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**Industrial trucks — Verification of  
stability —**

Part 17:  
**Towing tractors, burden and  
personnel carriers**

*Chariots de manutention — Vérification de la stabilité —*

*Partie 17: Tracteurs, transporteurs de charges et de personnel*

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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.

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](http://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](http://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 of 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 [www.iso.org/iso/foreword.html](http://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*.

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](http://www.iso.org/members.html).

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

# Industrial trucks — Verification of stability —

## Part 17:

# Towing tractors, burden and personnel carriers

## 1 Scope

This document specifies the tests for verifying the stability of towing tractors, burden and personnel carriers as defined in ISO 5053-1.

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

ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope*

ISO 5053-1, *Industrial trucks — Terminology and classification — Part 1: Types of industrial trucks*

ISO 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

## 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 <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Test conditions

### 4.1 General

The requirements of ISO 22915-1 shall apply.

If the truck can travel with an elevating operator position, an additional test shall be performed at the maximum height. If a device automatically limits the travel speed, this reduced speed shall be used when determining the angle of the tilt table.

### 4.2 Operating conditions

In addition to the requirements of ISO 22915-1, the truck to be tested shall reflect its operating weight and shall include all options and accessory items approved by the truck manufacturer which, when installed, will decrease the stability of the truck.

### 4.3 Test load

#### 4.3.1 General

The test load for carriers shall consist of a load corresponding to 4.3.2 or 4.3.3.

Towing tractors with a load platform shall be tested according to the method as defined for burden carriers (see 4.3.2).

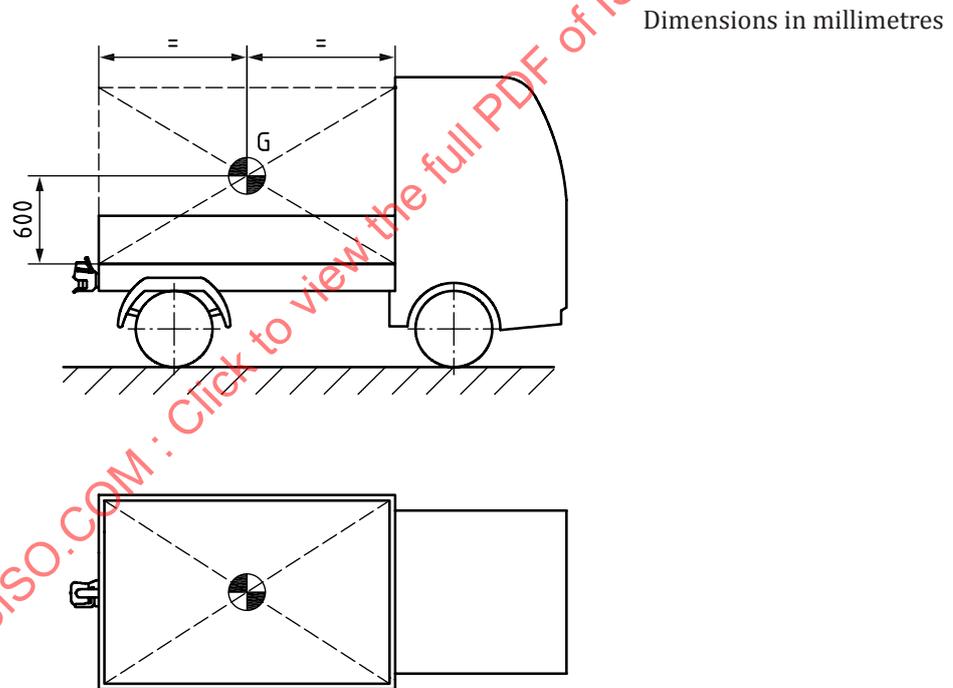
#### 4.3.2 Burden carriers

The test load shall be placed on the load bed of the carrier and secured such that the centre of gravity, G, is directly above the geometric centreline of the load bed.

The minimum height of the centre of gravity, G, shall be 600 mm above the load bed (see Figure 1) or as defined by the manufacturer.

The centre of gravity, G, defined by the manufacturer shall be indicated on the information plate.

The longitudinal position of the centre of gravity, G, shall be half of the length of the load bed.



**Figure 1 — Indication of the minimum height of the centre of gravity, G**

Manufacturers may define a load distribution plan to allow various combinations of load and load position on the load bed. The requirement above includes all tests that are necessary to verify the stability for each defined load arrangement.

