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Lawn and garden ride-on (riding) tractors — Power take-off

Tracteurs de jardin et de pelouse à conducteur porté — Prise de force

Reference number
ISO 9193:1990(E)

Foreword

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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 9193 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*.

Annex A of this International Standard is for information only.

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Lawn and garden ride-on (riding) tractors — Power take-off

1 Scope

This International Standard specifies the requirements for an internally splined (tube) rear-mounted 2 000 r/min power take-off (PTO) on lawn and garden ride-on (riding) tractors.

For the purposes of this International Standard, a lawn and garden ride-on (riding) tractor is a self-propelled machine on which an operator rides and wich is primarily designed for cutting grass and auxiliary garden work. The cutting means may either be an integral part of the machine, or an implement or attachment suspended from or attached to the machine. An attachment is an assembly or component that may be connected to a lawn and garden ride-on tractor for the purposes of accomplishing work.

The requirements specified for the PTO are essential to ensure that a 2 000 r/min PTO-driven machine or implement/attachment can be operated with a lawn and garden tractor equipped with an equivalent size 2 000 r/min PTO drive. Hitch reference dimensions also ensure that mounted and towed powered implements/attachments designed for operation in conjunction with lawn and garden tractors can be operated by those lawn and garden tractors designed for such implements/attachments.

2 Power take-off requirements

2.1 General

The general characteristics of the PTO shall be as follows:

a) nominal diameter: 26 mm;

b) number and type of splines: 15 involute splines;

c) nominal PTO rotational frequency: 2 000 r/min;

d) PTO maximum power at rated rotational frequency of engine: 20 kW.

2.2 Manufacturing requirements

2.2.1 The power take-off tube for PTO drives extending from the tractor to the rear shall have the internal spline dimensions shown in table 1.

2.2.2 The power take-off shafts for PTO drives extending from the attachment forward shall have the spline dimensions shown in table 1.

2.2.3 The normal rotational frequency of the rear PTO tube, when operating at rated engine speed, shall be 2 000 r/min $\pm$ 50 r/min.

2.3 Direction of rotation

The direction of rotation of the PTO shall be clockwise viewed from the end of the tractor PTO shaft (tube).

2.4 PTO retaining means

The PTO tube (internal spline) and shaft retaining means shall have the dimensions shown in figure 1.

The rotational frequency and direction of rotation shall be indicated on the guard and/or near the PTO tube.

3 Location of PTO

3.1 It is recommended that the tractor PTO tube should be on the tractor centreline; it shall in any case be within the limits of 25 mm to the right or left of the tractor centreline.

3.2 The vertical distance between the centreline of the spline tube of the PTO and the ground line shall be a minimum of 350 mm to a maximum of 480 mm (see y in figure 2 and table 2).

Table 1 — Power take-off tube and shaft spline dimensions

Flat root side fit	Tractor tube (internal spline)	Attachment shaft (external spline)
Number of teeth	15	15
Pitch	16/32	16/32
Pressure angle	30°	30°
Base diameter	20,622 23 mm	20,622 23 mm
Pitch diameter	23,812 mm	23,812 mm
Major diameter	26,06 mm max.	25,4 mm or 24,84 mm
Form diameter	25,5 mm	22,15 mm
Minor diameter	22,4 mm or 22,28 mm	21,34 mm min.
Circular space width (tolerance class 6):		
— maximum (actual)	2,563 mm	—
— minimum (effective)	2,494 mm	—
Circular tooth thickness:		
— maximum (effective)	—	2,456 mm
— minimum (actual)	—	2,388 mm
Measurement over pins	—	28,19 mm ref.
Pin diameter	—	3,05 mm
Measurement between pins	19,807 mm ref.	—
Pin diameter	2,743 mm	—

