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Agricultural vehicles — Mechanical connections between towed and towing vehicles —

Part 5:
Specifications for non-swivel clevis couplings

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

Partie 5: Spécifications pour attelages de type chape non rotatifs

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Foreword

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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.

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ISO 6489-5 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 4, *Tractors*.

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*

— *Part 5: Specifications for non-swivel clevis couplings*

Agricultural vehicles — Mechanical connections between towed and towing vehicles —

Part 5:
Specifications for non-swivel clevis couplings

1 Scope

This part of ISO 6489 specifies the requirements for non-swivel clevis couplings used for the attachment of agricultural trailers and implements equipped with a swivel hitch ring as specified in ISO 5692-3 to the rear of self-propelled agricultural 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 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits*

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 5692-3:2011, *Agricultural vehicles — Mechanical connections on towed vehicles — Part 3: Swivel hitch rings*

3 Terms and definitions

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

3.1
non-swivel clevis coupling
hitching device, not rotating around the horizontal longitudinal axis (roll), for the mechanical connection of trailers and implements

3.2
coupling reference centre
point along the pin centreline crossing the horizontal symmetry centreline of the drawbar housing

3.3
D value
D
mathematically established representative force for the horizontal component of the force acting on the coupling in the longitudinal axis of the machine

NOTE   It is expressed in kilonewtons (kN).

3.4
vertical load on the coupling point
S
load transmitted, under static conditions, on the reference centre of the mechanical coupling

NOTE   It is expressed in kilograms (kg).

4   Constructional requirements

Constructional requirements not given in this part of ISO 6489 shall be specified as appropriate. Tolerances on dimensions without individual tolerance indications shall be in accordance with ISO 2768-1:1989, tolerance class c. Limits and fits shall be in accordance with ISO 286-1.

The dimensions of trailer or implement couplings of shapes w, x, y and z shall be in accordance with Figure 1 and Table 1.

5   Calculation of D value

The D value shall be calculated, in kilonewtons, using the following equation, where the values of m_r and m_t are known:

$$D = g \times \left(\frac{m_t \times m_r}{m_t + m_r} \right)$$
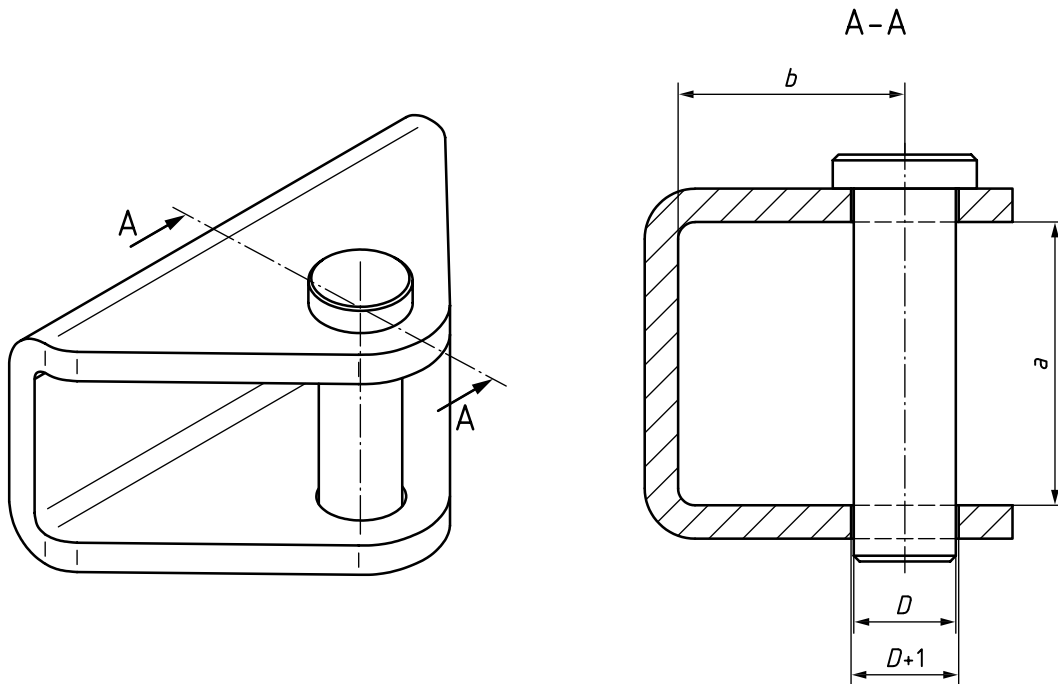
where

g is the acceleration due to gravity, 9,81 m/s²;

m_r is the allowable mass of the trailer or towed implement, in tonnes;

m_t is the allowable total mass of the tractor or towing vehicle, in tonnes.

