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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 3691-1

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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This document is circulated as received from the committee secretariat.

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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).

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 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 3691-1:2011), which has been technically revised.

The main changes are as follows:

- Travel speed and acceleration limit requirements have been revised and/or added
- Travel control and actuator requirements have been modified
- Lifting system requirements include allowance for higher lowering speeds
- Additional requirements for compressed natural gas (CNG) trucks
- Requirements for new types of enclosures on stand-on end-controlled trucks
- Additional general guarding requirements
- Additional operator instructions required for attachments
- The requirements for tow tractors have been removed from this document. They will be included in the next revision of ISO 3691-6.
- Numerous minor editorial 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.

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 document specifies 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) counterbalance lift 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) side-loading trucks (one side only);
- g) lateral-stacking trucks (both sides);
- h) lateral- and front-stacking trucks (three sides);
- i) pallet trucks;
- j) multi-directional lift trucks;
- kk) rough-terrain trucks;
- l) counterbalance container handlers;
- m) articulated counterbalance lift trucks;
- n) order-picking trucks;
- o) double-stackers.

This document is intended to be used in conjunction with ISO 3691-3:2016/Amd 1:2023 for:

- Trucks with an elevating operator position of more than 1 200 mm from ground level,
- Trucks without an elevating operator position that are designed to travel with an elevated load more than 1 200 mm from ground level,
- Trucks with an elevating operator position not exceeding 1 200 mm from ground level that are equipped with an additional load lifting device having a maximum lift height exceeding 1 800 mm from ground level.

NOTE 1 ISO 3691-3 does not apply to counterbalance fork lift trucks or trucks intended for container handling.

Basic requirements for attachments are given in the appropriate clauses.

NOTE 3 For the purposes of this document, fork arms, load-carrying platforms and integrated attachments are considered to be parts of the 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 truck.

This document does not apply to self-propelled variable-reach trucks, rough-terrain variable-reach trucks, driverless trucks, towing tractors, or burden carriers, which are covered in ISO 3691-2:2023, ISO 10896 series, ISO 3691-4:2023 and ISO 3691-6:2021, respectively. This document does not apply to lorry mounted trucks, which are covered by ISO 20297-1:2017.

This document is applicable to all classifications of internal combustion and electric trucks according to ISO 5053-1:2020, B.2. However, it does not establish requirements for hazards related to:

- Hydrogen fuel cells and hydrogen fuel,
- Permanent connections with electrical mains supply.

This document does not apply to 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 PrEN 16307-1:2025 for trucks to be placed on the market within the European Community (EC) and European Economic Area (EEA), 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 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 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,
- due to overload while operating,
- from contact or creation of an arc with live overhead power lines,
- for controls for operation from outside the truck other than travelling
- due to radiation emissions from the truck.

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.

IEC 60529:1989+A1:1999, *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*

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- 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 3691-5:2014+A1:2020, *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 5053-2:2019, *Industrial trucks — Vocabulary — Part 2: Fork arms and attachments*
- ISO 5053-3:2024, *Industrial trucks — Vocabulary — Part 3: Accessories and components*
- ISO 6055:2023, *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 13284:2022, *Industrial trucks — Fork arm extensions and telescopic fork arms — Technical characteristics and strength requirements*
- ISO 13849-1:2023, *Safety of machinery — Safety-related parts of control systems — Part 1: General 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 22915-1:2024, *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*
- ISO 22915-5:2020, *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 22915-10:2023, *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 22915-15:2020, *Industrial trucks — Verification of stability — Part 15: Counterbalanced trucks with articulated steering*

ISO 22915-20:2023, *Industrial trucks — Verification of stability — Part 20: Additional stability test for trucks operating in the special condition of offset load, offset by utilization*

ISO 22915-22:2014, *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*

EN 17314:2020, *Industrial trucks - Specifications and test methods - Operator restraint systems other than 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, ISO 5053-3:2024 as commented 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 Truck type

3.1.1

centre-controlled truck

self-propelled industrial truck with the *normal operating position* located near the longitudinal centre of the truck.

3.1.2

end-controlled truck

self-propelled industrial truck with the *normal operating position* located at the end opposite the load handling device.

3.1.3

low-lift truck

truck having a lift height of 500 mm or less

3.1.4

pedestrian-controlled truck

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

Note 1 to entry: The truck can be equipped with a stand-on option, for example a foldable operator platform.

3.1.5

rider-controlled truck

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

3.1.6

self-propelled industrial truck

operator 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 5053-1:2020 for a comprehensive terminology.

