
**Industrial trucks — Verification of
stability —**

**Part 1:
General**

Chariots de manutention — Vérification de la stabilité —

Partie 1: Généralités

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ISO 22915-1:2008

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22915-1 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 2, *Safety of powered industrial trucks*.

ISO 22915 consists of the following parts, under the general title *Industrial trucks — Verification of stability*:

- STANDARD PREVIEW**
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- Part 1: *General*
 - Part 2: *Counterbalanced trucks with mast* ISO 22915-1:2008
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 - Part 3: *Reach and straddle trucks*
 - Part 4: *Pallet stackers, double stackers and order-picking trucks with operator position elevating up to and including 1 200 mm lift height*
 - Part 7: *Bidirectional and multidirectional trucks*
 - Part 8: *Additional stability test for trucks operating in the special condition of stacking with mast tilted forward and load elevated*
 - Part 10: *Additional stability test for trucks operating in the special condition of stacking with load laterally displaced by powered devices*
 - Part 20: *Additional stability test for trucks operating in the special condition of offset load, offset by utilization*
 - Part 21: *Order-picking trucks with operator position elevating above 1 200 mm*

The following parts are under preparation:

- Part 5: *Single side loading trucks*
- Part 9: *Counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer*
- Part 11: *Industrial variable reach trucks*
- Part 12: *Industrial variable reach trucks handling freight containers of 6 m (20 ft) length and longer*

- *Part 14: Rough-terrain variable reach trucks*
- *Part 15: Counterbalanced trucks with articulated steering*
- *Part 16: Pedestrian-propelled trucks*
- *Part 17: Burden and personnel carriers*

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Introduction

An important step forward in work on the ISO 22915 series was the agreement to put in place a new structure. The stability tests are presented in the form of a basic part describing and defining stability tests in general, together with separate parts that each give specific stability test criteria and requirements for a different truck type.

From the very beginning, the task of the Working Group involved was to establish the new structure and revise existing standards to create a series of International Standards complying with the major legislative regulations in the world such as those in force in the EU, USA, Japan and Australia.

For several problem areas compromises were needed and will be needed in the future. In order to ensure that these International Standards are actively used in the ISO member countries worldwide, it will be necessary that they replace existing national standards.

Only in this way will there will be the guarantee that products in accordance with these International Standards can be shipped worldwide, freely and without any technical barriers to trade.

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Industrial trucks — Verification of stability —

Part 1: General

1 Scope

ISO 22915 deals with the safety of industrial trucks, as defined in ISO 5053, relative to their stability and the verification of that stability. For the purposes of ISO 22915, industrial trucks are wheeled, self-propelled or pedestrian-propelled vehicles, excepting those running on rails. They are either operator-controlled or driverless and designed to carry, tow, push, lift, stack or tier in racks.

This part of ISO 22915 specifies basic test criteria and requirements to verify stability for industrial trucks, hereafter referred to as trucks.

It applies to the following truck types and special conditions:

- a) counterbalanced trucks with mast, as specified in ISO 22915-2;
- b) reach and straddle trucks, as specified in ISO 22915-3;
- c) pallet stackers, double stackers and order-picking trucks up to and including 1 200 mm lift height, as specified in ISO 22915-4;
- d) single side loading trucks¹⁾;
- e) bidirectional and multidirectional trucks, as specified in ISO 22915-7;
- f) additional stability test for trucks operating in special conditions of stacking with the mast tilted forward, as specified in ISO 22915-8;
- g) counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer¹⁾;
- h) additional stability test for trucks operating in special conditions with the load substantially laterally displaced by powered devices, as specified in ISO 22915-10;
- i) industrial variable reach trucks¹⁾;
- j) industrial variable reach trucks handling freight containers of 6 m (20 ft) length and longer¹⁾;
- k) rough-terrain variable reach trucks¹⁾;
- l) counterbalanced trucks with articulated steering¹⁾;
- m) pedestrian-propelled trucks¹⁾;
- n) burden and personnel carriers¹⁾;
- o) additional stability test for trucks operating in the special condition of offset load, offset determined by utilization, as specified in ISO 22915-20;
- p) order-picking trucks with operator position elevating above 1 200 mm, as specified in ISO 22915-21.

