
**Industrial trucks — Verification of
stability —**

**Part 1:
General**

Chariots de manutention — Vérification de la stabilité —

Partie 1: Généralités
iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 22915-1:2016

<https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 22915-1:2016

<https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Stability tests for trucks	4
4.1 Test procedure	4
4.2 Verification procedure	4
4.2.1 Operation of the tilt table and test criteria	4
4.2.2 Calculation	4
4.2.3 Other methods	4
4.3 Test conditions	4
4.3.1 Condition of the truck	4
4.3.2 Position of the truck on the tilt table	5
4.3.3 Test load, lift height, and standard load centre distance	5
4.4 Safety precautions for testing	6
4.5 Stability verification for trucks with attachments	7
Bibliography	8

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 22915-1:2016](https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016)

<https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016>

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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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 22915-1:2008), 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*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 22915-1:2016](https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016)

<https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016>

Introduction

An important step forward in work on the ISO 22915 series was the agreement to put in place a new structure. The stability tests are presented in the form of a basic part describing and defining stability tests in general together with separate parts that each give specific stability test criteria and requirements for a different truck type.

From the very beginning, the task of the Working Group involved was to establish the new structure and revise existing standards to create a series of International Standards complying with the major legislative regulations in the world such as those in force in the EU, USA, Japan, and Australia.

For several problem areas, compromises were needed and will be needed in the future. In order to ensure that these International Standards are actively used in the ISO member countries worldwide, it will be necessary that they replace existing National Standards.

Only in this way will there will be the guarantee that products in accordance with these International Standards can be shipped worldwide, freely and without any technical barriers to trade.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 22915-1:2016](https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016)

<https://standards.iteh.ai/catalog/standards/sist/235cdb52-6df7-42f4-aa96-3d4bf8cdca37/iso-22915-1-2016>

Industrial trucks — Verification of stability —

Part 1: General

1 Scope

The ISO 22915 series deals with the safety of industrial trucks, as defined in ISO 5053-1, relative to their stability and the verification of that stability. For the purposes of ISO 22915, industrial trucks are wheeled, self-propelled, or pedestrian-propelled vehicles excepting those running on rails. They are either operator-controlled or driverless, and are designed to carry, tow, push, lift, stack or tier in racks.

This part of ISO 22915 specifies basic test criteria and requirements for verifying the stability of industrial trucks, hereafter referred to as *trucks*.

It applies to the following truck types and special conditions:

- a) counterbalanced trucks with mast as specified in ISO 22915-2;
- b) reach and straddle trucks as specified in ISO 22915-3;
- c) pallet stackers, double stackers, and order-picking trucks with operator position elevating up to and including 1 200 mm lift height as specified in ISO 22915-4;
- d) single-side-loading trucks as specified in ISO 22915-5;
- e) bidirectional and multidirectional trucks as specified in ISO 22915-7;
- f) additional stability test for trucks operating in special conditions of stacking with the mast tilted forward as specified in ISO 22915-8;
- g) counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer as specified in ISO 22915-9;
- h) additional stability test for trucks operating in special conditions with the load substantially laterally displaced by powered devices as specified in ISO 22915-10;
- i) industrial variable-reach trucks as specified in ISO 22915-11;
- j) industrial variable-reach trucks handling freight containers of 6 m (20 ft) length and longer as specified in ISO 22915-12;
- k) rough-terrain variable-reach trucks as specified in ISO 22915-14;
- l) counterbalanced trucks with articulated steering as specified in ISO 22915-15;
- m) pedestrian-propelled trucks as specified in ISO 22915-16;
- n) additional stability test for trucks operating in the special condition of offset load, offset determined by utilization as specified in ISO 22915-20;
- o) order-picking trucks with operator position elevating above 1 200 mm as specified in ISO 22915-21.

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

This part of ISO 22915 does not apply to the following:

- trucks handling suspended loads which may swing freely;
- low-lift trucks with lift height up to and including 500 mm.

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 3411, *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, *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 following terms and definitions apply.

3.1 normal operating conditions <trucks other than variable-reach and rough-terrain trucks> operating conditions corresponding to the following:

- stacking with fork arms reasonably horizontal on substantially firm, smooth, level, and prepared surfaces;
- operating with a load centre of gravity approximately on the longitudinal centre plane of the truck;
- travelling with the mast or fork arms tilted rearward, if possible, and the load in the lowered (travel) position on substantially firm, smooth, level, and prepared surface, for reach trucks, with the mast or forks fully retracted;
- travelling or manoeuvring with elevated load/operator (if the truck is specifically designed for this condition)

3.2 normal operating conditions <variable-reach and rough-terrain trucks> operating conditions corresponding to the following:

- stacking with a combination of boom elevation/extension and the fork arms reasonably horizontal on substantially firm, smooth, level, and prepared surfaces;
- operating with the load centre of gravity approximately on the longitudinal centre plane of the truck;
- trucks with a mast manoeuvring an elevated load with the mast neither tilted rearwards more than 10° nor the centre of gravity of the load displaced rearwards more than 600 mm;
- manoeuvring an elevated load with the fork arms tilted rearwards;
- rough-terrain trucks travelling with the mast or fork arms tilted rearwards and the load in the lowered (travelling) position on unimproved natural terrain and disturbed-terrain areas. Where applicable, any reaching/telescopic mechanism is to be fully retracted

3.3 operating conditions other than normal differing from those stated in 3.1 or 3.2 necessitating a truck that complies with either

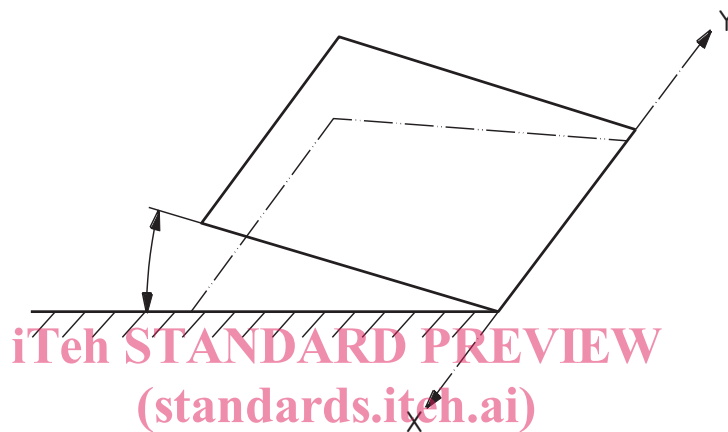
- a) appropriate International Standards covering the different specific conditions (e.g. trucks operated with offset load by powered devices or by utilization, trucks with mast tilted forward, and trucks handling freight containers), or
- b) stability requirements agreed upon by the interested parties in consultation with the manufacturer and being not less than required by the tests specified for normal operating conditions (3.1, 3.2) for that type of truck

3.4

tilt table

rigid table tilted at least to one side to prove the lateral and longitudinal stability of a truck positioned on that table

Note 1 to entry: See [Figure 1](#).



Key

X-Y indicates the tilt axis of the tilt table

ISO 22915-1:2016

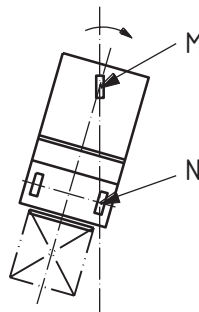
Figure 1 — Tilt table

3.5

tilt axis

axis about which the truck tips over, longitudinally or laterally, when a sufficient static or dynamic force is applied above the centre of gravity of the truck

Note 1 to entry: See [Figure 2](#).



Key

M-N indicates the tilt axis of the truck

Figure 2 — Tilt axis