INTERNATIONAL STANDARD

ISO 22915-4

Second edition
2018-11

Industrial trucks — Verification of stability —

Part 4: Pallet stackers, double stackers and order-picking trucks with operator position elevating up to and including 1 200 mm lift height

Chariots de manutention — Vérification de la stabilité —

Partie 4: Chariots à fourche recouvrante, chariots à double fourche et chariots préparateurs de commandes avec un poste de conduite élevable ayant une hauteur de levée de 1 200 mm inclus

Reference number
ISO 22915-4:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

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 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 22915-4:2009), which has been technically revised. It also incorporates the Amendment ISO 22915-4:2009/Amd 1:2013.

The main changes compared to the previous edition are as follows:

— the wording of 4.2.3 is revised editorially for better comprehensibility;

— several drawings in Table 1 are redrawn for better comprehensibility.

A list of all parts in the ISO 22915 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Industrial trucks — Verification of stability —

Part 4: Pallet stackers, double stackers and order-picking trucks with operator position elevating up to and including 1 200 mm lift height

1 Scope

This part of ISO 22915 specifies tests for verifying the stability of

— pallet stackers,

— double stackers, and

— order-picking trucks with an operator position elevating up to and including 1 200 mm lift height, measured from the ground to the floor of the platform.

It is applicable to these types of industrial truck, whether with tilting or non tilting masts or fork arms, having a rated capacity up to and including 5 000 kg.

It is also applicable to such trucks operating under the same conditions when equipped with load-handling attachments and to order-picking trucks with an elevating operator's position up to and including 1 200 mm lift height when equipped with an additional load lifting device(s).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 5053-1, *Industrial trucks — Terminology and classification — Part 1: Types of industrial trucks*

ISO 22915-1, *Industrial trucks — Verification of stability — Part 1: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053-1 and ISO 22915-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Test conditions

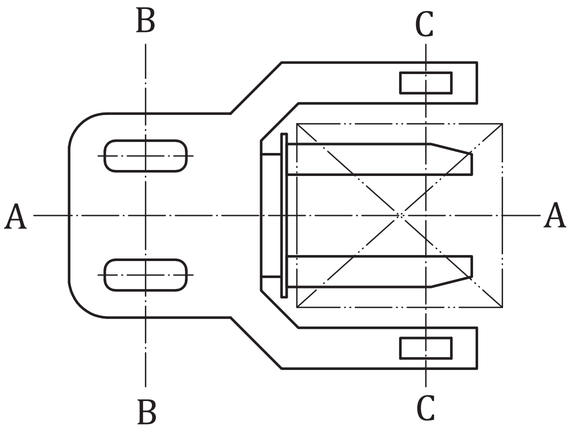
4.1 General

See ISO 22915-1.

4.2 Position of the truck on the tilt table

4.2.1 Load and drive/steer axles

The load axle and the drive/steer axle are defined by Figure 1.



Key

A-A longitudinal centre plane of truck

B-B drive/steer axle

C-C load axle

Figure 1 — Load and drive/steer axles

4.2.2 Tests 1, 2, 6, 7 and 8

The truck shall be positioned on the tilt table so that its drive/steer axle, B–B, and load axle, C–C, are parallel to the tilt axis, X–Y, of the tilt table. See Table 1.

4.2.3 Tests 3, 4, 5 and 9

The truck shall be positioned on the tilt table with the line, M–N, parallel to the tilt axis, X–Y, of the tilt table. See Table 1.

Point M is the point on the drive/steer axle B-B projected onto the tilt table and defined as follows.

a) For trucks with a single non-articulating drive (steer) wheel: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the drive/steer axle and the centreline of the drive wheel width.

b) For trucks with a single or dual non-sprung castor wheel: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the castor wheel axle and the centreline of the castor wheel width (single) or the centreline between the two castor wheels (dual), with the centreline of the castor wheel axle being positioned parallel to X–Y. The castor wheel shall be turned away from X-Y to the orientation that produces minimum stability.

