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Agricultural machinery — Agricultural trailers and trailed equipment — Drawbar jacks

Matériel agricole — Remorques agricoles et matériel traîné — Béquilles d'attelage

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 3, *Safety and comfort*.

This second edition cancels and replaces the first edition (ISO 12140:1998), which has been technically revised.

Agricultural machinery — Agricultural trailers and trailed equipment — Drawbar jacks

1 Scope

This International Standard specifies terms and definitions, establishes test procedures, and creates minimum performance requirements for telescopic mechanical screw-type jacks or hydraulic jacks mounted on agricultural implements as original equipment and/or replacement jacks.

Furthermore, this International Standard defines terms, establishes test procedures, and creates minimum acceptance criteria for the use of telescopic mechanical screw-type jacks or hydraulic jacks mounted on agricultural implements as original equipment jacks or jacks fitted with a jack attachment mounts (both weld-on and removable). In addition, it specifies minimum markings and information for use to be provided by the jack manufacturer.

These jacks are used specifically for:

— supporting the hitch points of towed agricultural implements during storage;

— lifting and lowering of implement hitches to facilitate attaching to or disconnecting from an agricultural tractor or other agricultural machines;

— levelling of machinery for stationary use.

NOTE Drawbar jacks as part/component of a machine are also covered by ISO 4254-1:2013.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

3 Terms and definitions

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

3.1
jack
hand or power-operated mechanism, with a ground contact pad (base) or wheel and fixing point (jack mount or mounting point), designed for controlled vertical movement

Note 1 to entry: A hand-operated jack typically uses mechanical means to control movement. A powered-operated jack typically uses hydraulic fluid displacement to control movement.

3.2
towed agricultural implement
machine or device that is designed to perform agricultural field operations and is pulled by an agricultural tractor or other agricultural machine and is usually equipped with wheels required for transport

3.3
static compressive load
vertical force measured at the jack location under static conditions

3.4
dynamic compressive load
vertical force measured at the jack location during jack extension (lifting)

3.5
static tensile load
force opposite of static compressive load resulting in a tension load applied to the jack

3.6
dynamic tensile load
force opposite of dynamic compressive load resulting in a tension load applied to the jack

3.7
side load
<fore-aft> force applied in a plane perpendicular to the longitudinal axis of the jack in a direction generally aligning with the towing direction of the towed agricultural implement

3.8
side load
<lateral> force applied in a plane perpendicular to the longitudinal axis of the jack at right angles to the general towing direction of the towed agricultural implement

3.9
screw and nut
threaded portion of the jack that transforms rotational motion of the crank assembly into linear motion of the jack

3.10
screw travel
total change in length of the jack from a fully retracted to a fully extended condition caused by screw movement only

3.11
swivel mount
jack mounting method that allows the jack to be rotated to a storage position without removing the jack from the towed implement

3.12
crank assembly
portion of the jack consisting of a crank and knob used to actuate the screw to extend or retract the jack

3.13
side wind jack
assembly of crank, knob, outer tube, inner tube and screw/nut that causes the extension or retraction of the jack when the crank assembly is rotated about an axis perpendicular to the screw travel

3.14
top wind jack
assembly of crank, knob, outer tube, inner tube and screw/nut that causes the extension or retraction of the jack when the crank assembly is rotated about an axis of rotation parallel to the screw travel

3.15
base
bottom load-bearing portion of the inner tube that transmits force to the ground or floor

3.16
jack cycle
cycle consisting of extending the jack through 65 % of the jack screw travel and then retracting the jack back to its original length

Note 1 to entry: If a particular jack has added screw travel for the purpose of greater unloaded range, the jack cycle can be based on 65 % of the normal screw travel.

3.17
retracted length
minimum attainable dimension from the centre of the mount to the bottom of the base of the jack

Note 1 to entry: In the case where the jack mount is not part of the jack during manufacture, use the uppermost part of the outer tube as the upper measuring point.

