are found.

6.4 PTO drive shaft length

The nominal length of the PTO drive shaft shall be chosen with regard to the maximum extended and minimum closed lengths that may be expected.

The nominal closed lengths given in table 3 are recommended. If there is a deviation from the proposed nominal closed length, increments of 50 mm should be used.

Table 3 — PTO drive shaft nominal closed lengths

Nominal closed lengths, mm					
460	510	560	610	710	1 010

7 Position of PIC

The horizontal and vertical spacing of the implement PIC (with the drawbar in the normal position and the lower links horizontal) shall be as shown in figure 7 and table 4.

For drawbar applications, the axes of the tractor PTO and PIC shall be aligned on the same horizontal plane.

To determine these dimensions, the tractor PTO shall be in the position specified in ISO 500, the lower links

of the three-point linkage, in accordance with ISO 730-1, horizontal, and the tractor drawbar and hitch hook in the positions specified in ISO 6489-3 and ISO 6489-1 respectively.

Table 4 — Horizontal and vertical distances

Dimensions in millimetres

Category of tractor (see ISO 730-1)	a_1 ¹⁾	a_2 min.	a_3 ± 10	h_1 ¹⁾ ± 100	h_2 ²⁾
1	150	720	400	100	510 max. 285 min.
2	250	820	400	100	530 max. 305 min.
3	300	920	500	100	560 max. 335 min.

1) Recommended dimensions. It may be necessary to vary them in the case of specialized implements.

2) Provision made for adjustment within this range to align PIC with PTO.

8 Lateral deviation of PIC

The lateral deviation of the PIC for both mounted and semi-mounted implements shall be within 50 mm to the right or left of the vertical centreline of the lower hitch attachments. The lower hitch attachments are defined in ISO 730.

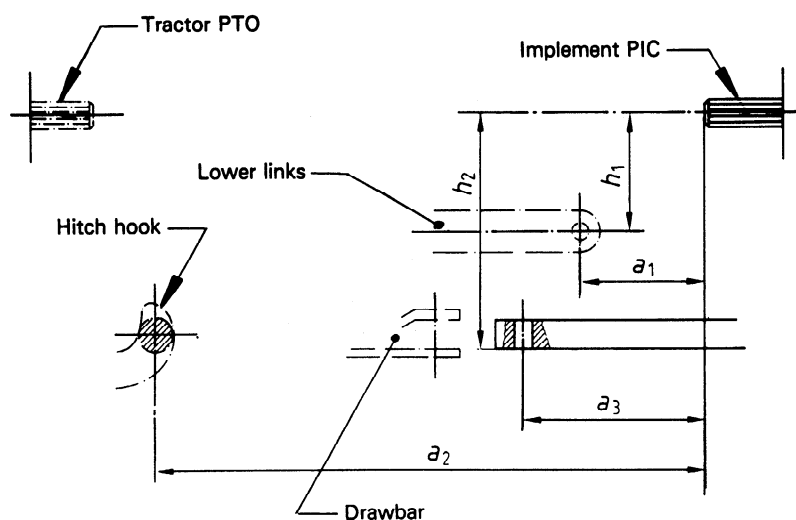


Figure 7 — Horizontal and vertical distances to lower links, drawbar and hitch hook

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