BS ISO 22915-3:2014

BSI Standards Publication

Industrial trucks — Verification of stability

Part 3: Reach and straddle trucks

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National foreword

This British Standard is the UK implementation of ISO 22915-3:2014. It supersedes BS ISO 22915-3:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MHE/7, Industrial trucks.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

ISO 22915-3

Second edition
2014-07-01

Industrial trucks — Verification of stability —

Part 3: Reach and straddle trucks

Chariots de manutention — Vérification de la stabilité —

Partie 3: Chariots à mât ou à fourche rétractable

Reference number
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Foreword

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

This second edition cancels and replaces the first edition (ISO 22915-3:2008), of which it constitutes a minor revision.

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 off 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*

The following parts are under preparation:

— *Part 24: Slewing variable-reach trucks*

Industrial and RTT lorry-mounted trucks are to form the subject of a future part 23.

INTERNATIONAL STANDARD ISO 22915-3:2014(E)

Industrial trucks — Verification of stability —

Part 3: Reach and straddle trucks

1 Scope

This part of ISO 22915 specifies the tests for verifying the stability of reach trucks (with retractable mast or fork) and straddle trucks, equipped with tilting or non-tilting masts or fork arms and 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.

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, *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

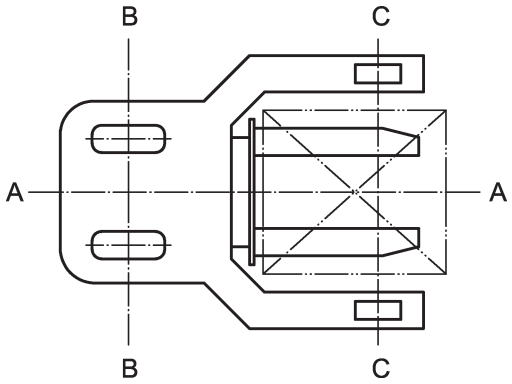
4.1 General

See ISO 22915-1.

4.2 Position of truck on tilt table

4.2.1 Load and drive/steer axles

The load and drive/steer axles 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 and 5

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 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 non-sprung castor wheel point:**

   1) for tests carried out on the castor wheel side of the truck, 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 midpoint between the castor wheel or the two castor wheels, with the non-sprung castor being positioned with the centreline of the castor wheel axle nearer to the centre plane of the truck;

   2) for tests carried out on the drive (steer) wheel side of the truck, 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.

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 the 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 axle of the drive wheel positioned at right angles to the tilt axis.

e) **For trucks with non-articulated dual drive (steer) wheels in pivoting mounting:** point M shall be the vertical projection onto the tilt table of the point of intersection between the centreline of the

drive axle and the centreline of the width of the drive wheel closer to the tilt axis, with the axle of the drive wheels positioned at right angles to the tilt axis.

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 width, with the non-sprung castor positioned with the centreline of the castor wheel axle nearer to the centre plane of the truck.

g) **For trucks with a non-articulated, single-drive wheel (steered) on the centre plane, A–A, and 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. The castor wheel closest to the tilt axis shall be positioned at right angles to the tilt axis and the castor wheel axle shall be nearer to the centre plane of the truck.

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 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 2, 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.