#### 4.3.3 Personnel carriers

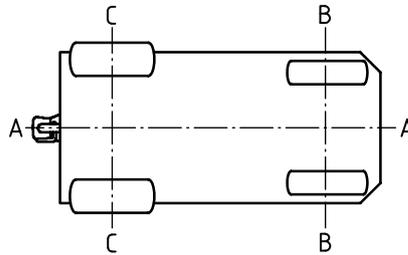
Personnel carriers shall be tested in the conditions of least stability with respect to the number and location of passengers. If provided, seats shall be adjusted to the mid-point adjustment position of seats in each test.

Each passenger shall be simulated by an object having a mass of 114,1 kg corresponding to a large size operator, in accordance with ISO 3411:2007, Clause 4. Objects simulating passengers and operator shall be secured to their respective position or seats.

The centre of gravity of the object shall be positioned 150 mm above the seat index point (SIP), as determined in accordance with ISO 5353:1995, 5.3.

#### 4.3.4 Steer and rear axles

The steer and rear axles are defined by [Figure 2](#).



#### Key

- A-A longitudinal centre plane
- B-B steer axle
- C-C rear axle

**Figure 2 — Indication of longitudinal centre plane and axles**

#### 4.3.5 Tests 1 and 2

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. The steered wheel(s) shall be turned so that it is parallel with the tilt axis, X-Y, (see [Table 1](#)).

Point M is defined as follows.

- a) For trucks steered by a single wheel: point M shall be the centre point of the tread contact area between the steer wheel and the tilt table surface.
- b) For trucks steered by twin wheels: point M shall be the centre point of the tread contact area between the steer wheel closest to the tilt axis, X-Y, of the tilt table and the tilt table surface.
- c) For trucks steered by two wheels: point M shall be the centre point of the tread contact area between the steer wheel closest to the tilt axis, X-Y, of the tilt table and the tilt table surface.

Point N is defined as the centre point of the area of contact between the tilt table surface and the rear wheel nearest to the tilting axis. On trucks with more than one rear axle, the axle nearest to the steer axle shall be used.

#### 4.3.6 Tests 3, 4, 5 and 6

As shown in [Table 1](#), the truck shall be placed on the tilting platform such that the longitudinal centre plane A-A is perpendicular to the tilt axis, X-Y, of the tilt table.

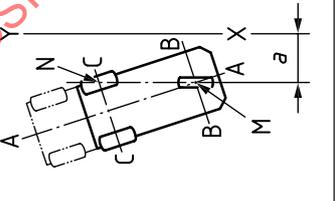
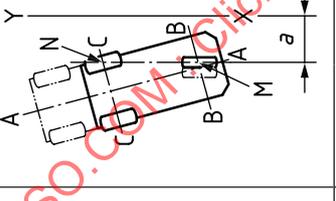
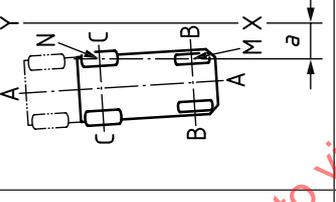
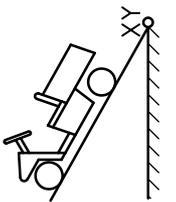
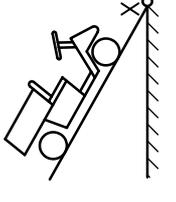
The axle of the steered wheel(s) shall be parallel to the tilt axis, X-Y, of the tilt table.

NOTE Tests 3 and 5 are not applicable for towing tractors without a load platform.

## 5 Verification of stability

Stability shall be verified according to [Table 1](#).

Table 1 — Verification of stability

Test criteria	Test 1 <sup>a</sup>	Test 2	Test 3 <sup>a</sup>	Test 4	Test 5 <sup>a</sup>	Test 6
Mode of operation	Turning	Turning	Upgrade	Upgrade	Downgrade	Downgrade
Direction of tests			x	x	x	x
Test load	Longitudinal					
	Lateral	x				
Tilt table angle	With	x	x		x	
	Without	(15 + 1,1 v) <sup>b</sup> % (40 % max.) <sup>b</sup>	(15 + 1,1v) % (40 % max.) <sup>b</sup>	25 %	25 %	25 %
Truck position on tilt table						
	as per 4.3.5 a)	as per 4.3.5 b)	as per 4.3.5 c)	as per 4.3.6	as per 4.3.6	

<sup>a</sup> Not applicable for towing tractors without a load platform.

<sup>b</sup> v is the maximum travel speed of the truck without load and/or trailers in km/h.