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**Industrial trucks — Safety requirements and verification — Part 2: Self-propelled
variable-reach trucks**

~~*Flurförderzeuge — Sicherheitsanforderungen und Verifizierung — Teil 2: Motorkraftbetriebene
Flurförderzeuge mit veränderlicher Reichweite*~~

~~*Chariots de manutention — Exigences de sécurité et vérification — Partie 2 : Chariots
automoteurs à portée variable*~~

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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 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 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 the following URL: www.iso.org/iso/foreword.html —, see 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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 150, *Industrial trucks - Safety*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 3691-2:2016), which has been technically revised.

The main changes compared to the previous edition are: — as follows:

— exclusions and limitations in the scope have been clarified;

— references for European regional requirements have been updated;

— requirements for the operator to be in defining the normal operator position necessary in order for the controls to function have been added;

— operator weight has been updated;

— information relating to truck modification has been updated;

— Verification — verification methods have been added as a new Annex-C.

A list of all parts in the ISO 3691 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.

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Introduction

General

This document is a type-C standard as stated in ISO 12100.

~~The machines~~ This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organisations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e. g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

The ISO 3691 series ~~of standards~~ covers safety requirements and their verification for industrial trucks as defined in ISO 5053-1.

This document does not repeat all the technical rules which are state-of-the art and which are applicable to the material used to construct the industrial truck. Reference will also need to be made to ISO 12100.

Structure

~~An important step forward in the work on the ISO 3691 series of standards was the agreement to issue a new structure of International Standards for industrial trucks having on one side basic standards for all kinds of trucks (see Foreword) and on the other side independent standards to cover the respective specific functions of industrial trucks, e.g. visibility, noise, vibration, electrical requirements, etc.~~

Legislative situation/Vienna Agreement

~~Every effort was made to develop a globally relevant International Standard. That goal was achieved with most of the issues. For several potential problem areas compromises were needed and will be needed in the future. Where divergent regional requirements remain, these are addressed by prEN 16307-2:2021 and ISO/TS 3691-8.~~

~~In order to ensure that the revised International Standard will be actively used in the ISO member countries, worldwide, procedures will be necessary to replace the existing national standards and technical regulations by the revised International Standard. In the European Community, ISO and the European Committee for Standardization (CEN) agreed on technical co-operation under the Vienna~~

~~Agreement, with the aim of replacing European Standards (EN) by International Standards. Other countries are asked to make similar agreements to ensure that their national standards and technical regulations are replaced by this International Standard.~~

~~Only by these actions will there be the guarantee that products in accordance with International Standards can be shipped worldwide freely without any technical barriers.~~

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Industrial trucks — Safety requirements and verification — Part 2: Self-propelled variable-reach trucks

1 Scope

This document gives safety requirements and the means for their verification for self-propelled industrial variable-reach trucks and variable-reach container handlers/reach stackers as defined in ISO 5053-1 (hereafter referred to as trucks), equipped with forks or integral load-handling devices for normal industrial duties (e.g. fork arms or means, such as spreaders, for handling containers).

This document does not apply to

- rough-terrain variable-reach trucks,
- rough-terrain variable-reach trucks for handling containers,
- lorry mounted trucks covered by ISO 20297-1,
- machines designed primarily for earth-moving (e.g. loaders and dozers), even when their buckets and blades are replaced with forks,
- machines from which the load can swing freely in all directions.

This document is not applicable to trucks manufactured before the date of its publication.

For the purposes of this document, fork arms and integrated attachments are considered to be a part of the truck, whereas attachments/equipment/tools mounted on the load carrier or on the fork arms which are removable by the user are not. Nevertheless, for interchangeable equipment, which is assembled with the truck by the operator in order to change the function of, or attribute a new function to, the truck, this document does provide requirements for:

- the interface with the truck,
- protection of the operator in the normal operating position from crushing and shearing hazards,
- operating and maintenance instructions,
- load charts,
- marking,
- provision for transportation, and,
- indicator lights for attachments for lifting containers

Any regional requirements additional to the provisions of this document are addressed in prEN 16307-2:2021 and ISO/TS 3691-8.

This document deals with all significant hazards, hazardous situations or hazardous events, as listed in Annex B, with the exception of the following, relevant to the applicable machines when used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

It does not establish requirements for hazards that can occur:

- during construction²;
- when using trucks on public roads²;
- when operating in potentially explosive atmospheres²;
- when lifting persons² or
- during dismantling, disabling and scrapping.

This document does not provide requirements for:

- tools, lifting accessories or removeable attachments, which do not change the function or attribute a new function, mounted on the load carrier or fork arms²;
- attachments/equipment mounted on the load carrier or on the fork arms which are removable by the user and which change the function or attribute a new function, except as stated above²;
- the reliability of control systems and performance requirements for safety related parts of control systems² or
- the requirement for fitting an enclosed cab, whether ~~pressurised~~ pressurized or not.

