BS EN 16307-6:2014

BSI Standards Publication

Industrial trucks — Safety requirements and verification

Part 6: Supplementary requirements for burden and personnel carriers

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 16307-6:2014.

The UK participation in its preparation was entrusted to Technical Committee MHE/7, Industrial trucks.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 75399 2

ICS 53.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16307-6

April 2014

ICS 53.060

English Version

Industrial trucks - Safety requirements and verification - Part 6: Supplementary requirements for burden and personnel carriers

Chariots de manutention - Exigences de sécurité et vérification - Partie 6 : Exigences supplémentaires pour les chariots porte-charge et chariots porte-personne

Flurförderzeuge - Sicherheitstechnische Anforderungen und Verifizierung - Teil 6: Zusätzliche Anforderungen für Lasten- und Personentransportfahrzeuge

This European Standard was approved by CEN on 1 December 2013.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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

Foreword

This document (EN 16307-6:2014) has been prepared by 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 October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

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

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive 2006/42/EC, see informative Annex ZA, which is an integral part of this document.

This document is based on ISO/TS 3691-7, *Industrial trucks — Safety requirements and verification — Part 7: Regional requirements for countries within the European Community*, and is limited to self-propelled industrial trucks.

EN 16307 consists of the following parts, under the general title *Industrial trucks — Safety requirements and verification*:

— *Part 1: Supplementary requirements for self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks*;

— *Part 2: Supplementary requirements for self-propelled variable-reach trucks*;

— *Part 3: Supplementary requirements for trucks with elevating operator position and trucks specifically designed to travel with elevated loads* (additional requirements to EN 16307-1);

— *Part 4: Supplementary requirements for driverless industrial trucks and their systems*;

— *Part 5: Supplementary requirements for pedestrian-propelled trucks*;

— *Part 6: Supplementary requirements for burden and personnel carriers*.

This document is to be used with EN ISO 3691-6:2013, *Industrial trucks — Safety requirements and verification – Part 6: Burden and personnel carriers (*ISO 3691-6:2013*)*.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

0 Introduction

0.1 General

This document is a type-C standard as stated in EN ISO 12100:2010.

The machines concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this document (Clause 1).

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.

The EN 16307 series of standards covers safety requirements and their verification for industrial trucks as defined in ISO 5053 that are not covered exhaustively by EN ISO 3691 series.

0.2 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 will have to identify the hazards that apply to his product and carry out a risk assessment. The manufacturer will then need 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 could also arise from foreseeable abnormal situations.

In selecting the most appropriate methods, the manufacturer will need 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 instructions will need to draw the user's attention to ways shown by experience in which the machinery ought not be used.

This part of EN 16307 does not repeat all the technical rules which are state-of-the art and which are applicable to the material used to construct the industrial truck. Reference will also need to be made to EN ISO 12100:2010.

1 Scope

This European Standard gives requirements for the types of industrial trucks specified in the scope of EN ISO 3691-6:2013.

This European Standard is intended to be used in conjunction with EN ISO 3691-6:2013. These requirements are supplementary to those stated in EN ISO 3691-6:2013 with the addition of following hazards:

- Noise emissions
- Vibration
- Electromagnetic compatibility (EMC)
- When operating in potentially explosive atmospheres

This European Standard replaces the following requirements of EN ISO 3691-6:2013:

- Electrical requirements

This European Standard defines supplementary requirements to EN ISO 3691-6:2013:

- Brakes
- Operator's seat
- Protection from burning
- Protection against crushing, shearing and trapping
- Visibility
- Information for use (instruction handbook and marking)

Annex A (informative) contains the list of significant hazards covered by this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1175-1:1998+A1:2010, *Safety of industrial trucks — Electrical requirements — Part 1: General requirements for battery powered trucks*

EN 1175-2:1998+A1:2010, *Safety of industrial trucks — Electrical requirements — Part 2: General requirements of internal combustion engine powered trucks*

EN 1175-3:1998+A1:2010, *Safety of industrial trucks — Electrical requirements — Part 3: Specific requirements for the electric power transmission systems of internal combustion engine powered trucks*

EN 1755, *Safety of industrial trucks — Operation in potentially explosive atmospheres — Use in flammable gas, vapour, mist and dust*

EN 12053, *Safety of industrial trucks — Test methods for measuring noise emissions*

EN 12895, *Industrial trucks — Electromagnetic compatibility*

EN 13059, *Safety of industrial trucks — Test methods for measuring vibration*

EN 13490, *Mechanical vibration — Industrial trucks — Laboratory evaluation and specification of operator seat vibration*

EN ISO 3691-6:2013, *Industrial trucks — Safety requirements and verification — Part 6: Burden and personnel carriers (ISO 3691-6:2013)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1)*

ISO 5053:1987, *Powered industrial trucks — Terminology*

ISO 6292:2008, *Powered industrial trucks and tractors — Brake performance and component strength*

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5053:1987 and EN ISO 3691-6:2013 apply.