1) Intended to be covered by a future part of ISO 22915. See Foreword.

It also applies to trucks operating under the same conditions when equipped with load-handling attachments.

This part of ISO 22915 does not apply to:

- trucks handling suspended loads which may swing freely;
- low-lift trucks with lift height up to and including 500 mm.

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 3411, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

ISO 5053, *Powered industrial trucks — Terminology*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

3 Terms and definitions

STANDARD PREVIEW

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

3.1

normal operating conditions

(trucks other than variable reach and rough-terrain trucks) operating conditions corresponding to

- a) stacking with fork arms reasonably horizontal on substantially firm, smooth, level, and prepared surfaces,
- b) operating with a load centre of gravity approximately on the longitudinal centre plane of the truck,
- c) travelling with the mast or fork arms tilted rearward, if possible, and the load in the lowered (travel) position on substantially firm, smooth, level, and prepared surface; for reach trucks, with the mast or forks fully retracted,
- d) travelling or manoeuvring with elevated load/operator (if the truck is specifically designed for this condition)

3.2

normal operating conditions

(variable reach and rough-terrain trucks) operating conditions corresponding to

- a) stacking with a combination of boom elevation/extension and the fork arms reasonably horizontal on substantially firm smooth, level and prepared surfaces,
- b) operating with the load centre of gravity approximately on the longitudinal centre plane of the truck,
- c) trucks with a mast, manoeuvring an elevated load with the mast neither tilted rearwards more than 10° nor the centre of gravity of the load displaced rearwards more than 600 mm,
- d) manoeuvring an elevated load with the fork arms tilted rearwards,
- e) rough-terrain trucks travelling with the mast or fork arms tilted rearwards and the load in the lowered (travelling) position on unimproved natural terrain and disturbed-terrain areas; where applicable, any reaching/telescopic mechanism is to be fully retracted

3.3**operating conditions other than normal**

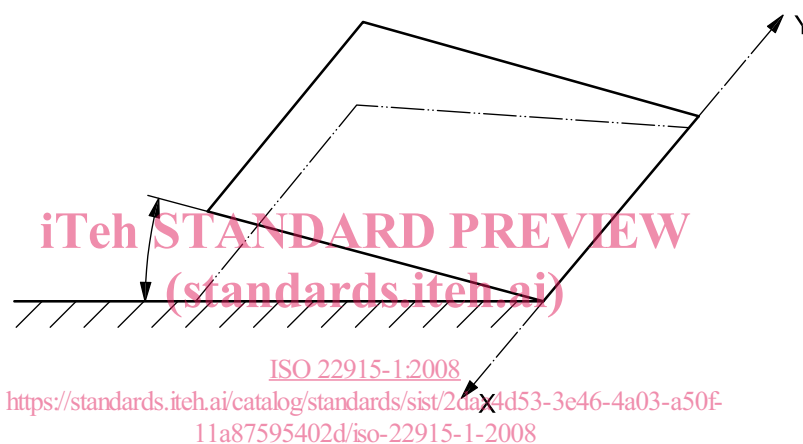
operating conditions differing from those stated in 3.1 or 3.2, necessitating a truck that complies with either

- a) appropriate International Standards covering the different specific conditions (e.g. trucks operated with offset load by powered devices or by utilization, trucks with mast tilted forward and trucks handling freight containers), or
- b) stability requirements agreed upon by the interested parties in consultation with the manufacturer and being not less than required by the tests specified for normal operating conditions for that type of truck

3.4**tilt table**

rigid table tilted at least to one side to prove the lateral and longitudinal stability of a truck positioned on that table

See Figure 1.

**Key**

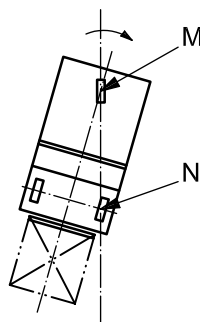
X–Y indicates the tilt axis of the tilt table

Figure 1 — Tilt table

3.5**tilt axis**

axis about which the truck tips over, longitudinally or laterally, when a sufficient static or dynamic force is applied above the centre of gravity of the truck

See Figure 2.

**Key**

M–N indicates the tilt axis of the truck

Figure 2 — Tilt axis