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**Vozila za talni transport - Varnostne zahteve in preverjanje - 1. del: Vozila za talni transport z lastnim pogonom, razen vozil brez voznika, vozil s spremenljivim dosegom in tovornih vozičkov (ISO/DIS 3691-1:2022)**

Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks (ISO/DIS 3691-1:2022)

Flurförderzeuge - Sicherheitstechnische Anforderungen und Verifizierung - Teil 1: Motorkraftbetriebene Flurförderzeuge mit Ausnahme von fahrerlosen Flurförderzeugen, Staplern mit veränderlicher Reichweite und Lastentransportfahrzeugen (ISO/DIS 3691-1:2022)

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Chariots de manutention - Exigences de sécurité et vérification - Partie 1: Chariots de manutention automoteurs, autres que les chariots sans conducteur, les chariots à portée variable et les chariots transporteurs de charges (ISO/DIS 3691-1:2022)

**Ta slovenski standard je istoveten z: prEN ISO 3691-1**

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**ICS:**

53.060	Industrijski tovarnjaki	Industrial trucks
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**oSIST prEN ISO 3691-1:2022**

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# DRAFT INTERNATIONAL STANDARD

## ISO/DIS 3691-1

ISO/TC 110/SC 2

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2022-08-25

## Industrial trucks — Safety requirements and verification —

Part 1:

### Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks

*Chariots de manutention — Exigences de sécurité et vérification —**Partie 1: Chariots de manutention automoteurs, autres que les chariots sans conducteur, les chariots à portée variable et les chariots transporteurs de charges*

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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.

This second edition cancels and replaces the first edition (ISO 3691-1:2011), which has been technically revised.

The main changes are as follows:

- Travel speed and acceleration limit requirements
- Travel control and actuator requirements
- Lifting system requirements
- Additional requirements for compressed natural gas (CNG) trucks
- Additional requirements for compressed natural gas (CNG) trucks
- Requirements for new types of enclosures on stand-on end-controlled trucks
- Additional general guarding requirements; guarding on double-stacking trucks
- Additional operator instructions required for attachments
- Numerous minor changes throughout the standard

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





# Industrial trucks — Safety requirements and verification —

## Part 1:

## Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks

### 1 Scope

This part of ISO 3691 gives safety requirements and the means for their verification for the following types of self-propelled industrial trucks (hereafter referred to as *trucks*), as defined in ISO 5053-1:2020:

- a) counterbalanced trucks;
- b) reach trucks with retractable mast or retractable fork arm carriage;
- c) straddle trucks;
- d) pallet-stacking trucks;
- e) high-lift platform trucks;
- f) trucks with elevating operator position;
- g) side-loading trucks (one side only);
- h) lateral-stacking trucks (three sides);
- i) lateral- and front-stacking trucks;
- j) pallet trucks;
- k) multidirectional trucks;
- l) towing tractors with a drawbar pull up to and including 66 750 N;
- m) rough-terrain counterbalance trucks;
- n) counterbalanced container handlers;
- o) industrial trucks powered by battery, diesel, gasoline, LPG (liquefied petroleum gas), or CNG (compressed natural gas).

For trucks with an elevating operator position of more than 1 200 mm and/or trucks designed to travel with an elevated load of more than 1 200 mm, this part of ISO 3691 is intended to be used in conjunction with ISO 3691-3.

NOTE 1 ISO 3691-3 is not applicable to counterbalanced fork lift trucks or trucks intended for container handling.

NOTE 2 Some low-level order pickers with an elevating operator's position up to and including 1 200 mm lift height can be equipped with an additional lifting device to lift the load to a maximum lift height of 1 800 mm.

Basic requirements for attachments are given in the appropriate clauses.

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NOTE 3 For the purposes of this part of ISO 3691, fork arms, load platforms and integrated attachments are considered to be parts of the industrial truck. Attachments mounted on the load carrier or on the fork arms which are removable by the user are not considered to be part of the industrial truck.

This part of ISO 3691 is not applicable to self-propelled variable-reach trucks, driverless trucks or burden carriers, which are covered in ISO 3691-2, ISO 3691-4 and ISO 3691-6, respectively. This standard is not applicable to lorry mounted trucks which are covered by ISO 20297-1.

It is not applicable to industrial trucks operating in severe conditions (e.g. extreme climates, freezer applications, hazardous environments), where special precautions can be necessary.

Regional requirements, additional to the requirements given in this part of ISO 3691, are addressed in EN 16307-1:2020+A1:202X for trucks to be placed on the market within the European Community (EC) and European Economic Area (EEA), and and ISO/TS 3691-8:2019 for other regions.