c) For trucks with a drive/steer axle in an articulating frame articulated in the centre plane of the truck: point M shall be the vertical projection onto the tilt table of the point of intersection between the lateral axis of the articulating frame and the centre plane, A–A, of the truck.

d) For trucks with a sprung castor wheel and a single non-sprung drive/steer wheel: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the drive wheel axle and the centreline of the drive wheel width, with the drive wheel positioned parallel to X–Y. The castor wheel shall be turned away from X-Y to the orientation that produces minimum stability.

e) For trucks with non-articulated dual drive/steer wheels: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the drive axle, B–B, and the centreline of the width of the drive wheel closest to X–Y, with the drive wheels positioned parallel to X–Y.

f) For trucks with non-articulated, non-sprung chassis castors: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the castor wheel axles and the centreline of the castor wheel width, with the non-sprung castors positioned with the centreline of the castor wheel axles parallel to X–Y. The castor wheel shall be turned away from X-Y to the orientation that produces minimum stability.

g) For trucks with a non-articulated, single drive wheel (steered) on the centre plane, A–A, and having sprung castor wheels: point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the drive wheel axle and the centreline of the drive wheel width, with the axle of the drive wheel positioned at right angles to the tilt axis X–Y. The castor wheel axle closest to X–Y shall be positioned parallel to and turned away from X-Y to the orientation that produces minimum stability.

As shown in Table 1, point N is defined as the centre point of the area of contact between the tilt table surface and the load front wheel closest to the tilt axis, X–Y, of the tilt table.

4.3 Datum point positions

4.3.1 General

Test 1 shall be conducted with the horizontal position of the load datum point, E, unchanged when elevated from its lowered position as shown in Figure 2.

With the prescribed test load, set the mast vertical and then elevate to approximately 300 mm above the tilt table. With the shank of the front face of the fork arm set vertical, establish point E, as shown in Figure 2 a), on the fork arms or fork carrier having a fixed relationship to the centre of gravity of the test load. Point E shall be used to provide a reference datum point, F, on the tilt table. When the mast is elevated, a new point, F1, on the tilt table may occur, as shown in Figure 2 b). This new point may be returned to the original location of F, as shown in Figure 2 c).

For trucks with tilting masts, changes in the location of F1 may be corrected by varying the tilt of the mast within the limits provided by the design of the truck, as shown in Figure 2.

For trucks with non-tilting masts, the location of F1 may be returned to the original location of F by adjusting the fork arms or fork carrier within the limits provided by the design of the truck.