2 Normative references

The following documents, are referred to in whole the text in such a way that some or in part, are normatively referenced in all of their content constitutes requirements of 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 2328:2011, *Fork-lift trucks — Hook-on type fork arms and fork arm carriages — Mounting dimensions*

ISO 2330:2002, *Fork-lift trucks — Fork arms — Technical characteristics and testing*

ISO 2867:2011, *Earth-moving machinery — Access systems*

ISO 3287:1999, *Powered industrial trucks — Symbols for operator controls and other displays*

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

ISO 3795:1989, *Road vehicles, and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 5053-1:2020, *Industrial trucks — Vocabulary — Part 1: Types of industrial trucks*

ISO 5053-2:2019, *Industrial trucks — Vocabulary — Part 2: Fork arms and attachments*

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

ISO 6055:2004, *Industrial trucks — Overhead guards — Specification and testing*

ISO 6292:2020, *Powered industrial trucks and tractors — Brake performance and component strength*

ISO 10263-3:2009, *Earth-moving machinery — Operator enclosure environment — Part 3: Pressurization test method*

ISO 10263-4:2009, *Earth-moving machinery — Operator enclosure environment — Part 4: Heating, ventilating and air conditioning (HVAC) test method and performance*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13284:2003, ~~Fork lift~~2022, *Industrial trucks — Fork-arm extensions and telescopic fork arms — Technical characteristics and strength requirements*

ISO 13564-1:2012, *Powered industrial trucks — Test methods for verification of visibility — Part 1: Sit-on and stand-on operator trucks and variable-reach trucks up to and including 10 t capacity*

ISO 15870:2000, *Powered industrial trucks — Safety signs and hazard pictorials — General principles*

ISO 15871:2019, *Industrial trucks — Specifications for indicator lights for container handling and grapple arm operations*

ISO 21281:2005, *Construction and layout of pedals of self-propelled sit-down rider-controlled industrial trucks — Rules for the construction and layout of pedals*

~~ISO 22915-1:2016, Industrial trucks — Verification of stability — Part 1: General~~

ISO 22915-10:2008, *Industrial trucks — Verification of stability — Part 10: Additional stability test for trucks operating in the special condition of stacking with load laterally displaced by powered devices*

ISO 22915-11:2011, *Industrial trucks — Verification of stability — Part 11: Industrial variable-reach trucks*

ISO 22915-12:2015, *Industrial trucks — Verification of stability — Part 12: Industrial variable-reach trucks handling freight containers of 6-m (20-ft) length and longer*

ISO 22915-20:2008, *Industrial trucks — Verification of stability — Part 20: Additional stability test for trucks operating in the special condition of offset load, offset by utilization*

ISO 24135-1:2006, *Industrial trucks — Specifications and test methods for operator restraint systems — Part 1: Lap-type seat belts*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053-1:2020, ISO 5053-2:2019 and ISO 12100:2010, and the following 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>~~ <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

self-propelled industrial variable-reach truck

seated-rider-operated, counterbalanced lift truck with one or more articulated arms, ~~telescopic, non-slewing, (3.13)]~~ used for stacking loads and for operation on smooth, level, prepared and consolidated surfaces

3.2

actual capacity at maximum lift height with forks

maximum load, Q_2 , specified by the manufacturer that the truck is capable of lifting to its maximum height in normal operating conditions

Note 1 to entry: ~~This~~ is equal to the maximum load, with centre of gravity, G (see Figure A.1), carried on the fork arms at the standard load centre distance, D , as specified in Annex A, and with the boom (3.7) adjusted to its maximum height. It is expressed in ~~kilograms~~kg.

3.3

actual capacity at container position with spreader

maximum load, Q , with row ~~(d)~~, and height ~~(h)~~, specified by the manufacturer that the truck is capable of lifting to its maximum height in normal operating conditions

3.4

axle locking

mechanism designed to stop oscillation of the rear axle so as to improve truck stability

3.5

stabilizer

extendable or pivoting mechanical supports used to improve stability of a stationary truck

3.6

lateral levelling

act of changing the angular relationship between the boom (3.7) pivot and the ground in order to adjust the boom pivot to horizontal when the truck is standing on a side slope

Note 1 to entry: Used to ensure that the boom (3.7) operates in a vertical plane.

3.7

boom

pivoting support member providing radial and telescoping (if equipped) movement of the load-engaging means

3.8

spreader

device fitted to the boom (3.7), designed to connect the lifting points of freight containers, swap bodies and semi-trailers

Note 1 to entry: ~~This~~ can include powered devices used to connect the lifting points of the load and an articulated mechanism to facilitate engagement.

