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Agricultural vehicles — Mechanical hook-type connections on towing vehicles — Test methods and requirements

Véhicules agricoles — Liaisons mécaniques de type crochet sur véhicules tracteurs — Méthodes d'essai et exigences

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 12368 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 2, *Common tests*.

Agricultural vehicles — Mechanical hook-type connections on towing vehicles — Test methods and requirements

1 Scope

This International Standard specifies a dynamic test method for mechanical hook-type connections and hook coupling devices, as well as a static test of their keeper plates. It is applicable to hooks meeting the requirements of ISO 6489-1 used on towing vehicles with an unladen mass of up to 10 t. Towing vehicles with a greater unladen mass are nevertheless treated as 10 t towing vehicles, especially with regard to their reference mass.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6489-1, *Agricultural vehicles — Mechanical connections between towed vehicles and towing vehicles — Part 1: Dimensions of hitch-hooks*

ISO 20019:—[1)], *Agricultural vehicles — Mechanical connections on towed vehicles — Dimensions for hitch rings*

89/173/EEC, *Council of Europe Directive of 21 December 1988 on the approximation of the laws of the Member States relating to certain components and characteristics of wheeled agricultural or forestry tractors*

3 Terms and definitions

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

3.1
unladen mass
mass of the unladen towing vehicle in working order with tanks and radiators full, including any protective structure, track equipment or additional front-wheel-drive components required for normal use, but not including operator, optional ballast weights, additional wheel equipment, special equipment or loads

3.2
reference mass
m_R
mass, not less than the unladen mass, selected by the manufacturer for calculation of the force to be used in the test

1) To be published. (Revision of ISO 5692:1979)

3.3
hook coupling device
hook, together with its keeper plate, locking mechanism and all load-carrying components needed for its installation on a towing vehicle chassis

3.4
keeper plate
part that ensures that the hitch ring cannot become detached from the hook

See ISO 20019.

3.2
vertical static load
S
maximum permissible static load at the hook, as declared by the manufacturer, applied vertically to a hitch ring

See ISO 20019.

4 Test equipment

4.1 Strength

The test equipment and the means of ensuring that the hook coupling device is fixed firmly to the bedplate shall be such that they do not deflect significantly in relation to the hook coupling device under loading.

4.2 Load application

4.2.1 Hook coupling device

The means of applying a force to the hook coupling device (see Figure 1) shall comply with the following requirements.

a) The dynamic force application frequency shall not exceed 5 Hz unless it can be demonstrated that the natural frequency is not affecting the load pattern.

b) The force shall be applied by means of a hitch ring whose maximum dimensions are in accordance with ISO 20019.

c) The force applied shall, during the whole test, be kept to within ± 2 % of the maximum force limits set as calculated.