3.1.7

stand-on truck

rider-controlled truck designed to be controlled by an *operator* standing on an operator platform on the truck

Note 1 to entry: for the purpose of this document stand-on trucks with an auxiliary seat for the operator are considered as stand-on trucks.

Note 2 to entry: auxiliary seats are features designed to support the body of the operator for ergonomic reasons.

3.2 Operator and operator position

3.2.1

normal operating position

position from which the *operator* controls functions for driving and/or load handling, as specified by the manufacturer

Note 1 to entry: Additional operating positions can be specified by the manufacturer. A rotating seat or stand-on end-controlled truck with more than one operating direction is considered as being or having a single normal operating position.

3.2.2

operator

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

Note 1 to entry: Depending on the truck type, the operator can be riding on the 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 regarding training, authorization and licensing can apply.

Note 3 to entry: Operator can also be responsible for other operations, for example pre-shift check, re-fueling.

3.3 Truck operation

3.3.1

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.

3.3.2

lift height

vertical distance between the upper face of the fork arm blade, load-carrying platform or an elevating operator platform and the ground

Note 1 to entry: When trucks are equipped with an attachment(s) in place of fork arms, the lift height is measured between the ground and the underside of the attachment.

3.3.3

lift height for travelling

lifting height providing sufficient ground clearance for travelling not exceeding the maximum lift height for stability tests simulating travel

3.3.4

lost load centre

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

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

3.3.5

operating pressure

pressure at which a fluid system is operated under normal operating conditions, not including any momentary surges

[SOURCE: ISO 8625-1:2018, 3.23 modified by adding “not including any momentary surges”]

3.3.6

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 a specified lift height

Note 1 to entry: For specification of rated capacity, see [Annex A](#).

Note 2 to entry: The rated capacity is also 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.

3.3.7

low speed

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

Note 1 to entry: 1,5 km/h is approximately 0,4 m/s, 2,5 km/h is approximately 0,7 m/s.

4 Safety requirements and/or protective / risk reduction measures

4.1 General

4.1.1 Overall requirements

Trucks and attachments shall conform to the safety requirements and/or protective measures specified in [clause 4](#).

In addition, trucks and attachments shall be designed in accordance with 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

Normal climatic conditions are as follows. Climatic conditions shall be specified in the instruction handbook (see [6.2](#)):

- 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 as follows. These shall be specified in the instruction handbook (see [6.2](#)):

- operating (driving and load handling) is carried out on substantially firm, smooth, level and prepared surfaces. Exception for rough-terrain trucks which can drive on un-prepared surfaces;
- the surface conditions (e.g. clean and dry surface) on which the truck is designed to operate;
- when travelling, the load centre of gravity is approximately on the longitudinal centre plane of the truck or on the centred position of the load handling device by design or powered means;
- when travelling, the mast or fork arm carriage fully retracted, where applicable;
- when travelling, the mast or fork arms are tilted backwards, where applicable, and at the lift height for travelling. 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](#).

NOTE Conditions for travelling on a gradient can be specified in the instructions for use. See [6.2](#).

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 can be subject to regional requirements. See PrEN 16307-1:2025 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 Protection from burning

All parts of the truck within reach of the operator in the normal operating position(s) or when the operator is entering or leaving the operating position(s) shall be insulated or shielded so that the surface temperature, generated by heat sources in the truck, of bare metal parts does not exceed 65 °C, and that of painted or plastic parts does not exceed 83 °C.

Accessible surfaces on the outside of the truck that can be inadvertently contacted by persons, for example raised exhausts, shall be insulated, guarded or shielded so that the surface temperature of exposed bare metal parts does not exceed 65 °C, and that of painted or plastic parts does not exceed 83 °C.

4.1.7 Stored energy components

It shall be possible to release or isolate stored energy that present a significant hazard before removal or disassembly of components (e.g. hydraulic accumulator or spring-applied brakes).

NOTE See also [6.2.6](#) and [6.3.3.4](#)

4.1.8 Storage of instruction handbook

If provision for storage of an instruction handbook (see [6.2](#)) is provided on the truck, it shall not obstruct the operation of the truck.

4.1.9 Special equipment

The truck shall be provided, as applicable, with any special equipment required to test, adjust and maintain the truck for safe operation.

4.2 Starting/moving

4.2.1 Unauthorized starting

Trucks shall be provided with a means (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 but shall not allow starting by unauthorized persons.

Where the means is a key, it shall not be removable in the run position.

