INTERNATIONAL STANDARD

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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
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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 22915-7 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*:

— *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 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 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*

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 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 5053, *Powered industrial trucks — Terminology*

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 and ISO 22915-1 apply.

4 Test conditions

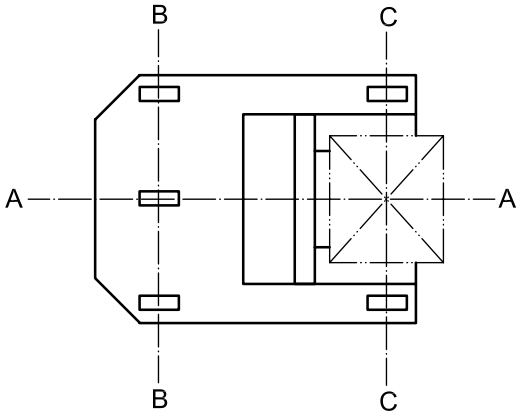
4.1 General

See 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 may 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.

4.3.2 Regional requirements for trucks with non-tilting masts

4.3.2.1 North America and Australia

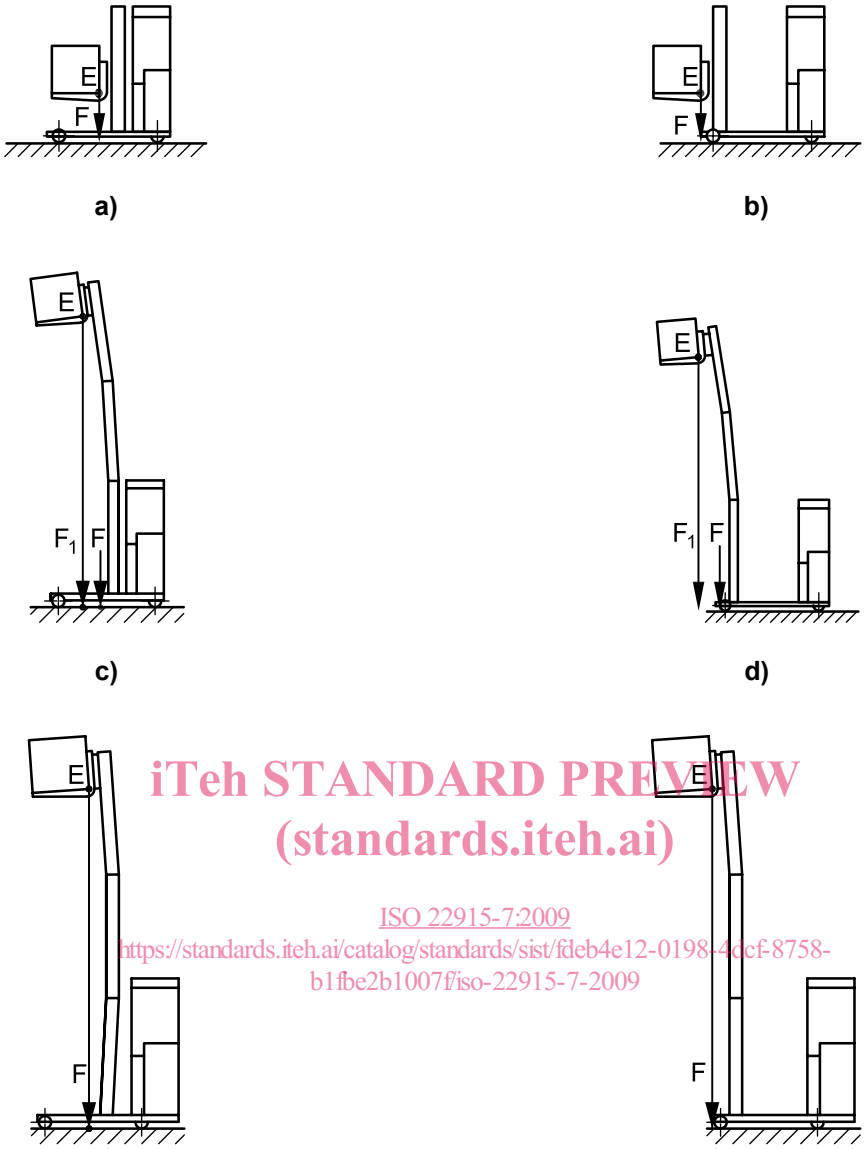
The location of F_1 shall not be corrected. Only correction by varying the mast tilt is permissible.

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 + 0,5i + 1,55v) % or max. (40 + 0,5i) % (see Figure 3)	(15+1,1v) % 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.