INTERNATIONAL STANDARD

ISO 22915-7

Second edition
2016-08-15

Industrial trucks — Verification of stability —

Part 7: Bidirectional and multidirectional trucks

Chariots de manutention — Vérification de la stabilité — Partie 7: Chariots bidirectionnels et multidirectionnels

Reference number
ISO 22915-7:2016(E)

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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 (see www.iso.org/directives).

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For an explanation on 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

The committee responsible for this document is ISO/TC 110, *Industrial trucks*, Subcommittee SC 2, *Safety of powered industrial trucks*.

This second edition cancels and replaces the first edition (ISO 22915-7:2009), which has been technically revised.

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

— *Part 1: General*

— *Part 2: Counterbalanced trucks with mast*

— *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 5: Single-side-loading trucks*

— *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 9: Counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer*

— *Part 10: Additional stability test for trucks operating in the special condition of stacking with load laterally displaced by powered devices*

— *Part 11: Industrial variable-reach trucks*

— *Part 12: Industrial variable-reach trucks handling freight containers of 6 m (20 ft) length and longer*

— *Part 13: Rough-terrain trucks with mast*

— *Part 14: Rough-terrain variable-reach trucks*

— *Part 15: Counterbalanced trucks with articulated steering*

— *Part 16: Pedestrian-propelled trucks*

— *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*

— *Part 22: Lateral- and front-stacking trucks with and without elevating operator position*

— *Part 24: Slewing variable-reach rough-terrain trucks*

Industrial trucks — Verification of stability —

Part 7: Bidirectional and multidirectional trucks

1 Scope

This part of ISO 22915 specifies the tests for verifying the stability of bidirectional and multidirectional trucks with tilting or non-tilting mast or fork arms.

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

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 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.

4 Test conditions

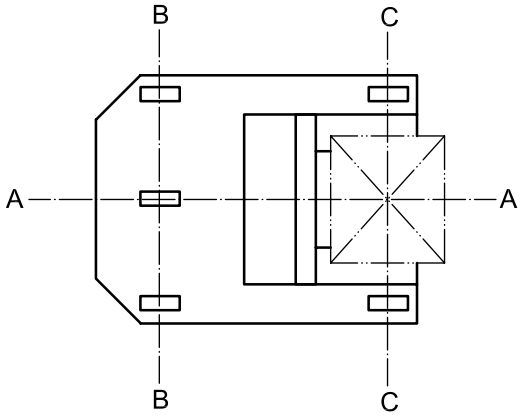
4.1 General

The test conditions shall be in accordance with ISO 22915-1.

4.2 Position of the truck on the tilt table

4.2.1 Load/steer axle and drive/steer axle

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



Key

A–A longitudinal centre plane of the truck

B–B drive/steer axle

C–C load/steer axle

Figure 1 — Load/steer and drive/steer axles

4.2.2 Tests 1 to 5

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

4.2.3 Tests 6 to 9

The truck shall be positioned on the tilt table with the line, M–N, or the outrigger (load/steer) axle, C–C, parallel to the tilt axis, X–Y, of the tilt table. See Table 1.

Point M is defined as follows.

a) For trucks with a sprung castor 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 drive/steer wheels in an articulated frame: point M shall be the vertical projection onto the tilt table of the point of intersection between the articulated frame axle and the lateral axis of the articulated frame.

c) For trucks with a single 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.

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 wheel nearest to the tilt axis, X–Y, of the tilt table.

4.3 Datum point positions

4.3.1 General

Test 1 may 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) and b), 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, F_1, on the tilt table might occur, as shown in Figure 2 c) and d). This new point may be returned to the original location of F, as shown in Figure 2 e) and f).

For trucks with tilting masts, changes in the location of F_1 may be corrected by varying the tilt of the mast within the limits provided by the design of the truck. See Figure 2 a), c) and e).

For trucks with non-tilting masts, the location of F_1 is subject to regional requirements (see 4.3.2).