4.2.2 Unintended movement

4.2.2.1 Unintended movement from standstill

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

The travel control system shall be so arranged that on level ground the truck will start from standstill only when the control(s) for speed and direction are activated. For IC trucks, rough terrain trucks and container handlers, after engaging direction control, a maximum travel speed of 4 km/h is allowed without activation of the speed control.

4.2.2.2 Internal-combustion-engine powered trucks

Internal-combustion-engine-powered trucks shall be fitted with a device which prevents the engine from being started while the transmission is engaged.

4.2.2.3 Powered travel movement

Powered travel movement of a rider-controlled truck shall be possible only if the operator is in a normal operating position. For example, for sit-on trucks, a powered travel interlock activated by a device that detects the operator in the seated position satisfies this requirement.

Powered travel movement from standstill shall not be restored automatically when the operator returns to a normal operating position without an additional operation, e.g. by requiring a resetting of the direction control or reactivation of the travel control.

NOTE For the purposes of this clause, travel movement includes low speed operation (e.g. manoeuvring).

4.2.2.4 Manual gearbox and manually operated clutch pedal

A truck with an automotive-type manual gearbox and manually operated clutch pedal satisfies the requirements of [4.2.2.2](#) and [4.2.2.3](#).

4.2.3 Travel speed

4.2.3.1 General

All travel speed requirements shall be evaluated with the truck operating on level ground. The maximum travel speed shall fulfil both the truck stability requirements in [4.8](#) and the service brake requirements in [4.3](#). Further limitations shall apply to specific truck types as specified in subclauses of [4.2.3](#).

Where specified in [Table 1](#), the travel distance from standstill in the first 0,5 s shall be measured with the travel control set to maximum speed, with the maximum acceleration and with the truck unladen. The travel distance in the first 0,5 s shall be verified in both travel directions unless otherwise stated.

Table 1 — Requirements for travel speed and travel distance from standstill in the first 0,5 s

Clause	Truck type	Operation / Condition	Max. Speed	Travel distance and time	Remarks
4.2.3.2	Pedestrian-controlled trucks				
4.4.2.4 c)	All kind of pedestrian-controlled trucks	Tiller in the upper end brake position	(low speed) 1,5 km/h	the first 62 mm of travel distance from standstill in tiller direction shall not be covered in less than 0,5 s	Brake override function
4.2.3.2.1	Single-speed	Pedestrian mode – No (further) speed limitation active	4 km/h	the first 62 mm of travel distance from standstill in tiller direction shall not be covered in less than 0,5 s	---
0	Variable-speed – Without foldable operator platform	Pedestrian mode – No (further) speed limitation active	6 km/h	the first 285 mm of travel distance from standstill in tiller direction shall not be covered in less than 0,5 s	---
4.2.3.2.3	Variable-speed – With foldable operator platform	Pedestrian mode – with the platform not in the folded down position	6 km/h	the first 285 mm of travel distance from standstill in tiller direction shall not be covered in less than 0,5 s	---
		Ride-on mode – without lateral support arms or with lateral support arms not in the extended position	6 km/h	the first 285 mm of travel distance from standstill shall not be covered in less than 0,5 s	---
		Ride-on mode – No (further) speed limitation active	14 km/h	the first 285 mm of travel distance from standstill shall not be covered in less than 0,5 s	Relevant with the operator standing on the folded down operator platform with the lateral support in the extended position. (see also 4.7.3.3)
Travel control device for remote operation or picking alongside of the truck					
4.2.3.3	All kind of trucks	remote operation (outside the truck) or picking alongside of the truck	6 km/h	the first 285 mm of travel distance from standstill shall not be covered in less than 0,5 s	e. g. lateral push button, remote
4.4.2.7			Regional requirements apply		
4.4.2.6 d) 2)	Trucks with trailer coupling	operation of the fine positioning device	(low speed) 2,5 km/h	the first 62 mm of travel distance from standstill in direction of coupling device shall not be covered in less than 0,5 s	---
4.2.3.4	Trucks with fixed operator platform				

Table 1 (continued)

Clause	Truck type	Operation / Condition	Max. Speed	Travel distance and time	Remarks
4.2.3.4.1	End-controlled pallet trucks	Ride-on mode – No (further) speed limitation active	16 km/h	the first 285 mm of travel distance from standstill shall not be covered in less than 0,5 s	Trucks equipped with a grab rail, when operating in stand-on mode. (see also 4.7.3.4)
		Pedestrian mode	See 4.2.3.2.1 or 0	See 4.2.3.2.1 or 4.2.3.2.2	---
4.2.3.4.2	Side entry stand-on and rear entry stand-on trucks		General requirements, see 4.2.3.1	the first 285 mm of travel distance from standstill shall not be covered in less than 0,5 s	---
4.2.3.5	Travel with mast elevated				
4.2.3.5	Rider-controlled reach trucks, including reach trucks with retractable mast, with moveable or without moveable fork arm carrier.	The elevated section of the mast is more than 400 mm above the height of the mast when fully lowered	6 km/h	---	---

4.2.3.2 Pedestrian-controlled trucks

4.2.3.2.1 Single-speed pedestrian-controlled trucks

The requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

Pedestrian controlled trucks with a lift height greater than 500 mm shall not be single speed.