NOTE   Dimensions are given in Table 1.

Figure 1 — Non-swivel clevis coupling

Table 1 — Shapes and dimensions of trailer or implement clevis couplings

Vertical load S kg	D value D kN	Shape	Dimension mm		
			D ±0,5	a min.	b min.
≤1 000	≤35	w	18	50	40
≤2 000	≤90	x	28	70	55
≤3 000	≤120	y	43	100	80
≤3 000	≤120	z	50	110	95

6 Design requirements

6.1 The coupling unit shape shall allow the swivel hitch ring the following minimum angles:

— ± 60° in the horizontal plane (yaw),

— ± 20° in the vertical plane (pitch),

— ± 20° around its longitudinal axis (roll).

6.2 Where a sub-frame is used between the agricultural tractor or towing vehicle and the coupling, this shall be tested with the appropriate coupling, according to the maximum coupling capacity.

6.3 The non-swivel clevis coupling unit shall be provided with a device to prevent unintentional uncoupling. This device shall be

— easy to apply,

— retained on the hitch unit, and

— tested by the application of a static load of 0,25 D.

6.4 The clevis shall be designed for the D values specified in Table 1.

7 Location

7.1 Horizontal location

The non-swivel clevis coupling shall be located as shown in Figure 2, mounted in the plane of the tractor's or towing vehicle's longitudinal axis. The centre of the non-swivel clevis coupling shall be located at the distance, t, rearwards from the end of the power take-off (PTO) shaft, in accordance with Table 2.
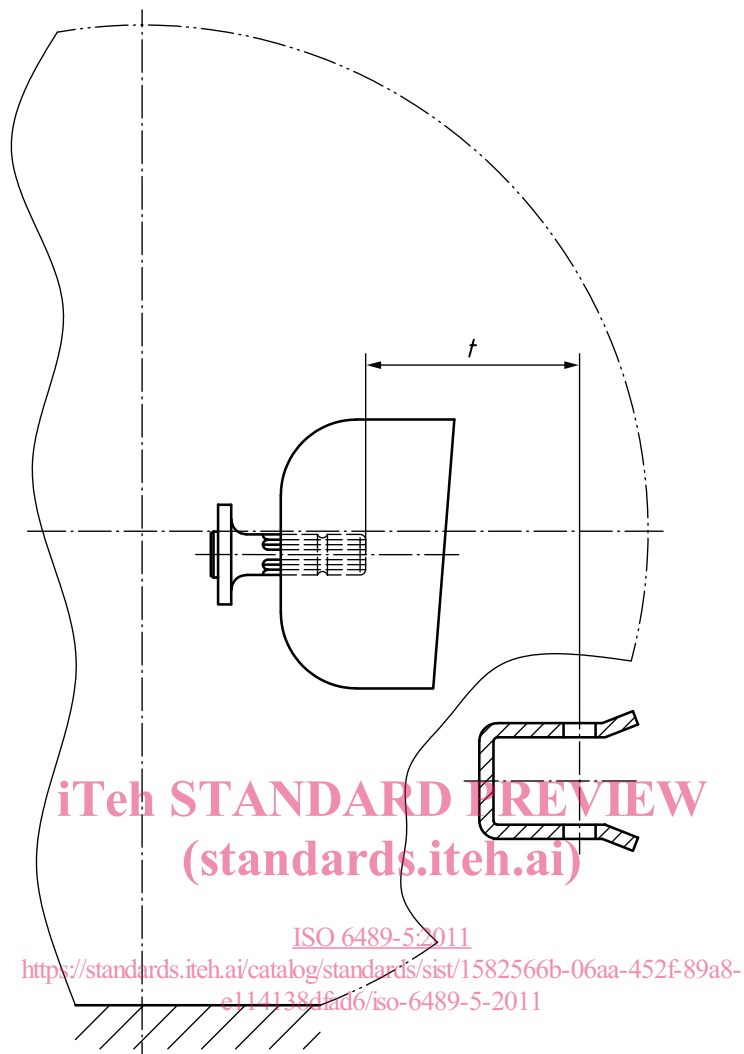
Figure 2 — Non-swivel clevis coupling — Relation to power take-off (PTO)

