

# SVENSK STANDARD

## SS-EN ISO 3691-4:2020

**Industritruckar – Säkerhetskrav och provning –  
Del 4: Förarlösa industritruckar och deras system  
(ISO 3691-4:2020)**

**Industrial trucks – Safety requirements and verification –  
Part 4: Driverless industrial trucks and their systems  
(ISO 3691-4:2020)**



**sis** Svenska  
Institutet för  
Standarder

Language: engelska/English

Edition: 1

This preview is downloaded from [www.sis.se](http://www.sis.se). Buy the entire standard via <https://www.sis.se/std-80022288>

Den här standarden kan hjälpa dig att effektivisera och kvalitetssäkra ditt arbete. SIS har fler tjänster att erbjuda dig för att underlätta tillämpningen av standarder i din verksamhet.

#### **SIS Abonnemang**

Snabb och enkel åtkomst till gällande standard med SIS Abonnemang, en prenumerationstjänst genom vilken din organisation får tillgång till all världens standarder, senaste uppdateringarna och där hela din organisation kan ta del av innehållet i prenumerationen.

#### **Utbildning, event och publikationer**

Vi erbjuder även utbildningar, rådgivning och event kring våra mest sålda standarder och frågor kopplade till utveckling av standarder. Vi ger också ut handböcker som underlättar ditt arbete med att använda en specifik standard.

#### **Vill du delta i ett standardiseringsprojekt?**

Genom att delta som expert i någon av SIS 300 tekniska kommittéer inom CEN (europeisk standardisering) och/eller ISO (internationell standardisering) har du möjlighet att påverka standardiseringsarbetet i frågor som är viktiga för din organisation. Välkommen att kontakta SIS för att få veta mer!

#### **Kontakt**

Skriv till [kundservice@sis.se](mailto:kundservice@sis.se), besök [sis.se](https://www.sis.se) eller ring 08 - 555 523 10

---

© Copyright/Upphovsrätten till denna produkt tillhör Svenska institutet för standarder, Stockholm, Sverige. Upphovsrätten och användningen av denna produkt regleras i slutanvändarlicensen som återfinns på [sis.se/slutanvandarlicens](https://www.sis.se/slutanvandarlicens) och som du automatiskt blir bunden av när du använder produkten. För ordlista och förkortningar se [sis.se/ordlista](https://www.sis.se/ordlista).

© Copyright Svenska institutet för standarder, Stockholm, Sweden. All rights reserved. The copyright and use of this product is governed by the end-user licence agreement which you automatically will be bound to when using the product. You will find the licence at [sis.se/enduserlicenseagreement](https://www.sis.se/enduserlicenseagreement).

Upplysningar om sakinnehållet i standarden lämnas av Svenska institutet för standarder, telefon 08 - 555 520 00. Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.

Standarden är framtagen av kommittén för Industritruckar, SIS/TK 221.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på [www.sis.se](https://www.sis.se) - där hittar du mer information.

Europastandarden EN ISO 3691-4:2020 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 3691-4:2020.

Denna standard ersätter SS-EN 1525, utgåva 1

The European Standard EN ISO 3691-4:2020 has the status of a Swedish Standard. This document contains the official version of EN ISO 3691-4:2020.

This standard supersedes the SS-EN 1525, edition 1



EUROPEAN STANDARD

**EN ISO 3691-4**

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2020

ICS 53.060

Supersedes EN 1525:1997

English Version

**Industrial trucks - Safety requirements and verification  
- Part 4: Driverless industrial trucks and their systems  
(ISO 3691-4:2020)**

Chariots de manutention - Exigences de sécurité  
et vérification - Partie 4: Chariots sans conducteur  
et leurs systèmes (ISO 3691-4:2020)

Flurförderzeuge - Sicherheitstechnische  
Anforderungen und Verifizierung - Teil 4: Fahrerlose  
Flurförderzeuge und ihre Systeme (ISO 3691-4:2020)

This European Standard was approved by CEN on 11 January 2020.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

