INTERNATIONAL STANDARD

ISO 3691-6

Second edition
2021-07

Industrial trucks — Safety requirements and verification —

Part 6: Burden and personnel carriers

Chariots de manutention — Exigences de sécurité et vérification —

Partie 6: Transporteurs de charges et de personnel

Reference number
ISO 3691-6:2021(E)

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Published in Switzerland

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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 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 3691-6:2013), which has been technically revised.

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

— the Introduction has been modified;

— throughout the document, old references to ISO 5053 have been updated to ISO 5053-1 and references to ISO/TS 3691-7 to EN 16307-6;

— in 4.7, the stability requirements have been changed to ISO 22915-17;

— in 4.6.3.1, the range for weight adjustment of the seat has been changed to "52 kg to 114 kg";

— in 4.6.3.3, the requirements for restraints and handholds have been clarified;

— in 6.2.2.1, list item t) has been added;

— in 6.2.5, the old requirement has been replaced by a reference to regional requirements outside Europe in ISO/TS 3691-8.

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.

Introduction

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

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.

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 to ISO 12100 is also necessary.

Structure

An important step forward in the work on the ISO 3691 series 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 and on the other side independent standards to cover the respective specific functions of industrial trucks, e.g. visibility, noise, vibration, electrical requirements, etc.

Global relevance

From the beginning, the task of the working group was to revise ISO 3691:1980 and establish worldwide basic standards to align with the major regulations in, for example, the European Union, Japan, Australia and North America.

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 the EN 16307 series and ISO/TS 3691-8:2019.

Industrial trucks — Safety requirements and verification —

Part 6: Burden and personnel carriers

1 Scope

This document gives safety requirements and the means for their verification for self-propelled carriers designed for carrying burdens without lifting, as defined in ISO 5053-1:2020, and/or personnel carriers, having three or more wheels, a maximum speed not exceeding 56 km/h and a load capacity not exceeding 5 000 kg (hereafter referred to as carriers or trucks).

This document is applicable to trucks equipped with a platform (which can be tilting) for the purpose of carrying materials or with a number of seats for the purpose of transporting passengers.

It is not applicable to:

— vehicles intended primarily for earth-moving or over-the-road hauling;

— driverless trucks;

— pedestrian controlled trucks;

— golf cars;

— tractors with a drawbar pull up to and including 20 000 N equipped with a platform for the purpose of carrying materials.

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

This document does not deal with hazard due to the risk of break-up during operation.

It does not establish requirements for hazards that can occur when using trucks on public roads or when operating in potentially explosive atmospheres.

It does not establish requirements to provide fire extinguishers.

Regional requirements, additional to the requirements given in this document, are addressed in EN 16307-6:2014 and ISO/TS 3691-8:2019.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 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 5010:2019, *Earth-moving machinery — Rubber-tyred machines — Steering requirements*

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

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 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 13849-1:2006, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

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

ISO 20898:2008, *Industrial trucks — Electrical requirements*

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

ISO 22915-17:2020, *Industrial trucks — Verification of stability — Part 17: Towing tractors, burden and personnel carriers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053-1:2020, 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
burden carrier
personnel carrier
mobile power-driven machine that is not self-loading, used for transporting material and/or personnel on indoor and outdoor improved surfaces, but not for use on public roads

3.2
operator
designated person, trained and authorized, who is responsible for the movement and operation of the carrier and, depending on the carrier type, can be transported by the carrier, or can be on foot accompanying the truck or can be remote from the truck (remote-controlled by cables, radio, etc.)

3.3
normal operating position
position in which the operator is able to control all functions for driving as defined by the manufacturer

3.4
load capacity
maximum load, including the operator and passengers

3.5
capacity
operator and number of passengers permitted by the manufacturer

4 Safety requirements and/or protective measures

4.1 General

4.1.1 Overall requirements

Trucks shall comply with the safety requirements and/or protective measures of this clause. 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 Electrical requirements

Electrical systems and equipment shall be in accordance with ISO 20898:2008. However, regional requirements can exist (see EN 16307-6:2014 and ISO/TS 3691-8:2019).