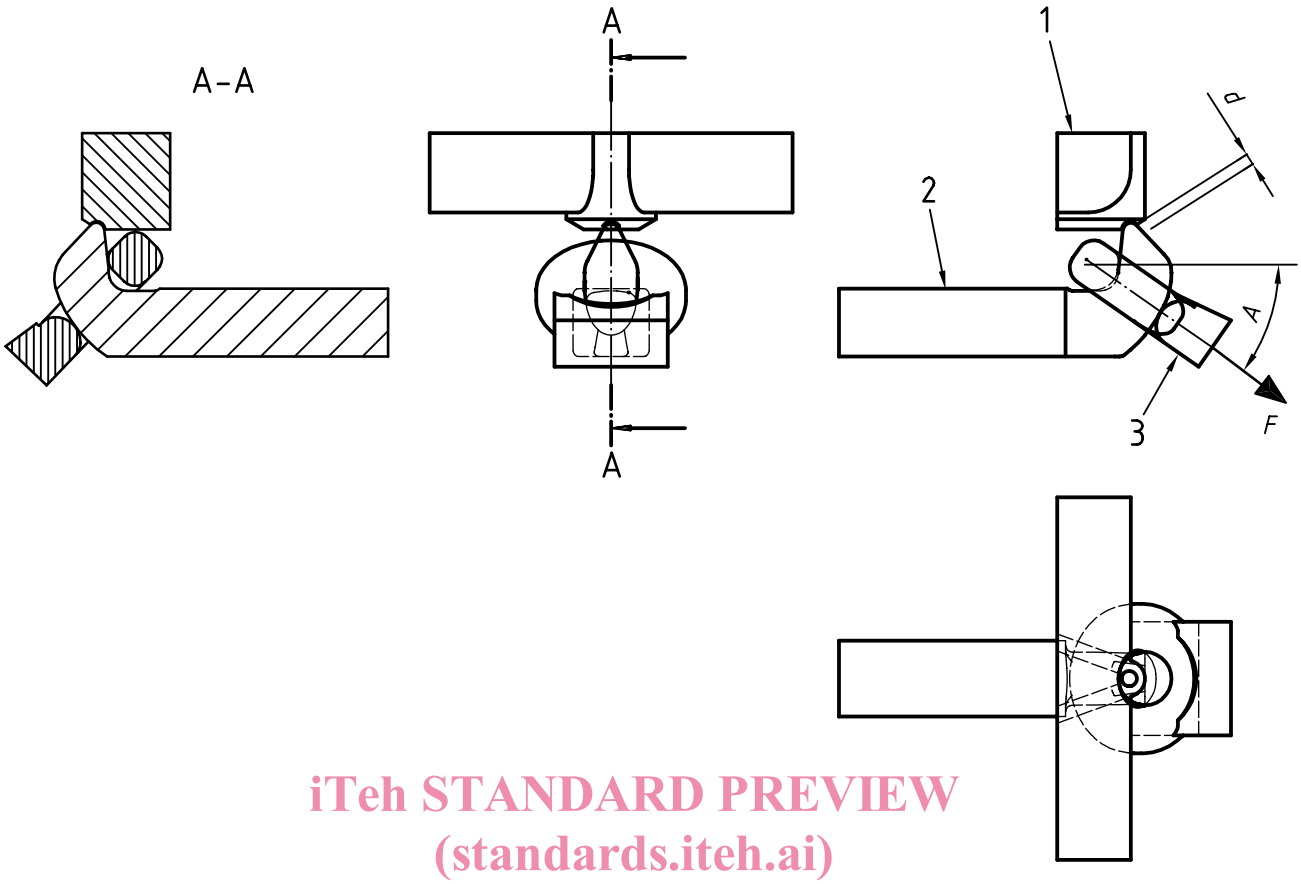
d) The loading direction shall, during the whole test, be kept to within ± 3° of the original set direction downwards and ± 1,5° from the set sideways inclination.

4.2.2 Keeper plate

The means of applying a force to the keeper plate (see Figure 2) and hook shall comply with the following requirements.

a) The static force shall be applied by means of a hitch ring whose dimensions are in accordance with ISO 20019.