4.3.2 Regional requirements for trucks with non-tilting masts

4.3.2.1 North America

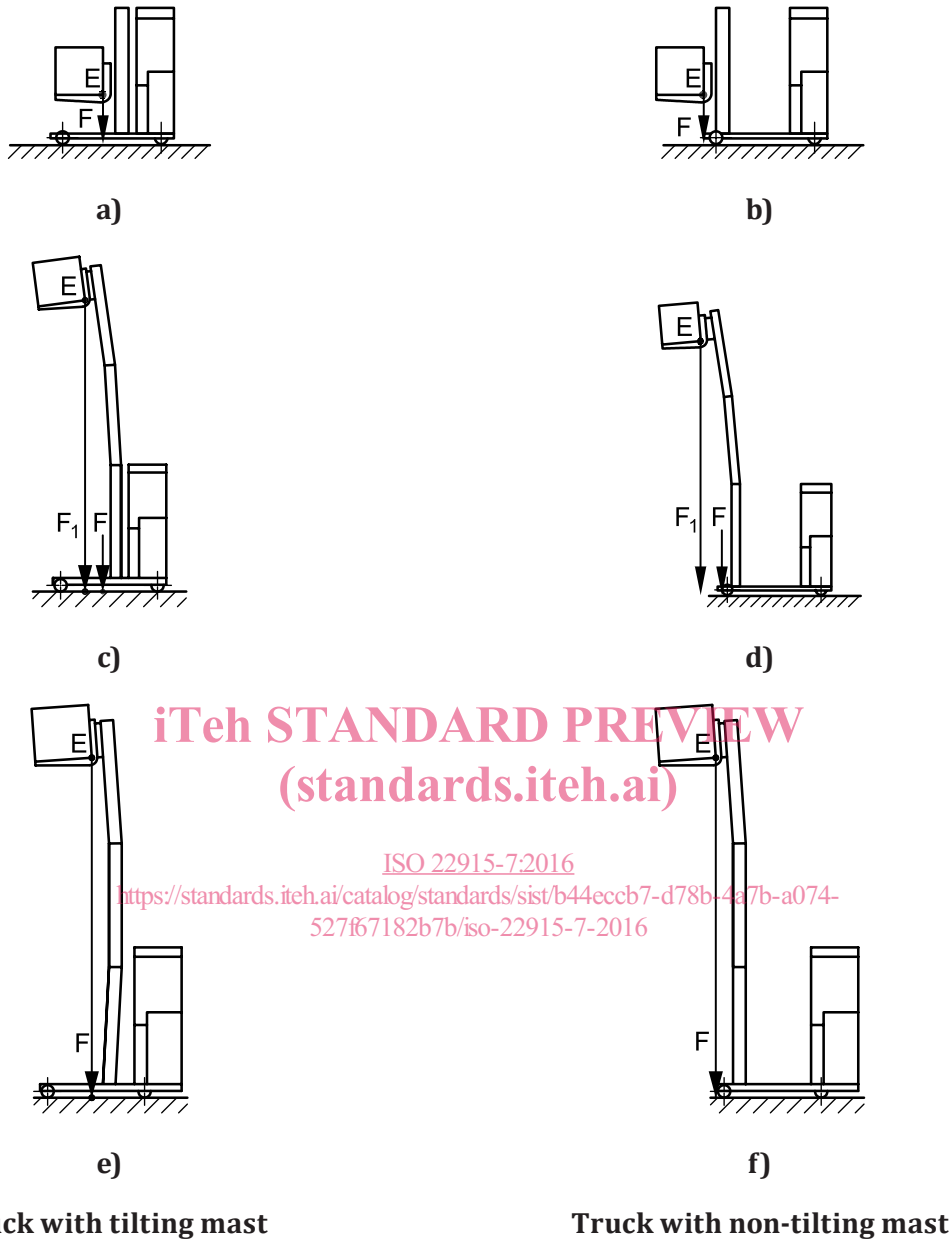
The location of F_1 shall not be corrected. Only correction by varying the mast tilt is permissible.

4.3.2.2 All other regions

Adjustments in the fork arms or fork carrier tilt, fork carrier retraction (where provided) or retraction of the mast may be used to correct for changes in the location of point F_1, within the limits provided by the design of the truck. See Figure 2 b), d) and f).

4.4 Lift height for tests simulating travel

For tests simulating travel (Tests 5, 6 and 7), the upper face of the fork arms, measured at the heel of the fork arm, shall be positioned 300 mm above the tilt table for trucks with a rated capacity less than or equal to 10 t, and 500 mm for trucks with a rated capacity of greater than 10 t.



Truck with tilting mast **Truck with non-tilting mast**

Figure 2 — Datum point positions

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	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9
Direction of test	Longitudinal	x	x	x	x	x				
	Lateral						x	x	x	x
Mode of operation	Travelling					x	x	x		
	Stacking/ retrieving	x	x	x	x				x	x
Load at load centre	With	x	x					x	x	
	Without			x	x	x	x			x
Lift height	Maximum	x	x	x	x				x	x
	Travel					x	x	x		
Position of carrying device	Extended	x								
	Retracted		x	x	x	x	x	x	x	x
Position of mast	Vertical	x					x	x	x	
	Full rearward		x (if stability thereby reduced)	x (if stability thereby reduced)	x (if stability thereby reduced)	x	x (if stability thereby reduced)	x (if stability thereby reduced)	x (if stability thereby reduced)	x (if stability thereby reduced)
Tilt table angle for actual capacity	<5 000 kg	4 %	14 %	14 %	14 %	(15 + 0,5*i* + 1,55*v*) % or max. (40 + 0,5*i*) % (see Figure 3)	(15+1,1*v*) % or max. 40 % (see Figure 4)	18 %	6 %	8 %
	≥5 000 kg	3,5 %								
Position of least stability			x	x	x		x	x	x	x

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 unladen truck, in km/h.