3.18
extended length
maximum attainable dimension from the centre of the mount to the bottom of the base of the jack

Note 1 to entry: In the case when the jack mount is not part of the jack during manufacturing, use the uppermost part of the jack outer tube as the upper measuring point.

3.19
basic rated life
L_{10}
term taken from bearing terminology, indicating that the 90 %-reliable life of the samples tested pass a given requirement

3.20
crank effort
tangential force, measured at the crank knob position, required to actuate the jack

3.21
jack stand system
includes the jack, attaching structure of the towed implement, jack mount, and attached components

3.22
implement tongue
that portion of the machine designed to be attached to the drawbar or hitch of the towing machine

3.23
drawbar
mechanical connection mounted on the rear of an agricultural tractor or other agricultural machine for the mechanical coupling of an implement

3.24
towed implement mount
part of the implement tongue designed to mount or accept the jack

3.25
largest application vertical static load
static compressive load when the intended application is at the maximum rated weight configuration

3.26
normal operational length
jack extended to its application length to properly support and lift the implement tongue to the appropriate height for hitching to the towing machine

Note 1 to entry: If the application length is unknown, the operational length shall be the maximum extended length of the jack.

4 Requirements

4.1 Crank effort

During the jack cycle, the crank effort shall not exceed 225 N while the jack is loaded to its rated dynamic compressive load capacity or, if applicable, its rated dynamic tensile load capacity. The knob on the crank assembly shall be designed to rotate freely on the crank and the knob shall have a radial dimension of not less than 25 mm.

4.2 Overtravel

The jack shall be designed with sufficient means to withstand the applied force when attempting to extend or retract beyond the intended screw travel. Without functional or catastrophic failures, the jack shall be able to sustain one and one half times the maximum crank effort experienced at the rated dynamic compressive lift capacity or, if applicable, the rated dynamic tensile load capacity.

4.3 Ground pressure

If the jack is provided with a substantially flat base, the base shall be of sufficient size that the average ground pressure shall not exceed 400 kPa. The implement manufacturer may include or recommend additional support to meet the required value. Jacks equipped with a wheel or other base configuration intended for use on an improved or special surface are excluded from this requirement.

4.4 Corrosion protection

The jack shall not experience a functional failure after a 48-h salt spray exposure in accordance with ISO 9227.

Note Guidance can be drawn from ASTM B-117-09 also.

4.5 Service life

The service life for the jack shall be greater than 250 jack cycles when tested in accordance with this International Standard.

4.6 Rated static compressive load capacity

The rated static compressive load capacity shall not exceed one half that of the static compressive load sufficient to cause catastrophic failure. This load shall be applied through the intended jack mount or swivel mount. The jack shall also be able to support the rated static compressive load and afterward meet all other requirements of this International Standard. This is a maximum value and may be reduced by the jack or implement manufacturer based on application.

4.7 Rated dynamic compressive load capacity

The rated dynamic compressive load capacity shall not exceed the largest dynamic compressive load to be moved by the jack through a jack cycle, and shall meet the service life and crank effort requirements of this International Standard. This load shall be applied through the intended jack mount or swivel mount. The jack shall also independently meet all other requirements of this International Standard. The rated dynamic compressive load capacity shall not exceed the rated static compressive load capacity. This is a maximum value and may be reduced by the jack or implement manufacturer based on application.

4.8 Rated static tensile load capacity

The rated static tensile load capacity shall not exceed one half that of the static tensile load sufficient to cause catastrophic failure. This load shall be applied through the intended jack mount or swivel mount. The jack shall also be able to support the rated static tensile load and afterward meet all other

requirements of this International Standard. This is a maximum value and may be reduced by the jack or implement manufacturer based on application.