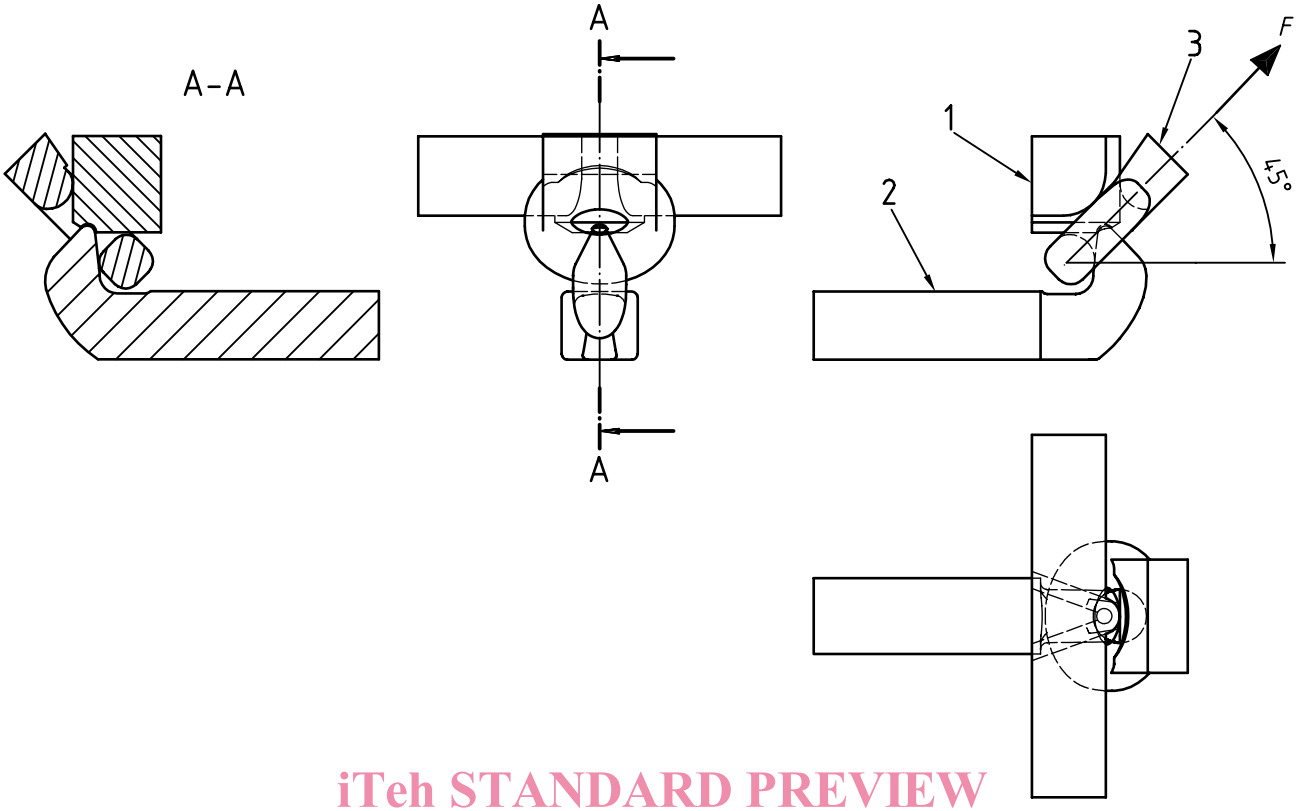
b) The force applied shall be within ± 2 % of the calculated force, and the upward inclination within ± 3°.



Key

1 Keeper plate
2 Hook
3 Ring

Figure 1 — Hook coupling device dynamic test load application



Key

1 Keeper plate
2 Hook
3 Ring

Figure 2 — Keeper plate static test load application

5 Preparation of hook coupling device

The hook coupling device shall be to production specification and fitted on the test bed or towing vehicle chassis with all parts, and only those parts, needed for installation on a towing vehicle.

The assembly shall be secured to the bedplate so that the members connecting the assembly and the bedplate do not deflect significantly. The assembly shall not receive any support under loading other than that due to the initial attachment.

6 Test conditions

The hook coupling device, in the locked position, shall be dynamically tested with a pulsating tensile force of the magnitude and direction specified in clauses 7 and 8.

After completion of the dynamic test, the keeper plate shall be tested with a static tensile force according to clause 9.

The tests shall be conducted at an ambient temperature of at least 10 °C.

7 Determination of test force and load direction

7.1 Test force

The determination of the test force, F, is valid for

— towing vehicle/trailer assemblies whose combined total mass does not exceed 40 t, and

— a ratio between the unladen mass of the towing vehicle and the maximum laden mass of the towing vehicle equal to 1,5 (as adopted in 89/173/EEC, Annex IV).

The test force, F, expressed in newtons, is determined using the following equation:

$$F = (F_h^2 + F_v^2)^{1/2}$$

where

F_h is a horizontal force, in newtons:

$$F_h = 12 m_R$$

where m_R is the reference mass in kilograms;

NOTE This is a simplified version of the formula for the horizontal force, F_h, found in 89/173/EEC.

F_v is a vertical force, in newtons:

$$F_v = 15S$$

where S is the static vertical load, in kilograms (if a value is not available, use $S = 0{,}6 m_R$).

When selecting the value S, the limitation on the vertical static load given in ISO 6489-1 shall be taken into account.

7.2 Load direction

The downward angle of load direction, A, is defined as:

$$\tan A = \frac{F_v}{F_h}$$

In addition, the load direction shall be inclined 5° to the side of the longitudinal plane.

8 Dynamic test of hook coupling device

Load the hook coupling device with a pulsating tensile force, F, according to clause 4.

Before the test, check that hook coupling device conforms to the requirements given in clause 5; conduct the test under the conditions given in clause 6.

Calculate the test force and load direction using the formulae given in 7.1 and 7.2.

During the whole test, the force shall alternate between $0{,}05F$ and $1{,}0F$. For steel components, test for 1×10^6 load cycles.