Table 2 — Distances between non-swivel coupling and power take-off (PTO)

Coupling type	$t \pm 10$ mm	
	PTO types 1 and 2	**PTO type 3**
w	80–400	65–500
x	100–400	85–500
y	120–400	105–500
z	130–400	115–500

7.2   Vertical location

The height above the ground of the coupling device shall be in accordance with one of the following relationships (see Figure 3):

$$h_1 \le \frac{\left[(m_\text{a} - 0{,}2m_\text{t}) \times l - S \times c\right]}{0{,}8 \times (0{,}8m_\text{t} + S)}$$

or

$$h_2 \le \frac{\left[(m_\text{1a} - 0{,}2m_\text{1t}) \times l - S \times c\right]}{0{,}8 \times (0{,}8m_\text{1t} + S)}$$

where

m_t is the mass of the tractor or towing vehicle, in kg;

m_1t is the mass of the tractor or towing vehicle with the ballast weight on the front axle, in kg;
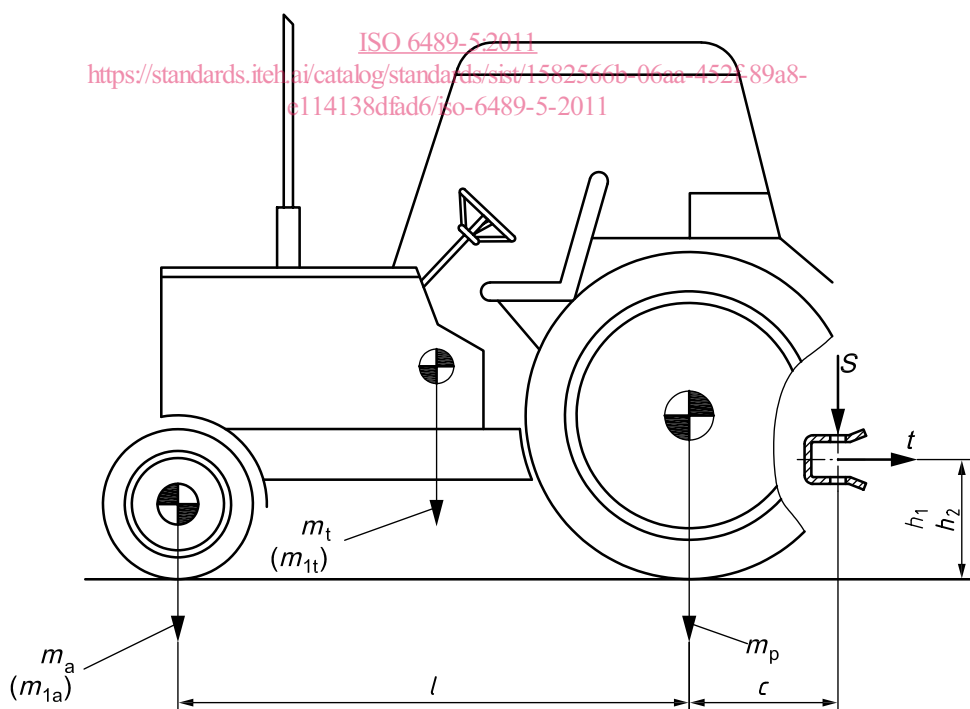
m_a is the load on the front axle of the unladen tractor or towing vehicle, in kg;

m_1a is the load on the front axle of the tractor or towing vehicle with the ballast weight on the front axle, in kg;

l is the tractor or towing vehicle wheelbase, in mm;

S is the vertical load on the coupling point, in kg;

c is the distance, in mm, between the reference centre of the mechanical coupling and the vertical plane passing through the axle of the rear wheels of the tractor or towing vehicle.

NOTE m_p is the load on the rear axle of the unladen tractor.

Figure 3 — Non-swivel clevis coupling — Vertical location

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