# Contents

Page

<b>Foreword .....</b>	<b>viii</b>
<b>European foreword .....</b>	<b>ix</b>
<b>Introduction .....</b>	<b>x</b>
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>2</b>
<b>3 Terms and definitions.....</b>	<b>4</b>
<b>4 Safety requirements and/or protective/risk reduction measures .....</b>	<b>10</b>
4.1 General .....	10
4.1.1 Overall requirements.....	10
4.1.2 Normal climatic conditions.....	10
4.1.3 Electrical requirements.....	10
4.1.4 Stored energy components.....	10
4.1.5 Edges or angles .....	11
4.1.6 Guards.....	11
4.1.7 Interlocking devices for guards .....	11
4.1.8 Two hand control devices.....	11
4.1.9 Transmission parts.....	11
4.1.10 Electro-sensitive protective equipment .....	11
4.1.11 Pressure-sensitive protective devices.....	11
4.1.12 Hydraulic systems.....	11
4.1.13 Pneumatic systems.....	11
4.1.14 Avoidance of automatic restart.....	11
4.1.15 Foot protection.....	12
4.2 Braking system .....	12
4.3 Speed control.....	12
4.4 Automatic battery charging.....	12
4.5 Load handling.....	13
4.6 Steering .....	13
4.7 Stability .....	13
4.7.1 General.....	13
4.7.2 Tilting platform stability test.....	13
4.7.3 Stability requirements for trucks not covered by 4.7.2 .....	14
4.8 Protective devices and complementary measures.....	14
4.8.1 Emergency stop .....	14
4.8.2 Detection of persons in the path .....	15
4.9 Modes of operation .....	17
4.9.1 General.....	17
4.9.2 Automatic mode.....	18
4.9.3 Manual mode.....	19
4.9.4 Maintenance mode .....	20
4.10 Trucks intended to tow trailers .....	20
4.11 Safety-related parts of the control system .....	20
4.12 Electromagnetic compatibility (EMC) .....	25
4.13 Conveyors fitted to a truck.....	26
4.13.1 Trucks fitted with conveyors.....	26
4.13.2 Conveyors.....	26
<b>5 Verification of safety requirements and/or protective measures .....</b>	<b>26</b>
5.1 General .....	26
5.2 Tests for detection of persons .....	26
5.3 Stability tests .....	28
5.3.1 General.....	28
5.3.2 Stability tests for truck not covered by 4.7.2 .....	28

5.4	Fitness for purpose .....	29
5.4.1	General.....	29
5.4.2	Structural tests .....	29
5.4.3	Dynamic tests.....	29
<b>6</b>	<b>Information for use.....</b>	<b>30</b>
6.1	General .....	30
6.2	Warning systems.....	30
6.3	Instruction handbook for use.....	30
6.3.1	General.....	30
6.3.2	Concerning the trucks and system .....	31
6.3.3	Operation of the trucks and system .....	31
6.3.4	Routine service and maintenance of the trucks and system .....	32
6.3.5	Operating information .....	32
6.3.6	Information for the application .....	32
6.3.7	Details for floor/ground conditions.....	33
6.3.8	Details for power sources.....	33
6.3.9	Truck modification .....	33
6.4	Minimum marking.....	33
6.4.1	Marking .....	33
6.4.2	Warning signs .....	33
6.4.3	Information plates .....	34
6.5	Putting into service (commissioning).....	34
	<b>Annex A (normative) Requirements for preparation of the operating zones.....</b>	<b>36</b>
	<b>Annex B (informative) List of significant hazards .....</b>	<b>46</b>
	<b>Annex C (normative) Determination of rated capacity.....</b>	<b>51</b>
	<b>Annex D (informative) Load transfer operations .....</b>	<b>53</b>
	<b>Annex E (normative) Verification of essential health and safety requirements.....</b>	<b>56</b>
	<b>Bibliography.....</b>	<b>85</b>

## 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*.

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).

A list of all parts in the ISO 3691 series can be found on the ISO website.



## European foreword

This document (EN ISO 3691-4:2020) has been prepared by Technical Committee ISO/TC 110 "Industrial trucks" in collaboration with Technical Committee CEN/TC 150 "Industrial Trucks - Safety" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2020, and conflicting national standards shall be withdrawn at the latest by November 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1525:1997.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 3691-4:2020 has been approved by CEN as EN ISO 3691-4:2020 without any modification.

## Introduction

### General

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 organizations, 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 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.

### Structure

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

### Assessment of hazards

The product needs to be designed in such a way that it is fit for its purpose or function and can be adjusted and maintained without putting persons at risk when used under the conditions foreseen by the manufacturer.

In order to properly design a product and to cover all specific safety requirements, the manufacturer needs to identify the hazards that apply to their product and carry out a risk assessment. The manufacturer then needs to design and construct the product taking this assessment into account.

The aim of this procedure is to eliminate the risk of accidents throughout the foreseeable lifetime of the machinery, including the phases of assembling and dismantling where risks of accidents can also arise from foreseeable abnormal situations.

In selecting the most appropriate methods, the manufacturer needs to apply the following principles, in the order given here:

- a) eliminate or reduce risks as far as possible by design (inherently safe machinery design and construction);

- b) take the necessary protective measures in relation to risks that cannot be eliminated by design;
- c) inform users of any shortcoming of the protective measures adopted;
- d) indicate whether any particular training is required;
- e) specify any need to provide personal protection equipment;
- f) refer to the appropriate user's document for proper operating instructions.

Industrial trucks need to be designed to prevent foreseeable misuse wherever possible, if such would engender risk. In other cases, the manufacturer's instructions need to draw the user's attention to ways shown by experience in which the machinery ought not to be used.

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. Refer to ISO 12100.

### **Global relevance**

From the very beginning, the task was to revise ISO 3691:1980 to establish international basic standards to align with the major legislative regulations in, for example, the EU, Japan, Australia and North America.

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