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Industrial trucks — Verification of stability —

Part 16: Pedestrian-propelled trucks

Chariots de manutention — Vérification de la stabilité —

Partie 16: Chariots à conducteur à propulsion manuelle

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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 document 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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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 22915-16:2014), which has been technically revised.

The main changes are as follows:

— in the Scope, for scissor-lift pallet trucks with lift heights up to 1 000 mm, the rated capacity has been increased to 1 500 kg;

— in the Scope, "straddle" has been replaced with "stacker" and "platform stacker" has been replaced by "pallet stacker" (in accordance with ISO 5053-1);

— in Table 3, the figure at the bottom right for lateral test (i.e., non-articulated, non-sprung castor wheel axle turned towards load axle C–C and parallel with X–Y), has been updated.

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 16: Pedestrian-propelled trucks

1 Scope

This document specifies tests for verifying the stability of pedestrian-propelled trucks.

It is applicable to:

— stacker, pallet and pallet stacker trucks with capacities not exceeding 1 000 kg, with manual or battery-powered lift;

— scissor-lift pallet trucks with lift heights up to 1 000 mm and rated capacity up to 1 500 kg, with manual or battery-powered lift;

— platform trucks.

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

It is not applicable to trucks with retractable devices such as a retractable mast or retractable fork carrier.

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 3691-5:2014, *Industrial trucks — Safety requirements and verification — Part 5: Pedestrian-propelled trucks*

ISO 5053-1, *Industrial trucks — Vocabulary — 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 terminology databases for use in standardization at the following addresses:

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

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

4 Requirements

4.1 General

ISO 22915-1 shall apply.

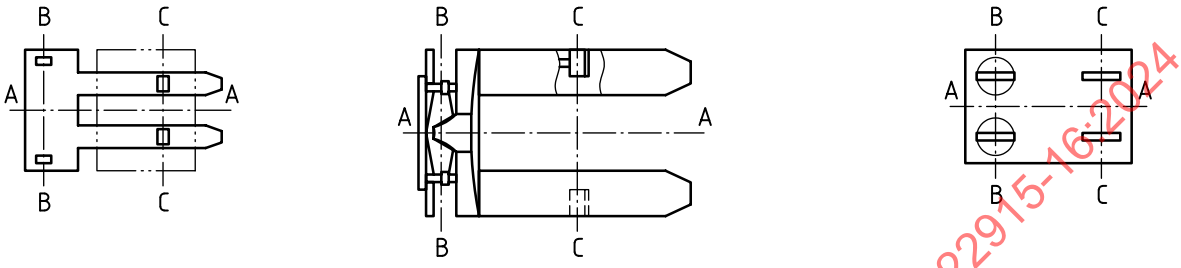
4.2 Position of the truck on the tilt table

4.2.1 General

All tests shall be carried out with castors and swivelling wheels, when fitted, in the position of least stability (see Tables 1, 2 and 3).

4.2.2 Load and steer axles

The load and steer axles are defined by Figure 1.



a) Stacker truck **b) Scissors-lift pallet truck** **c) Platform truck**

Key

A–A longitudinal centre plane of the truck

B–B steer axle

C–C load axle

Figure 1 — Load and steer axles

4.2.3 Tests 1, 2, 4, 7 and 8 for longitudinal direction of test

The truck shall be positioned on the tilt table with the steer axle B–B and the load axle C–C parallel to the tilt axis X–Y of the tilt table.

4.2.4 Tests 3, 5, 6, 9 and 10 for lateral direction of test

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.

Point M is defined as follows:

a) 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.

b) For trucks having non- articulating dual steer wheels, point M is the vertical projection onto the tilt table of the point of intersection between the centreline of the steer axle and the midpoint between the two steer wheels, with the axle of the steer wheels positioned parallel to the tilt axis X–Y or at any other orientation that produces minimum stability.

c) For trucks with stabilizers, point M is the vertical projection onto the tilt table of the point of symmetry of the stabilizer contact surface.

As shown in Table 1, 2 and 3, point N is defined as the centre point of the area of contact between the tilt table surface and the load wheel closest to the tilt axis, X–Y, of the tilt table.

5 Verification of stability

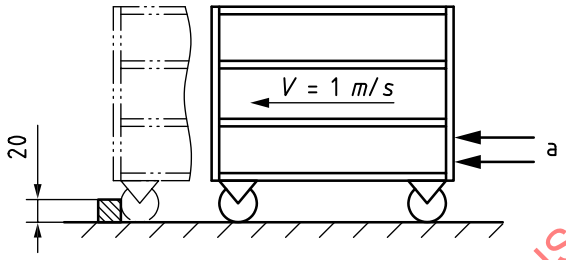
5.1 Dynamic test — Platform trucks

This dynamic test applies only to platform trucks.