The requirements are defined by the combination of this document and the relevant regional requirements.

This part of ISO 3691 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 construction,
- when handling suspended loads that can swing freely,
- when using trucks on public roads,
- when operating in potentially explosive atmospheres,
- when using trucks in very narrow aisles with clearance of less than 500 mm to the racks,
- arising from a non-ergonomic body attitude when driving sit-on trucks, load trailing,
- due to overload.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

ECE-R 67 -*Uniform provisions concerning the approval of*

I. Approval of specific equipment of vehicles of category M and N using liquefied petroleum gases in their propulsion system

II, Approval of vehicles of category M and N fitted with specific equipment for the use of liquefied petroleum gases in their propulsion system with regard to the installation of such equipment

ECE-R 110*Uniform provisions concerning the approval of*

I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system

II, Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system

EN 16307-1:2020+A1:202X, *Industrial trucks. Safety requirements and verification. Supplementary requirements for self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks*

IEC 60529:2013, *Degrees of protection provided by enclosures (IP Code)*

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 3691-3:2016, *Industrial trucks — Safety requirements and verification — Part 3: Additional requirements for trucks with elevating operator position and trucks specifically designed to travel with elevated loads*

ISO 3691-5:2014/Amd 1:2020, *Industrial trucks — Safety requirements and verification — Part 5: Pedestrian-propelled trucks*

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

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

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

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

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

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

ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design*

ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

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 22915-2:2018, *Industrial trucks — Verification of stability — Part 2: Counterbalanced trucks with mast*

ISO 22915-3:2021, *Industrial trucks — Verification of stability — Part 3: Reach and straddle trucks*

ISO 22915-4:2018, *Industrial trucks — Verification of stability — Part 4: Pallet stackers, double stackers and order-picking trucks with operator position elevating up to and including 1 200 mm lift height*

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ISO 22915-5, *Industrial trucks — Verification of stability — Part 5: Single-side-loading trucks*

ISO 22915-7:2016, *Industrial trucks — Verification of stability — Part 7: Bidirectional and multidirectional trucks*

ISO 22915-8:2018, *Industrial trucks — Verification of stability — Part 8: Additional stability test for trucks operating in the special condition of stacking with mast tilted forward and load elevated*

ISO 22915-9:2014, *Industrial trucks — Verification of stability — Part 9: Counterbalanced trucks with mast handling freight containers of 6 m (20 ft) length and longer*

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 22915-13:2012, *Industrial trucks — Verification of stability — Part 13: Rough-terrain trucks with mast*

ISO 22915-15:2013, *Industrial trucks – Verification of stability – Part 15: Counterbalanced trucks with articulated steering*

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 22915-21:2019, *Industrial trucks — Verification of stability — Part 21: Order-picking trucks with operator position elevating above 1 200 mm*

ISO 22915-22:2014, *Industrial trucks — Verification of stability — Part 22: Lateral- and front-stacking trucks with and without elevating operator position*

ISO 24134:2006, *Industrial trucks — Additional requirements for automated functions on trucks*

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

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### 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 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 <https://www.electropedia.org/>

#### 3.1

##### **self-propelled industrial truck**

*operator* (3.7) controlled, wheeled vehicle having at least three wheels with a powered driving mechanism, except for those running on rails, designed to carry, tow, push, lift, stack or tier loads

Note 1 to entry: See ISO 5053-1 for a comprehensive terminology.

#### 3.2

##### **pedestrian-controlled truck**

truck designed to be controlled by an *operator* (3.7) walking with the truck by means of, for example, a tiller

Note 1 to entry: The truck may be equipped with a stand-on option.

**3.3****rider-controlled truck**

truck designed to be controlled by an *operator* (3.7) sitting on a seat or standing on a platform on the truck

Note 1 to entry: Stand-on industrial trucks with a seat for the operator are considered as being stand-on trucks.

**3.4****low-lift truck**

truck having a lift height of 500 mm or less

**3.5****operator**

designated person, appropriately trained and authorized, who is responsible for the movement and load handling of an industrial truck

Note 1 to entry: Depending on the truck type, the operator can be riding on the industrial truck, on foot accompanying the truck (e.g. tiller-, cable-controlled) or remote from the truck (e.g. remote radio-controlled).

Note 2 to entry: National regulations can apply.

**3.6****normal operating position**

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

Note 1 to entry: Additional positions are permitted to be defined 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.