4.2.3.2.2 Variable-speed pedestrian-controlled trucks without foldable operator platform

The requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

4.2.3.2.3 Variable-speed pedestrian-controlled trucks with foldable operator platform

The requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

4.2.3.3 Trucks controlled with a travel control device for remote operation (outside the truck) or picking alongside of the truck

The requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

Travel speeds can be subject to regional requirements. See PrEN 16307-1:2025 and ISO/TS 3691-8:2019.

4.2.3.4 Trucks with fixed operator platform

4.2.3.4.1 End-controlled pallet trucks

For end-controlled pallet trucks equipped with a grab rail, the requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

For end-controlled pallet trucks operated in the pedestrian mode, the applicable requirements of [4.4.2.4 c\)](#), [4.2.3.2.1](#) or 0 shall apply.

4.2.3.4.2 Side entry stand-on and rear entry stand-on trucks

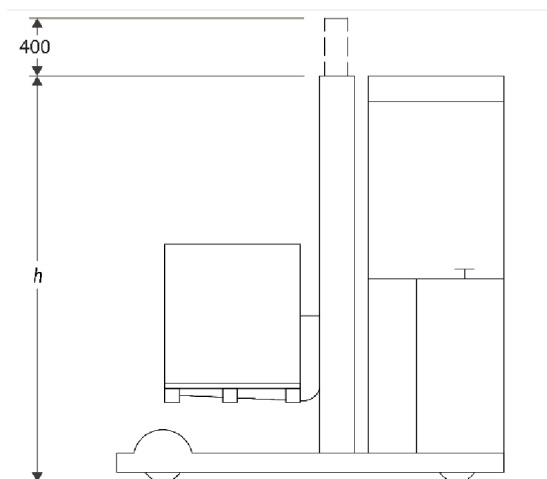
The requirements for travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

4.2.3.5 Travel with mast elevated

The travel speed of rider-controlled reach trucks (for example with retractable mast, with moveable or without moveable fork arm carrier) shall be limited or reduced automatically as specified in [Table 1](#), without causing a tip-over hazard, when the elevated section of the mast is more than 400 mm above the height of the mast when fully lowered (see [Figure 1](#)).

Travel with mast elevated can be subject to regional requirements in addition to the requirements of this document. See ISO/TS 3691-8:2019.

Dimensions in millimetres



Key

h height of mast when fully lowered

Figure 1 — Mast extension on reach trucks

4.2.4 Parts exceeding the plan view outline of the truck

When parts are not in their designed travel position (e.g. open battery compartment doors, rigid service doors) and exceed the plan view outline of the truck, their unsecured position shall be visible to the operator from the normal operating position.

If this is not possible, indicators, warning devices or interlocks shall be provided.

4.3 Brakes

4.3.1 General

All trucks shall be designed with a service and a parking brake system. Brakes shall conform to ISO 6292:2020.

The parking brake shall be equipped with a system preventing unintentional release. The parking brake force shall be applied by mechanical means.

Braking requirements can be subject to regional requirements, in addition to the requirements of this document. See PrEN 16307-1:2025 and ISO/TS 3691-8:2019.

4.3.2 Failure of energy supply to service brake

In the case of a loss of the energy used to apply the service brake, a manually- or automatically-applied braking system shall be able to slow down and stop the truck. This requirement shall be verified by the procedure in [5.4](#).

4.3.3 Parking brake systems

4.3.3.1 Parking brake indication

For trucks not equipped with automatically released parking brakes, the engaged state of the parking brake shall be indicated to the operator.

4.3.3.2 Manually applied parking brakes

For trucks with only a manually applied parking brake system, the parking brake function shall be operable by hand or foot from the normal operating position.

4.3.3.2.1 For trucks with only manually applied parking brakes, a warning (audible and/or visual) to the operator shall be activated when leaving the normal operating position if the parking brake system has not been applied.