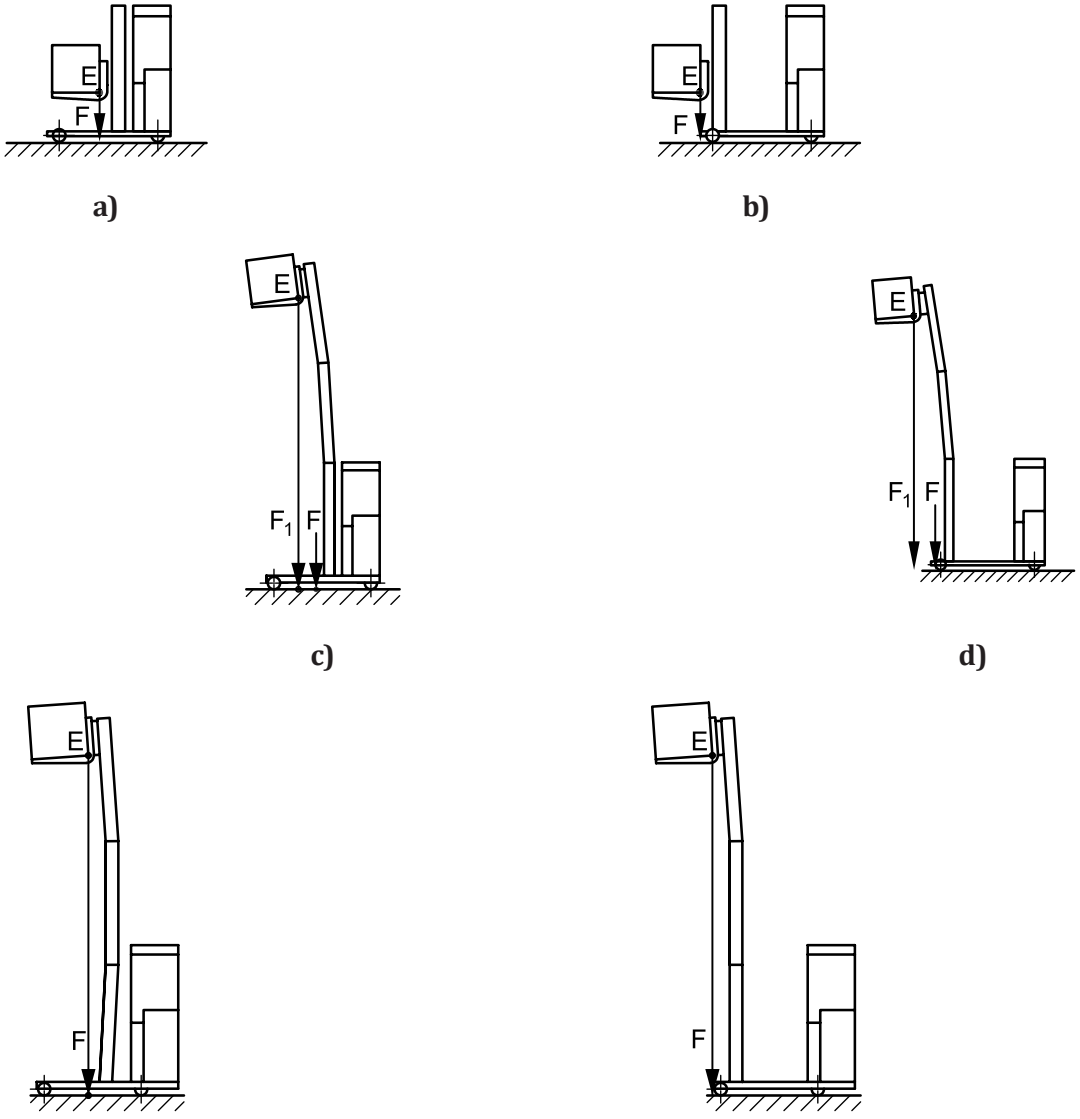
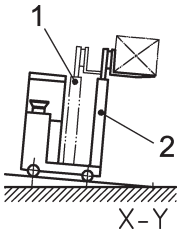
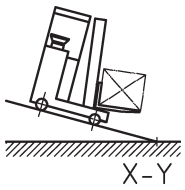
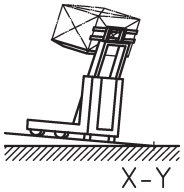
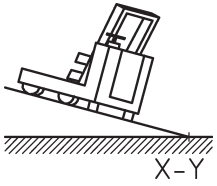
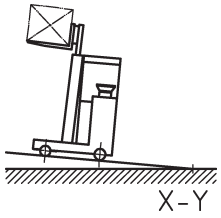
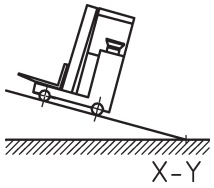


Figure 2 — Datum point positions

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
Direction of test	Longitudinal	x	x				x	x	x
	Lateral			x	x	x			
Direction of load-handling device	Load leading	x	x						
	Load trailing						x	x	x
Mode of operation	Travelling		x			x			x
	Stacking/ retrieving	x		x	x		x	x	
Load at load centre	With	x	x	x			x		
	Without				x	x		x	x
Lift height	Maximum	x		x	x		x	x	
	Travel		x			x			x
Position of load-carrying device	Extendable	x[a]							
	Retractable		x	x	x	x	x	x	x
Position of mast	Vertical	x		b	b	b			
	Full rearward		x	b	b	b			
Tilt table angle		4 %	18 %	6 %	8 %	(15 + 1,1v) % or 50 % max.	14 %	14 %	(15 + 0,5i + 1,55v) % (40 + 0,5i) % max.
Truck position on tilt table									

1 Position for straddle trucks

2 Extended (for reach trucks)

v Maximum travel speed of unladen truck, km/h

i Maximum gradient, expressed as a percentage, on which unladen truck is designed to travel