Dimensions in millimetres

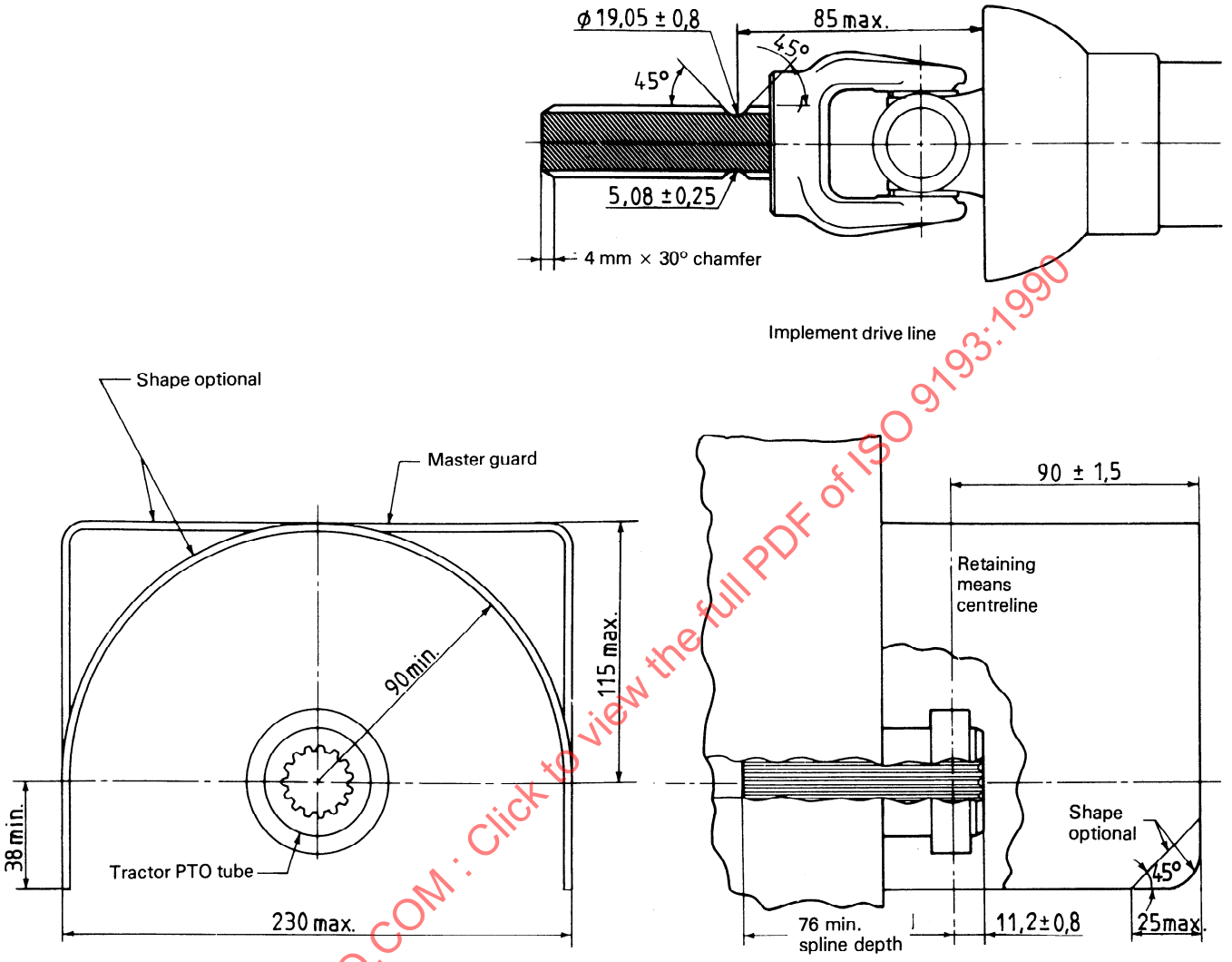

Figure 1 — Dimensions for power take-off retaining means and master guard

4 Relationship of PTO location to three-point hitch

The dimensional relationship between the PTO splined tube and the category 0 three-point hitch shall be as given in table 2 and figure 2.

5 PTO guard

5.1 The tractor shall be equipped with a PTO master guard with dimensions which conform to figure 1.

5.2 Although not intended as a step, the master guard shall not be permanently deformed if used as a step by a 120 kg operator.

5.3 If removal of the master guard is required for integral PTO-driven attachments, shielding shall be provided with the implement to provide protection as specified in 5.1 and 5.2.

5.4 The master guard shall not be removable without the use of tools.

6 Implements/attachments

6.1 All implements/attachments shall be capable of operating at 10 % over the normal rotational frequency of 2 000 r/min. In addition, tractors shall be equipped with means to prevent the operator from inadvertently operating the PTO tube at more than 2 300 r/min under no-load conditions.

6.2 The PTO clutch on the tractor shall be independent of the traction clutch.

6.3 Any power take-off shaft, including its connectors, fasteners and any torque-limiting device, shall be enclosed or otherwise safeguarded from the power take-off up to the first fixed bearing, to prevent contact with revolving parts.

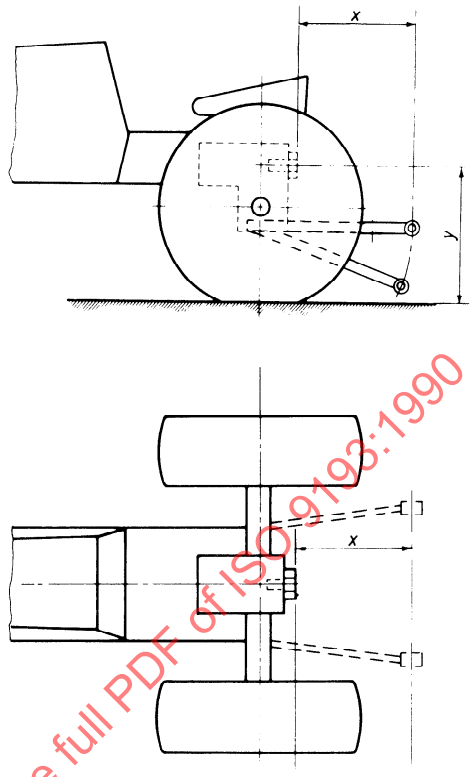

Figure 2 — Relationship of tractor PTO and category 0 lift links

Table 2 — Dimensional relationships of tractor PTO and category 0 lift links

Dimensions in millimetres

Distance	Dimension	
	min.	max.
x horizontal distance from PTO splined tube to lower hitch point (with lower link horizontal)	250	350
y vertical position of PTO splined tube above GRP	350	480