The unladen truck moving at a stabilized speed of 1 m/s ±10 % shall be pushed into a vertical obstacle 20 mm high. Both wheels (if provided) shall contact the obstacle at the same time.

The force to move the platform shall be applied at the lower platform (see Figure 2). The force to push the truck shall cease immediately before the truck hits the obstacle. This test shall be carried out in both directions, i.e. pushed and pulled.

Dimensions in millimetres



Key

a Force.

V speed expressed in metres per second

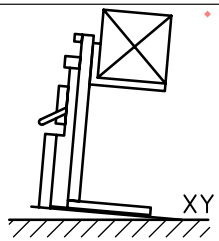
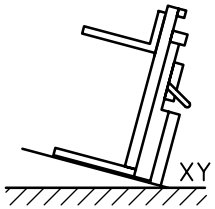
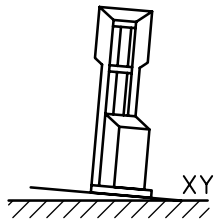
Figure 2 — Dynamic test

The unladen truck shall not tip-over after coming into contact with the obstacle.

5.2 Tilt table tests

The stability of a truck shall be verified according to Tables 1, 2 or 3, as applicable.

Table 1 — Verification of stability — Stacker trucks

Test criteria		Test 1	Test 2	Test 3
Direction of test	Longitudinal	x	x	
	Lateral			x
Direction of load-handling device	Load leading	x		
	Load trailing		x	
Mode of operation	Travelling			
	Stacking/retrieving	x	x	x
Load at load centre D See ISO 3691-5:2014, Table B.1.	With	x		x
	Without		x	
Lift height	Maximum	x	x	x
Tilt table angle		4 %	14 %	3,5 %
Truck position on tilt table				

Key

[a] Parallel.

1 non-articulated, non-sprung castors (any position)

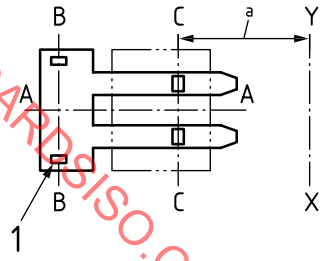
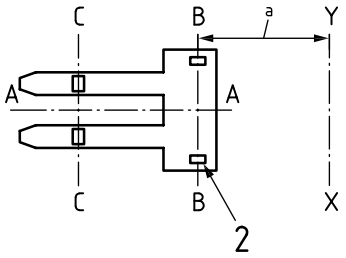
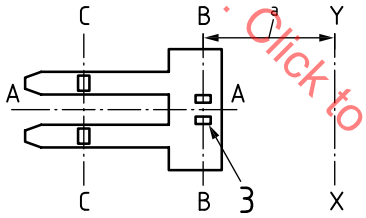
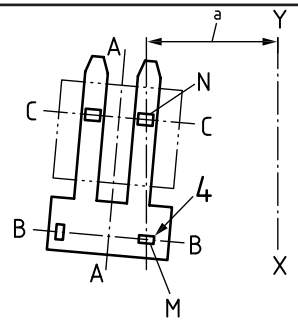
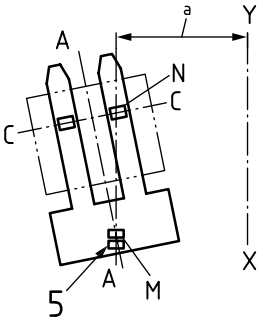
2 non-articulated, non-sprung castors turned towards load axle C–C

3 dual-steer wheel axle parallel to the tilt axis X–Y

4 non-articulated, non-sprung castor wheel axle parallel to X–Y or at angle that produces minimum stability

5 non-articulating dual-steer wheel axle parallel to tilt axis X–Y

Table 1 *(continued)*

Test criteria	Test 1	Test 2	Test 3
Truck position on tilt table	  		 **As per 4.2.4 a)**  **As per 4.2.4 b)**

Key

[a] Parallel.