4.3.3.2.2 Where a truck without automatically applied parking brake is designed to be held stationary for more than 2 s on inclined surfaces by the drive system with the travel control in neutral position, a warning shall be given to the operator when the travel control is in neutral position, the truck is no longer at standstill and the parking brake is not engaged.

NOTE a truck creeping downhill due to a limited amount of torque automatically applied with the travel control in neutral position is not considered at standstill.

4.3.3.3 Automatically applied parking brake

4.3.3.3.1 For trucks with automatically applied parking brakes, the parking brake function shall be automatically initiated not later than 0,2 s after the following conditions are satisfied:

- the truck is at standstill; and
- the operator is not in the normal operating position.

4.3.3.3.2 For trucks designed to be held stationary by the drive system and where the parking brake system engages in the event of a loss of power, it is not required to apply the parking brake per the requirements of [4.3.3.3.1](#). Failure of the drive system to hold the truck stationary shall result in automatic parking brake initiation within 0,2 s.

4.3.3.3.3 Failure of the control system of an automatically applied parking brake shall be indicated to the operator.

4.4 Manual controls

4.4.1 General

4.4.1.1 Normal stop

Each normal operating position shall be provided with means to stop all control functions available in that position.

4.4.1.2 Emergency stop device

If provided, the emergency stop device shall be operable from all normal operating positions.

NOTE See ISO 13850:2015

4.4.1.3 Control motions

Movement of manual controls shall be consistent with the motions of the truck being operated, wherever practicable.

4.4.1.4 Multiple operators

If additional normal operating positions are provided (e.g. for more than one operator) the operation of these controls shall only be possible from one normal operating position at a time, except for the normal stop device and the emergency stop device.

4.4.1.5 Multiple operating positions

If more than one normal operating position is provided for a single operator, the use of the controls for one of these operating positions shall preclude the use of the controls of another operating position, except for the normal stop device and the emergency stop device.

The requirements of this subclause are also applicable for controls located outside the truck (e.g. cable-connected remote controls; cableless remote control.).

4.4.1.6 Control actuation force

The actuation force under normal operating conditions at the rim of the steering wheel shall not exceed 250 N under the following conditions:

- The truck shall be stationary on a dry flat level surface providing good adhesion, for example, concrete,
- The truck shall be laden or unladen, whichever is least favourable condition,
- For IC trucks, the engine shall be at idle.

The actuation force under normal operating conditions at the periphery of the tiller shall not exceed 250 N under the following conditions:

- The truck shall not exceed low speed on a dry flat level surface providing good adhesion, for example, concrete,
- The truck shall be laden or unladen, whichever is least favourable condition
- Tiller in the non-brake position.

NOTE A truck tested stationary meets this requirement.

For other controls, except for braking, the following shall apply:

Control operation	Maximum control actuating force N
Hand	
— Lever, forward/backward	230
— Lever, sideways	100
— Lever, upwards	400
Foot	
— Pedal,	450
— Centre pivot treadle	230
Toe	90
Finger tip (lever or switch)	20

The minimum strength of the control shall be sufficient to withstand at least five times the control actuating force that the control was designed for without sustaining permanent damage (e.g. deformation, fracture) or having its function impeded.

4.4.2 Travel and braking controls

4.4.2.1 General

The travel control shall be designed such that an increase in the displacement of the control from the neutral position increases the travel speed in the direction of the travel control request. This requirement does not apply to single speed travel controls.

When the control is released, it shall return to the neutral position.

4.4.2.2 Sit-on trucks

Trucks with pedal-operated travel and braking controls shall conform to ISO 21281:2005.

4.4.2.3 Stand-on trucks

The requirements for travel and braking controls for a stand-on truck are as follows.

a) Travel control functions

- Where a tiller is used, it shall be fitted with control devices for travel direction and speed.
- Where a steering wheel, a steering crank, a handlebar, or similar control is fitted, the controls for travel direction and speed shall be positioned in close proximity to the steering control or, in a position making them ergonomically accessible and operable by the operator.

b) Service brake functions

The service brake function shall be engaged by one or more of the following methods:

- automatically when the tiller is released;
- automatically when the travel control is released;
- automatically when releasing the foot actuator (pedal, foot switch);
- when actively inverting the travel control;
- when the tiller is actively pushed to either its upper or lowered position;
- when activating the hand actuator;

— when activating the foot actuator (pedal).

c) Trucks with elevating operator platform up to 1 200 mm

Means shall be provided to prevent travel while the operator platform is elevated more than 500 mm, unless the controls are elevated with the platform.