3.9

overhead guard

device fitted to the truck for the purpose of protecting the operator against falling objects

3.10

load backrest

portion of the fork carriage serving to restrain the load when the load is tilted rearward or upward

3.11**normal operating position**

position in which the operator is able to control all functions for driving and load handling as specified by the manufacturer

Note 1 to entry: Additional positions may be specified by the manufacturer if it is not possible to control all the functions of the truck from a single position. A rotating seat or stand-up end-control truck with more than one operating direction is considered as being or having a single operating position.

3.12**fork carrier**

device fitted at the end of the *boom* (3.7) to connect and lock interchangeable attachments without the use of a tool

3.13**non-slewing**

having a slewing movement not greater than 5° on either side of the longitudinal axis of the truck

Note 1 to entry: See Figure 1.

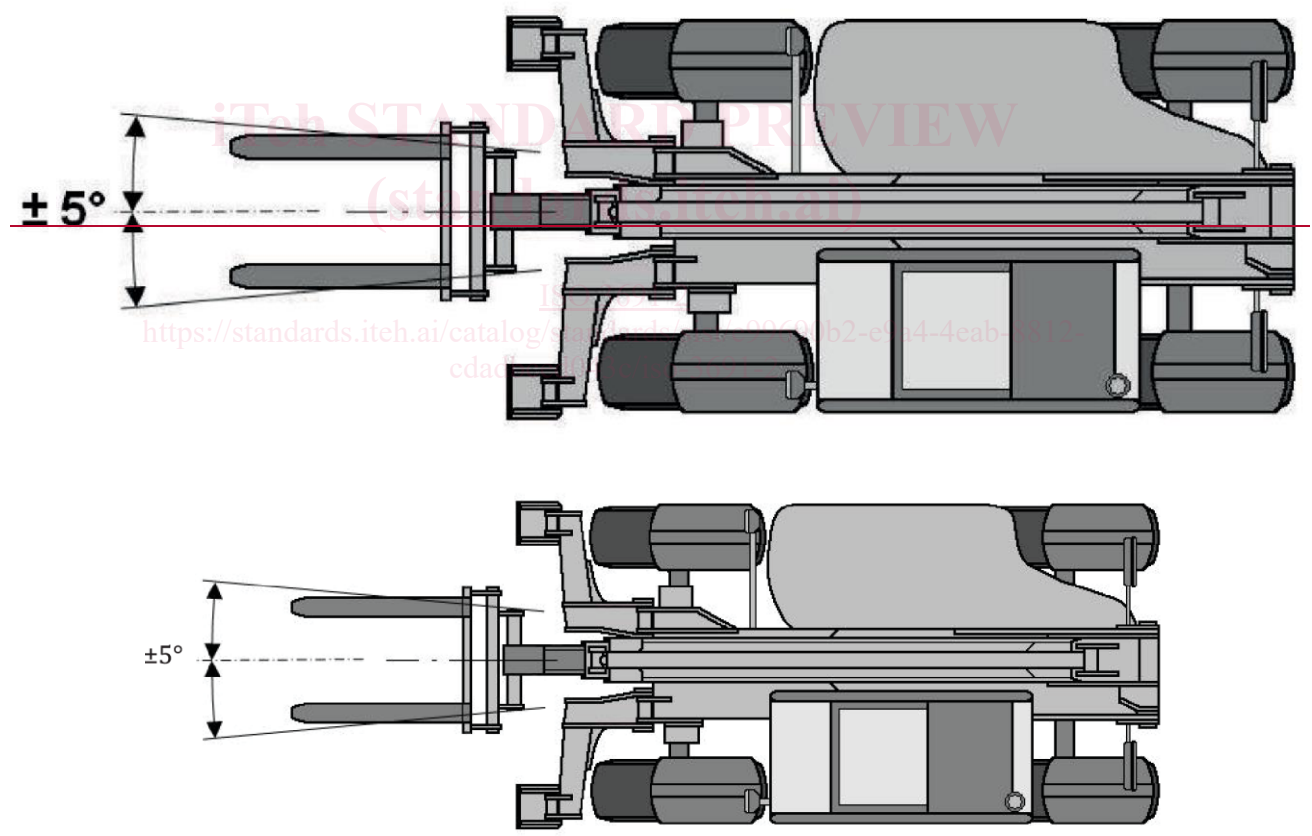


Figure 1 — Slewing movement $\leq 5^\circ$ (non-slewing)

3.14**rated capacity with fork arms**

load, Q_1 , in kilograms, permitted by the manufacturer, that the truck type is capable of transporting and lifting in normal operating conditions with the *boom* (3.7) fully retracted

Note 1 to entry: For centre of gravity, G .