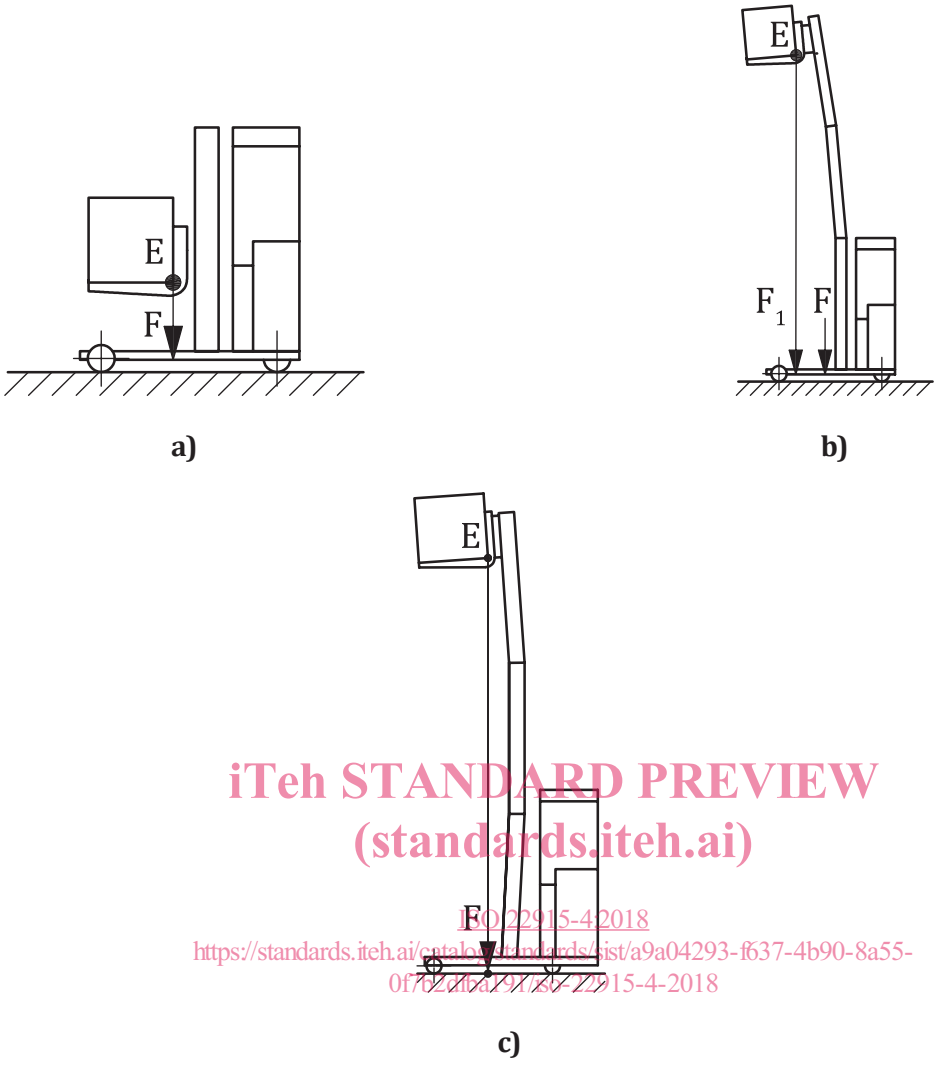


Figure 2 — Datum point position

4.4 Lift height for tests simulating travel

For tests simulating travel (tests 2, 4, 5 and 8), the upper face of the fork arms, measured at the heel of the fork arm, shall be positioned 300 mm above the tilt table or as close as possible to the outrigger, whichever is the higher.

4.5 Position of upper load when the truck is used as a double stacker

For trucks travelling with two loads, one load on the support arms and the other on the fork arms, the upper load shall be positioned so that the heel of the upper forks is at

— 1 100 mm from the load bearing surface of the support arms, for trucks intended for a standard load distance of 500 mm,

— 1 300 mm from the load bearing surface of the support arms, for trucks intended for a standard load distance of 600 mm.

5 Verification of stability

The stability of a truck shall be verified in accordance with Table 1.

Table 1 — Verification of stability

Test criteria		Test 1	Test 2	Test 3[b]	Test 4[b,d]	Test 5	Test 6	Test 7[e,f,h]	Test 8	Test 9[e,f,h]
Direction of test	Longitudinal	x	x				x	x	x	
	Lateral			x	x	x				x
Direction of load-handling device	Load leading	x	x					x		
	Load trailing						x	x	x	
Mode of operation	Travelling		x		x	x		x	x	x
	Stacking/ retrieving	x		x			x			
Load at load centre	With	x	x	x	x		x	x		x
	Without					x			x	
Lift height	Maximum	x		x			x	g		
	Travel		x		x	x			x	g
Position of mast	Vertical	x			c			x		
	Full rearward		x				x		x	
Tilt-table angle		4 %	18 %	$(2 + 0{,}3v)$ % min. 3,5 % max. 6 %	$(2 + 0{,}6v)$ % for $v \leq 6$ km/h max. 6 % $(2 + 0{,}7v)$ % for $v > 6$ km/h max. 7 %	$(15 + 1{,}1v)$ % max. 26 %	10 %	$(4 + 1{,}24v)$ % see NOTE 1 or $(8 + 1{,}24v)$ % see NOTE 2	$(10 + 0{,}5i + 1{,}1v)$ % for $v \leq 10$ km/h $(21 + 0{,}5i)$ % for $v > 10$ km/h max. 26 %	$(6 + 1{,}24v)$ %
		i is the maximum gradient, expressed as a percentage, on which the unladen truck is designed to travel. v is the maximum travel speed of the truck (unladen or laden with the actual load), in km/h.								
Truck position on tilt table