4.4.2.4 Pedestrian-controlled trucks including trucks with a foldable operator platform

The requirements for pedestrian-controlled trucks including trucks with a foldable platform are as follows.

- a) The tiller shall be fitted with control devices for travel direction and speed.
- b) When the tiller is released, it shall automatically return to its upper rest position, cut off traction power in the travel direction and engage the service brake.
- c) If the tiller is equipped with a function (e.g. brake override) that allows travelling when the tiller is in the upper braking position the speed shall be limited to low speed as specified in [Table 1](#) and a service brake function shall be provided.
- d) When the tiller is in its lowered braking position, the traction power in the travel direction shall be cut off and the service brake shall be engaged.
- e) The tiller shall be fitted with a safety device to detect a contact of the head of the tiller in its operating position with an operator. As long as pressure is applied, truck movement towards the operator shall be stopped and a braking means shall be initiated to stop movement toward the operator.
- f) With the tiller in operating position and the tiller head safety device actuated, it shall be possible to move the truck away from the operator either automatically or by the actuation of the travel control.

Movement away from the operator shall not induce other risks (e.g. by unlimited uncontrolled motion or by compromising the stability of the truck).

This function shall be verified by functional testing according to [5.1 d\)](#) and through routine testing according to [5.3](#).

- g) The function of the tiller head safety device shall be active up to and including a travel speed of 6 km/h. The function may be automatically deactivated while the travel speed exceeds 6 km/h (see [Table 1](#)). If the function of the tiller head safety device is deactivated, it shall be indicated to the operator (e.g. by a warning display, label, or an indicator light).
- h) The tiller head safety device may be deactivated while the travel control is active and the truck is travelling away from the operator.

4.4.2.5 Differential locking

It shall be possible to unlock the differential when the truck is moving.

For trucks fitted with a pedal-operated differential lock, pressing on the pedal shall lock the differential and it shall be unlocked when releasing the pedal.

4.4.2.6 Travel controls for operating alongside the truck and remote controls

Additional travel control(s) for operating alongside the truck, if provided, shall meet the following requirements.

NOTE See [4.2.3.3](#) for travel speed requirements for operating alongside the truck.

a) General

- 1) Travel controls that are affixed to the truck shall be arranged so that the operator is not exposed to hazards occurring through movement of the truck.

- 2) Means shall be provided to prevent unintentional activation of controls.
- 3) Travel controls shall be made operable by means of a separate lockable selector switch, or by sensing of the operator in the appropriate operating position for the corresponding travel control. The travel controls associated with the most limited speed may be set active when the operator is not sensed in another normal operating position.

When a set of controls is selected, all safety functions required for the selected set of controls shall be active. This safety function shall be in accordance with a PLr of b in accordance with ISO 13849-1:2023.

Powered movement shall not be restored when the travel controls for operating alongside the truck are made operable without an additional operation. (e.g., by requiring a resetting of the direction control or reactivation of speed control).

- 4) Simultaneous operation from the normal operating position(s) shall be excluded.
- 5) Travel controls shall be hold-to-run. If the travel control is released, a controlled stop shall be initiated, followed by application of the parking brake.

Exception: For coasting, [4.4.2.7](#) applies.

b) Additional requirements for cable-connected remote controls

- 1) A control device for actuating the service brake shall be provided.
- 2) The length and layout of the cables shall allow the operator to operate from outside of the area of hazard of the truck and shall allow visibility of the path of travel. The truck and cable system shall be designed to minimise the risk of entanglement with the wheels.

c) Additional requirements for cableless remote control

- 1) A control device for actuating the service brake shall be provided.
- 2) The cableless transmission range shall allow the operator to operate from outside the hazard zone of the truck and shall allow visibility of the path of travel.
- 3) The cableless communication system shall provide a residual error rate which contributes no more than 1 % of the lower boundary of the required PFH range of the relevant safety function, (see IEC 62745:2017+A11:2020 and IEC 61784-3:2021+A1:2024).

A maximum of one cableless remote shall be paired to a maximum of one truck at a time. This safety function shall be in accordance with a PLr of b in accordance with ISO 13849-1:2023.

d) Additional requirements for trucks with trailer coupling

- 1) The controls used for fine positioning of the truck when coupling a trailer (e.g. inching device) shall be arranged so that the operator does not have to be positioned between the truck and the trailer to operate them (see also a) 1) in this clause).
- 2) When operating the fine positioning controls, the requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

4.4.2.7 Additional operation from alongside pedestrian-controlled and stand-on trucks (coasting)

The additional operation of pedestrian-controlled and stand-on trucks while the operator is walking alongside the truck shall only be possible with the truck's fork arms trailing.