**3.7****lift height**

vertical distance between the upper face of the fork blades or the lifting platform and the ground

**3.8****lift height for travelling**

lifting height up to and including 500 mm providing sufficient ground clearance for travelling

Note 1 to entry: It is identical to the maximum lift height for the stability test for travelling.

**3.9****low lift height**

maximum lift height up to and including 500 mm, where the vertical centre of gravity of the load does not exceed 1 100 mm above the ground

**3.10****lost load centre**

horizontal shift in the standard load centre that may occur when removable attachments are added to a truck

Note 1 to entry: For standard load centre, see [Annex A](#).

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**3.11****actual capacity**

maximum load, expressed in kilograms, established by the manufacturer based on component strength and truck stability, that a truck can carry, lift and stack to a specified height, at a specified load centre distance and reach, if applicable, in normal operation

Note 1 to entry: The actual capacity depends on the configuration of the truck, including variables such as the type and lift height of the mast fitted, the actual load centre and any attachments that might be fitted. This actual capacity defines the load-handling ability of the particular truck, as equipped. Additional actual capacity ratings with removable attachments can also be established where permitted by the appropriate stability tests or by calculation verified by empirical data.

**3.12****rated capacity**

maximum load, expressed in kilograms, established by the manufacturer based on component strength and truck stability, that the truck can carry, lift and stack to the standard lift height and at the standard position of the centre of gravity

Note 1 to entry: For centre of gravity, see [Annex A](#).

Note 2 to entry: If the lifting height of the mast is lower than the standard lift height,  $H$ , the rated capacity is still assessed at the standard lift height.

Note 3 to entry: The rated capacity is used to compare the capacity of different manufacturers' trucks and to provide the break points used in technical standards and statistics. The operating limits for the truck are defined by its actual capacity.

**3.13****low speed**

any travel speed below 1,5 km/h for pedestrian-controlled trucks and below 2,5 km/h for all other types of trucks

**3.14****operating pressure**

highest pressure at which a system is operated under normal operating conditions. (not including any momentary surges)

Note 1 to entry: Source ISO 8625-1:2018, 3.23

**4 Safety requirements and/or protective measures****4.1 General****4.1.1 Overall requirements**

The truck shall comply with the safety requirements and/or protective measures of [clause 4](#).

In addition, the truck shall be designed according to the principles of ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

**4.1.2 Normal climatic conditions**

For truck operation, the following climatic conditions apply:

- average ambient temperature for continuous duty: +25 °C;
- maximum ambient temperature, short term (up to 1 h): +40 °C;
- lowest ambient temperature for trucks intended for use in normal indoor conditions: +5 °C;



- lowest ambient temperature for trucks intended for use in normal outdoor conditions: –20 °C;
- altitude: up to 2 000 m.

#### 4.1.3 Normal operating conditions

Normal operating conditions are the following and shall be specified in the instruction handbook (see [6.2](#)):

- operating (travelling and load handling) on substantially firm, smooth, level and prepared surfaces
  - the surface conditions on which the truck is designed to operate;
- travelling with the horizontal load centre of gravity approximately on the longitudinal centre plane of the truck or on the centred position of the load handling means by design or powered device;
- travelling with the mast or fork arms tilted backwards, where applicable, and the load in the lowered (travel) position.

If the above is not sufficient to allow the conditions for stability of a particular truck type to be specified, then the operating conditions shall be according to the International Standards referenced for stability in [4.8](#).

#### 4.1.4 Safety requirements for the electrical/electronic system

Safety requirements for the electrical/electronic system and for carrying out safety functions by the truck control systems are subject to regional requirements. See EN 16307-1:2020+A1:202X and ISO/TS 3691-8:2019.

#### 4.1.5 Edges or angles

There shall be no sharp edges or angles posing a hazard in the area of the operator in the normal operating position or in the area of access and egress during normal operation and daily checks.

#### 4.1.6 Stored energy components

Components which store energy and that would cause a risk during removal or disassembly, e.g. hydraulic accumulator or spring-applied brakes, shall be provided with a means to release the energy before removal or disassembly.

### 4.2 Starting/moving

#### 4.2.1 Unauthorized starting

Trucks shall be provided with a device (e.g. key, code, magnetic card) which prevents starting without its use.

Such devices for pedestrian-controlled and rider-controlled trucks manufactured by the same manufacturer shall not be interchangeable between the two truck types. Where devices, e.g. magnetic cards, are destined for an individual operator, one device may be used on both truck types.

#### 4.2.2 Unintended movement

Trucks with travel controls in neutral position shall not move due to powered drift or creep e.g. by leakage from standstill on level ground.