4.9 Rated dynamic tensile load capacity

The rated dynamic tensile load capacity shall not exceed the largest dynamic tensile load to be repeatedly retracted (pulled) by the jack, and shall meet the service life and crank effort requirements of this International Standard. This load shall be applied through the intended jack mount or swivel mount. The jack shall also independently meet all other requirements of this International Standard. The rated dynamic tensile load capacity shall not exceed the rated static tensile load capacity. This is a maximum value and may be reduced by the jack or implement manufacturer based on application.

4.10 Rated static side load capacity

The rated static side load capacity shall not exceed one-half that of the static side load sufficient to cause catastrophic failure. This load shall be applied through the intended jack mount or swivel mount. The jack shall also be able to support the rated static side load and afterward meet all other requirements of this International Standard. The rated static side load capacity is the least value resulting from loading in any direction, such as fore-aft, lateral or other. This is a maximum value and may be reduced by the jack or implement manufacturer based on application.

4.11 Rated static side torque class

Jacks that have been manufactured with a specific mount or mounting location shall be classified in accordance with Table 1.

The rated static side torque shall be calculated as follows: rated static side torque is equal to rated static side load times the distance from the jack mounting location to the bottom of the base at maximum extension.

Table 1 — Rated static side torque classes

Class	**Torque,** in Newton metres Nm
I	<1351
II	1 351 to 2 050
III	2 051 to 2 700
IV	2 701 to 3 400
V	3 401 to 4 100
VI	4 101 to 5 400
VII	>5 400

4.12 Crank assembly

If the design of a mechanical jack includes a crank assembly for controlling the height adjustment of the drawbar, it shall be possible to stow the handle to avoid impalement.

4.13 Prevention of ground contact when not in use

The jack shall be either so designed, or have such a device installed, that it can be prevented from winding or dropping down by its own volition while the towed agricultural equipment or trailed equipment is in motion over the ground.

4.14 Security in operating position

For jacks that can be folded or moved into a storage position when not in use, it shall be possible to locate them securely in the operating position. The jack shall be lockable (by design or additional means). Supporting or height adjusting of the drawbar shall not be possible unless the jack is locked. This requirement shall be verified during the test described in 4.16.2.

For hydraulic jacks, a means to ensure that the load is maintained and the jack does not drift down shall be affixed to the jack, e.g. a holding valve. This requirement shall be verified during the test described in 6.3.3.

4.15 Hydraulic components and fittings

Hydraulic systems for hydraulic jacks shall comply with the safety requirements of ISO 4413.

4.16 Application performance

4.16.1 General

These performance requirements apply when the jack is mounted to the implement in the manner and location dictated by the implement design. Performance requirements shall be verified either by analytical methods or by successful performance of the tests described in Clause 6.

4.16.2 Static application vertical load

The jack stand system shall be capable of withstanding a static vertical load equal to 200 % of the largest application vertical static load. There shall be no functional or catastrophic failure of the jack stand system.

4.16.3 Static application side load

The jack stand system shall be capable of withstanding a vertical load of 120 % of largest application vertical static load while applying a side load of 50 % of the largest application vertical static load to the jack. There shall be no functional or catastrophic failure of the jack stand system.

4.16.4 Functional failure

The jack or jack stand system is described as having a functional failure if the jack does not meet any one of the following conditions:

a) have the ability to complete 10 jack cycles at the rated dynamic compressive load capacity;

b) have the ability to complete 10 jack cycles at the rated dynamic tensile load capacity, if applicable;

c) in the case of a swivel mount, the jack shall be able to rotate;

d) have the ability to sustain the rated static side load capacity.

4.16.5 Catastrophic failure

The jack or jack stand system is described as having a catastrophic failure if the jack does not meet any one of the following conditions:

a) have the ability to support its rated static compressive load capacity at any position in the jack travel;

b) have the ability to sustain its rated static tensile load capacity at any position in the jack travel, if applicable;

c) have the ability to withstand the static application side load at any position in the jack travel.

5 Marking

The permanent marking on a jack shall take into account changes in environment and use to sustain little or no change in physical properties. Examples of marking processes include stamping, embossing, permanent single-use adhesive labels or mechanically fastened nameplates.