4.1.4 Edges and 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 of operators or passengers and during normal operation and daily checks.

4.1.5 Stored energy components

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

4.2 Starting/moving

4.2.1 Unauthorized starting

Carriers shall be provided with a device (e.g. a key, a code, a magnetic card) that prevents starting without that device.

4.2.2 Unintended movement

4.2.2.1 Parking brake

A parking brake shall be provided complying with 4.3.1.

4.2.2.2 Internal combustion engine-powered carriers

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

4.2.2.3 Travel controls

Travel controls on internal combustion engine powered carriers shall be arranged so that, on level ground, the carrier does not move from rest until the transmission has been engaged.

4.2.2.4 Powered travel movement

Powered travel movement of the carrier with a ride-on operator shall be possible only if the operator is in the normal operating position.

Powered travel shall not occur automatically when the operator returns to the normal operator position(s) without an additional operation, e.g. by requiring resetting the direction control or reactivating speed control, etc.

4.2.2.5 Manual gearbox and manually operated clutch pedal

A carrier with an automotive-type manual gearbox and manually operated clutch pedal satisfies the requirements of 4.2.2.2 and 4.2.2.4.

4.2.3 Speedometer

A speedometer shall be provided on ride-on carriers that have a maximum travel speed greater than 25 km/h.

4.3 Brakes

4.3.1 General

All carriers shall be designed with service and parking brakes complying with ISO 6292:2020. The parking brake shall be equipped with a system preventing unintentional release.

Emergency braking is subject to regional requirements, additional to the requirements of this document (see EN 16307-6:2014 and ISO/TS 3691-8:2019).

4.3.2 Stand-on carriers

Stand-on carriers shall be equipped with a brake system that automatically engages upon release of the brake actuating control by the operator. This system may serve as the service and parking brake.

4.3.3 Failure of the energy supply

Failure of the energy supply for the brake release shall not result in loss of braking for automatically acting brakes. The brake shall be automatically applied in the event of failure of energy supply to this brake system.

4.4 Manual control actuators

4.4.1 General

4.4.1.1 Consistency with the carrier motions

Movement of these controls, where practicable, shall be consistent with the carrier motions being operated. They shall be confined within the plan view outline of the carrier or tiller.

4.4.1.2 Multiple operators

If additional operating positions are fitted, i.e. more than one operator, the operation of these controls shall only be possible from one operating position at a time, excepting the emergency disconnect switch, which shall be operable from all positions.

4.4.1.3 Multiple operating positions

If more than one operating position is fitted for a single operator, the use of the controls of one operating position shall preclude the use of the controls of other operating positions, excepting the emergency disconnect switch, which shall be operable from all positions.

4.4.2 Travel and braking controls

4.4.2.1 General

The motion of the speed operating control shall be designed such that an increase in the movement of the control increases the travel speed. When the control is released, it shall return to the neutral position of the control actuator.

4.4.2.2 Sit-on carriers

Pedal operated travel and braking controls shall comply with ISO 21281:2005.

4.4.2.3 Differential locking

For carriers fitted with a pedal-operated differential lock, pressing on the pedal shall lock the differential and it shall be unlocked by releasing the pedal. It shall be possible to unlock the differential when the truck is moving.

4.4.2.4 Hand-operated direction control lever

The movement of a direction control lever shall correspond to the selected direction of travel.

4.4.2.5 Hand-operated accelerator control lever

The control lever shall be a hold-to-run control. It shall return to the neutral position when released. Movement towards the front of the carrier or away from the operator shall increase speed.

4.4.2.6 Additional operation from outside the carrier

4.4.2.6.1 General

If travel control from outside the carrier is provided for the operator, the travel speed shall be limited to 6 km/h. These controls can be attached to the carrier or remote control can be provided. This operating system can be made operable by means of a separate switch or automatically when the operator leaves the normal operating position.