Table 1 — *(continued)*

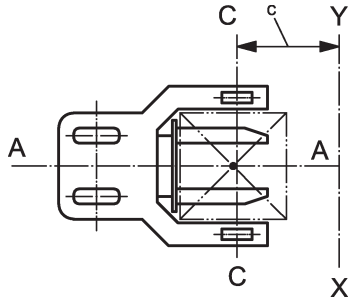
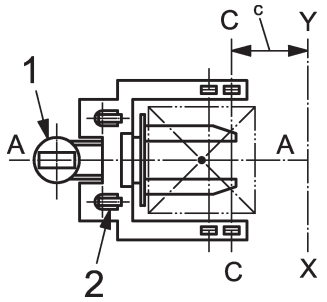
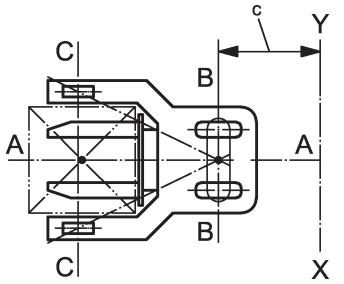
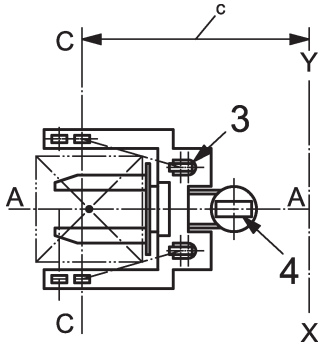
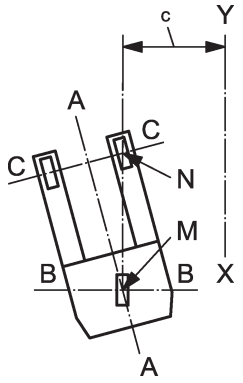
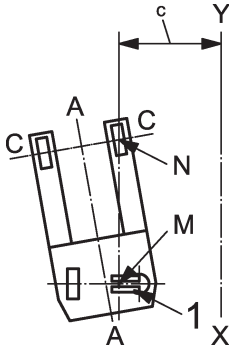
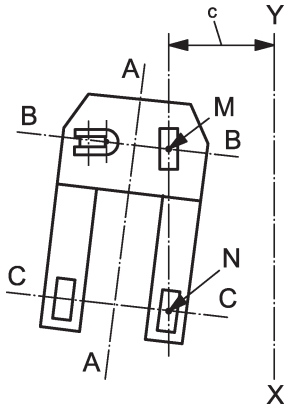
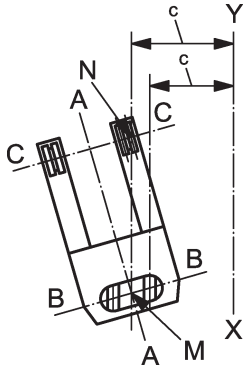
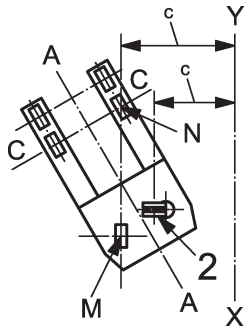
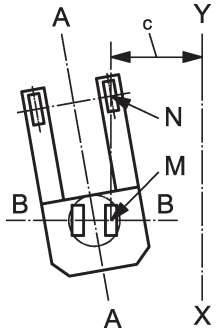
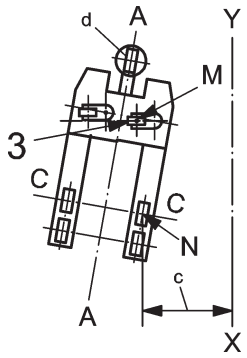
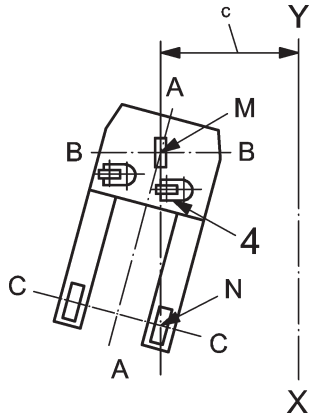
Test criteria	Tests 1, 2, 6, 7 and 8
Truck position on tilt table	  **As per 4.2.2 — Tests 1 and 2**   **As per 4.2.2 — Tests 6, 7 and 8** 1 Articulated steering and driving axle (any wheel position permitted in test) 2 Non-articulated, non-sprung castors (any wheel position permitted in test) 3 Non-articulated, non-sprung castors turned towards load 4 Articulated steering and driving axle (longitudinal direction)

Table 1 — *(continued)*

Test criteria	Tests 3, 4 and 5 (points M and N)
Truck position on tilt table	 **As per 4.2.3 a)**  **As per 4.2.3 b) 1)**  **As per 4.2.3 b) 2)**  **As per 4.2.3 c)**  **As per 4.2.3 d)**  **As per 4.2.3 e)**  **As per 4.2.3 f)**  **As per 4.2.3 g)** 1 Non-sprung castor 2 Support wheel sprung castor 3 Non-articulated, non-sprung castor turned towards truck centreline 4 Sprung castor turned towards truck centreline

a For reach trucks only.

b When the truck is equipped with a tilting mast or tilting fork arms, these shall be positioned so that the truck is at its least stable.

c Parallel.

d Any position.

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