Each jack shall be permanently marked:

a) to indicate its rated dynamic and static compressive load capacities or based on application, to indicate the rated static tensile load capacity and rated dynamic tensile load capacity in place of the respective compressive load capacity values;

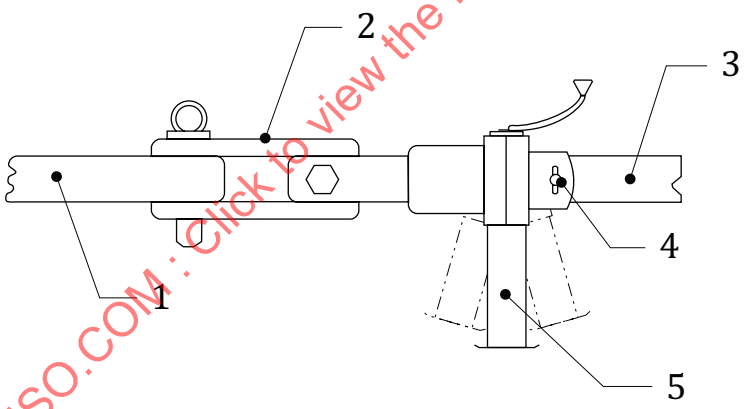
b) with a jack manufacturer's identification and a serial number or code indicating lot or approximate date of manufacture;

c) in the case of a hydraulic jack, the fluid to be used and an indication that it is essential that only a recommended fluid be used;

d) with a static side torque class in accordance with Table 1 for jacks with a specific mount or mounting location.

NOTE Concise common industry terms or abbreviated terms can be used in place of the above-mentioned terms.

If the jack stand system has an adjustable mount, an appropriate instruction sign shall be affixed to the implement near the jack mount indicating the proper adjustment of the jack or jack stand system. See Figure 1 as an example.



Key

1 drawbar
2 clevis
3 tongue
4 positioning nut
5 jack

Figure 1 — Jack stand system — Example

6 Acceptance tests — Installation and procedures

6.1 General procedures and installation of jack

a) For all tests, the jack shall be installed in accordance with the manufacturer's instructions on an implement tongue or a simulated fixture and fitted with the same mounting hardware with which the jack would normally be mounted.

b) All forces and restraints shall be applied in such a manner as to closely simulate actual field conditions.

c) A new jack shall be used for each test.

NOTE 1 A break-in period of 10 jack cycles is allowed for each new jack. Thermal and environmental conditions are intended to closely resemble field or application conditions.

d) Jack actuation shall resemble the input force in both type and direction found in actual practice. This generally consists of a force at an offset distance as determined by the crank assembly.

NOTE 2 If the intended application includes an outboard bearing, elimination of the tangential crank effort can more closely simulate field experience. Some of the tests in Clause 6 are of an iterative nature. It is possible that several trial "rated loads" can be evaluated.

e) Extend the jack to its maximum extended length.

f) For application testing, extend the jack to its normal operational length.

6.2 Jack stand system design verification tests

6.2.1 Crank effort test

a) Mount jack as specified in 6.1.

b) Load the jack to the rated dynamic compressive load capacity or if applicable, its rated dynamic tensile load capacity.

c) Measure the crank effort.

d) Test results shall be verified in accordance with 4.1.

6.2.2 Overtravel

a) Mount jack as specified in 6.1.

b) Extend and retract the jack until all internal stops have been encountered.

c) Test results shall be verified in accordance with 4.2.

6.2.3 Ground pressure

a) Determine the projected base area.

b) Calculate the ground pressure using the rated dynamic compressive load capacity.

c) Test results shall be verified in accordance with 4.3.

6.2.4 Corrosion protection test

a) Expose jack in its typical static position to a 48-h salt spray test in accordance with ISO 9227.

b) Test results shall be verified in accordance with 4.4.