The additional operation of such trucks while the operator is walking alongside the truck, and the use of low-lift order-picking trucks provided with a system that allows for operation while walking alongside the truck, can be subject to regional requirements, additional to the requirements of this document. See EN 16307-1:2024 and ISO/TS 3691-8:2019.

When the truck is operated while walking alongside, the requirements for travel speed and travel distance from standstill in the first 0,5 s are specified in [Table 1](#).

4.4.3 Steering controls

4.4.3.1 Steering direction

For the steering direction, the following applies with respect to the forward-driving direction as defined in Annex [A.1](#).

- a) For stand-on or sit-on trucks with an operator facing the line of travel, clockwise rotation of the steering wheel, or equivalent movement of the steering control, shall steer the truck to the right when driving in the forward direction.

NOTE 1 For these trucks, forward direction is defined as load leading – see [A.1](#) (a) and (g).

- b) 1) For stand-on trucks with an operator facing at a right angle to the line of travel, clockwise rotation of the steering wheel, or equivalent movement of the steering control, shall steer the truck to the right when driving in the load trailing direction.

NOTE 2 For these trucks, travel directions are defined as load leading or load trailing – see [A.1](#) (h). The default steering direction should be consistent with that for sit-on trucks with the operator facing at a right angle to the line of travel – see [4.4.3.1](#) b)2)

- b) 2) For sit-on trucks with an operator facing at a right angle to the line of travel, clockwise rotation of the steering wheel, or equivalent movement of the steering control, shall steer the truck to the right when driving in the forward direction.

NOTE 3 For these trucks, forward direction is defined as load trailing – see [A.1](#) (b).

- c) For stand-on or sit-on trucks with a rotatable operator control position that can be rotated more than 90° or having duplicated control positions in order to facilitate the operator facing in the opposite direction, clockwise rotation of the steering wheel or equivalent movement of the steering control shall always steer the truck to the right, (i.e. dependent on the direction the operator is facing).
- d) Trucks with continuous 360° steering (i.e. the steering/drive wheel can move through 360° to propel the truck in the direction selected by the steering control) shall operate in the same sense as described in point a), b)1, or b)2, as applicable, when driving in the forward direction.
- e) For pedestrian-operated trucks fitted with a tiller, when driving in the forward direction, clockwise movement of the tiller shall steer the truck to the right.

NOTE 4 for these trucks, forward direction is defined as load trailing – see [A.1](#) (f)

- f) End-controlled rider trucks, with steering as described in (a) or (b), may be provided with “reverse steering”, (i.e. clockwise rotation of the steering control will steer the truck to the left) when requested by the user. Such trucks should be identified.

NOTE 5 This is to allow for consistency of truck steering in a facility where an opposite steering sense is used.

4.4.3.2 Failure of energy supply to the steering system

An interruption of the energy supplied to the steering system, shall result in at least one of the following:

- a) The ability to control steering shall be maintained until the truck is brought to a stop.
- The ability to control steering shall be verified according to [5.5](#).
- b) A controlled stop shall be initiated within 0,2 s.

For trucks with a maximum travel speed of ≥ 20 km/h, a) shall apply.

4.4.4 Load handling controls

4.4.4.1 Controls

Controls shall return to the neutral position when released and shall stop the corresponding movement.

Where a group of single-operation levers or controls with similar direction of actuation are used for the activation of functions of the load handling system, controls for functions with higher priority shall be positioned closer to the operator than controls for functions with lower priority, with priority values according to [Table 2](#), i.e., the control closest to the operator shall be for the hoist function (lifting and lowering).

Note 1 single-operation levers or controls include fingertip switches.

Note 2 controls to be manipulated with the thumb are not considered as single-operation levers for priority positioning.

The motion of the load or of the truck equipment and the corresponding predominant motion of the hand of the operator when actuating the load handling system controls shall be as specified in [Table 2](#).

Trucks equipped with attachments that hold the load by power (e.g. paper clamp) shall feature a secondary action or means to prevent unintentional release of the load.