1 non-articulated, non-sprung castors (any position)

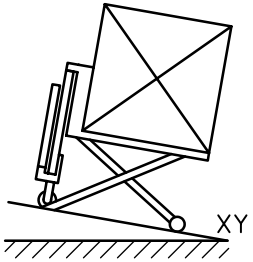
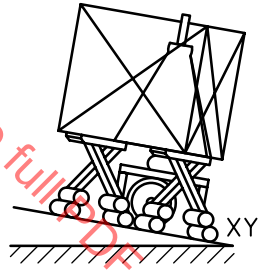
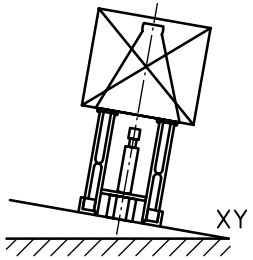
2 non-articulated, non-sprung castors turned towards load axle C–C

3 dual-steer wheel axle parallel to the tilt axis X–Y

4 non-articulated, non-sprung castor wheel axle parallel to X–Y or at angle that produces minimum stability

5 non-articulating dual-steer wheel axle parallel to tilt axis X–Y

Table 2 — Verification of stability — Scissors-lift pallet trucks

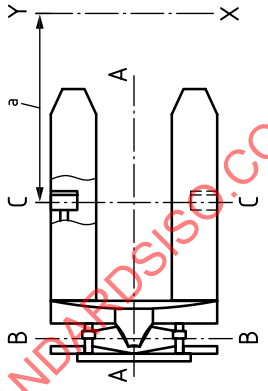
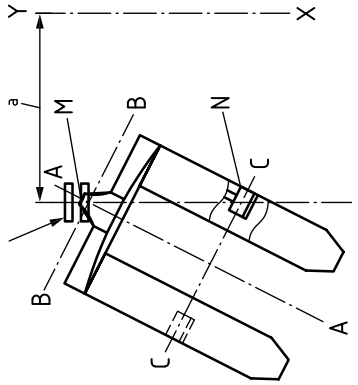
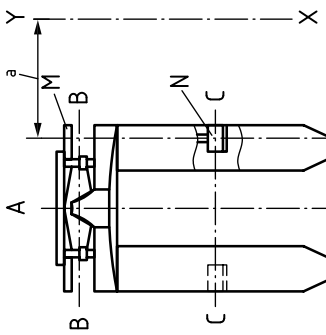
Test criteria		Test 4	Test 5	Test 6
Direction of test	Longitudinal	x		
	Lateral		x	x
Direction of load-handling device	Load leading	x	x	
	Load trailing			
Mode of operation	Travelling	x	x	x
Load at load centre	With	x	x	x
	Without			
Lift height	Maximum	x		x
	Maximum for rolling without stabilizers		x	
Tilt table angle	If truck cannot be moved in fully raised position	10 %	6 %	6 %
	If truck can be moved in fully raised position	12 %		
Truck position on tilt table				

Key

[a] Parallel.

1 non-articulating dual-steer wheel axle parallel to tilt axis

Table 2 *(continued)*

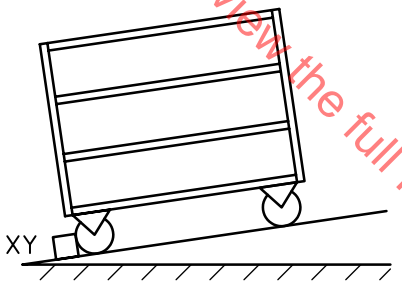
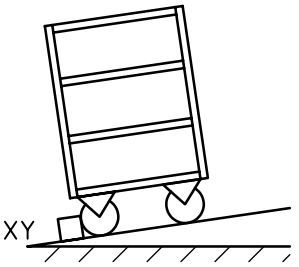
Test criteria	Test 4	Test 5	Test 6
Truck position on tilt table		 As per 4.2.4 b)	 As per 4.2.4 c)

Key

a Parallel.

1 non-articulating dual-steer wheel axle parallel to tilt axis

Table 3 — Verification of stability — Platform trucks

Test criteria		Test 7	Test 8	Test 9	Test 10
Direction of test	Longitudinal	x	x		
	Lateral			x	x
Direction of load-handling device	Load centred		x	x	x
Mode of operation	Travelling	x	x	x	x
Load at load centre	Without	x			
	With rated load on top loading surface		x		
	With rated load uniformly distributed on all loading surfaces			x	
	With rated load divided by number of loading surfaces placed on top loading surface (other surfaces empty)				x
Tilt table angle	Longitudinal	36 %	18 %		
	Lateral			23 %	18 %
Truck position on tilt table Select for appropriate truck type		**Longitudinal**  		**Lateral**  	
Truck position on tilt table		**Longitudinal**		**Lateral**	

Key

[a] Parallel.

1 non-articulated, non-sprung castor wheel turned towards and parallel with load axle C–C

2 non-articulated, non-sprung castor wheel axle turned towards A–A and parallel to X–Y or at the angle that produces minimum stability

3 steer axle B–B parallel to tilt axis X–Y

4 non-articulated, non-sprung castor wheel turned towards and parallel with load axle C–C

5 non-articulated, non-sprung castor wheel axle turned towards load axle C–C and parallel with X–Y