Table 2 — Levers or controls with single operation, sequence of location and direction of movement

Function	Priority	Direction of movement	
		Motion of load or equipment	Predominant motion of operator's hand when actuating the control while facing the load
Hoist	1	Up	Rearward or up
		Down	Forward or down
Reach ^a	2	Retract	Rearward
		Extend	Forward
Tilt	3	Rearward	Rearward or up
		Forward	Forward or down
Side shift	4	Right	Rearward or up
		Left	Forward or down
Push-pull	5	Rearward	Rearward
		Forward	Forward
Rotate laterally	5	Clockwise	Rearward or up
		Counter-clockwise	Forward or down
Rotate longitudinally	5	Rearward	Rearward or up
		Forward	Forward or down
Load stabilizer	5	Down	Rearward or up
		Up	Forward or down
Fork position	5	Together	Rearward or up
		Apart	Forward or down
Grip	5	Engage	Rearward or up
		Release	Forward or down
Truck stabilizer	5	Raise	Rearward or up

^a Only for trucks with a retractable mast or forks, see ISO 5053-1:2020, 3.4

Table 2 (continued)

Function	Priority	Direction of movement	
		Motion of load or equipment	Predominant motion of operator's hand when actuating the control while facing the load
		Lower	Forward or down
Clamp	5	Clamp	Rearward or up
		Release	Forward or down
^a Only for trucks with a retractable mast or forks, see ISO 5053-1:2020, 3.4			

4.4.4.2 Manual-lift systems

The hand power forces and the layout of controls of manually operated lifting systems shall conform to ISO 3691-5:2014/Amd 1:2020.

4.4.5 Multi-function controls

Where a control is designed to perform more than one function, each separate function shall be clearly marked. Each control function shall return to the neutral position when released and stop the corresponding movement.

4.4.6 Controls for automated functions

The controls for automated functions shall conform to ISO 24134:2006 with the following exception: the electrical requirements for automated functions shall conform to [4.1.4](#) of this document.

4.4.7 Marking

Controls shall be marked in accordance with 6.3.1.4.

4.5 Power systems and accessories

4.5.1 Exhaust systems

The exhaust system shall be designed in accordance with [4.7.6](#) and such that engine exhaust is directed away from the operator position. Materials used in the vicinity of exhaust systems shall be non-flammable and shall be chosen and protected such that they are not adversely affected by heat from the exhaust system.

4.5.2 Fuel tank

4.5.2.1 Tank isolation

The tank and/or filling arrangement shall be separated from the electrical and exhaust systems by suitable protection, for example location, a separate enclosure or baffles. The tank filling arrangement shall be such that spillage or leakage will not drain into the engine or operator's compartment or onto electrical or exhaust system parts.

4.5.2.2 Fuel spillage

Fuel spillage shall not be possible under normal operating conditions.

4.5.3 Access to engine and other compartments

4.5.3.1 Engine compartments with moving parts

Moving parts in the engine compartment shall be protected by either

- guarding designed according to ISO 14120:2015, or
- engine covers opened only by using keys or tools or by a means for opening the cover located in a lockable cabin.

Guarding of the access from underneath is not required if the access ground clearance is less than 600 mm between the underside of the truck and level ground.

4.5.3.2 Unintentional closure

Where unintentional closure could cause injury, access covers (i.e. traction battery or engine covers) shall be provided with means for preventing unintentional closure. Those means shall be permanently affixed to the truck or stored in a safe place on the truck.

4.5.4 Gas-powered trucks

4.5.4.1 Liquefied Petroleum Gas (LPG)-powered trucks

4.5.4.1.1 Containers

The following applies to the permanently mounted and removable containers of trucks powered by LPG.

- a) When LPG containers are removable, their fastenings shall permit easy handling and checking of the installation after the exchange of containers.
- b) Removable LPG containers that incorporate a pressure-relief valve shall be positioned on the truck so that the pressure-relief valve opening is always in communication with the vapour space at the top of the container. This may be accomplished, for example, by an indexing pin which positions the container when the container is properly installed.
- c) LPG containers shall be securely mounted to the truck to prevent movement. Fastening shall withstand static loading of four times the filled container weight in any direction without visible permanent deformation.
- d) LPG containers shall be fitted on the truck such that exposure to abrasion, shock and the corrosive action of the products handled by the truck is reduced.
- e) LPG containers and their connections shall be installed such that there are no projections outside the plan view outline of the truck.
- f) If LPG containers are installed in a compartment, this compartment shall have permanent openings at the bottom. The total surface area of these ventilation openings shall be at least 200 cm² allowing adequate ventilation to outside the truck.
- g) If an additional LPG container is carried on the truck, it shall be secured in the same manner as the main container.
- h) LPG containers shall be equipped with a device to prevent unintentional emission of gas or liquid, e.g. in the case of a pipe system failure. This does not apply to pressure-relief valves.
- i) Pipe fittings and accessories on LPG containers shall be protected against mechanical damage when used as specified by the manufacturer.