4 Safety requirements and/or protective measures

4.1 General

The following applies to the burden and personnel carriers dealt with in EN ISO 3691-6:2013. These are additional to the requirements of EN ISO 3691-6:2013 and, in certain instances, replace them.

4.2 Electrical requirements

Subclause 4.1.3 of EN ISO 3691-6:2013 is replaced with the following:

Electrical systems and equipment shall be in accordance with the relevant part(s) of EN 1175.

4.3 Brakes

The requirements of EN ISO 3691-6:2013, 4.3.1 shall apply with the following addition:

The truck shall be provided with an emergency brake in accordance with ISO 6292:2008, 4.3.

4.4 Operator's seat

The requirements of EN ISO 3691-6:2013, 4.6.3.1 shall apply with the following addition:

The operator's seat shall be specified and marked in accordance with EN 13490.

4.5 Protection from burning

The requirements of EN ISO 3691-6:2013, 4.6.4 shall apply with the following addition:

The carrier shall provide a space for the location of a fire extinguisher.

4.6 Protection against crushing, shearing and trapping

The requirements of EN ISO 3691-6:2013, 4.6.5 shall apply with the following addition:

Where fixed and/or removable guard systems are needed, the requirements of EN 953 shall be met.

When a fixed guard is removed, its fixing system shall remain on the guard or truck. This requirement applies to any fixed guards that are liable to be removed by the user with a risk of loss of the fixings, e.g. fixed guards that are liable to be removed during routine maintenance or setting operations carried out at the place of use.

4.7 Visibility

The requirements of EN ISO 3691-6:2013, 4.9.1 shall apply with the following modifications:

Replace the requirement given in ISO 13564-1:2012, 9.2.2 a) with the following:

a) forward direction:

   25 % of the vertical surface of the test body;

b) rearward direction:

   20 % of the vertical surface of the test body.

Replace the required minimum illuminated area of test surface as required by ISO 13564-1:2012, Table 3, Test No.1, with the following:

25 % of the vertical surface of the test body.

4.8 Reduction of noise by design

4.8.1 General

Burden and personal carriers shall be designed and constructed such that risks resulting from the emission of airborne noise are reduced according the state of the art.

When noise is a significant hazard, there is need for a low-noise design. In this case, the methodology for low-noise design given in EN ISO 11688-1 shall be considered.

NOTE EN ISO 11688-2 gives useful information on noise generation mechanisms in machinery.

Normally, noise is not a significant hazard for battery-powered trucks.

4.8.2 Main source of noise

On burden and personal carriers, the main sources of noise are components, such as the following, in a high-speed operation mode:

— combustion engines, including air intake, cooling fan and exhaust system;

— hydraulic pumps/motors.

4.8.3 Measures to reduce noise at the operator's position

Typical measures to reduce noise include:

— selection of low-noise components;

— use of elastic mountings that prevent the transmission of structure born noise from the components to the structures;

— the use of improved noise insulation in the cabin, if fitted.

These and other measures of identical or better efficiency may be used.

4.8.4 Determination of noise emission values

The value of noise emission shall be measured using the test method given in EN 12053.

4.9 Vibration

Whole body vibration shall be measured using the test method given in EN 13059.

4.10 Electromagnetic compatibility (EMC)

The truck's EMC shall comply with EN 12895.

4.11 Operation in potentially explosive atmospheres

Trucks operating in potentially explosive atmospheres shall comply with EN 1755.

5 Verification of safety requirements and/or protective measures

The requirements specified in Clause 4 shall be verified in accordance with the referenced standards.

6 Information for use

6.1 Instruction handbook(s)

6.1.1 Carrier/attachments

The requirements of EN ISO 3691-6:2013, 6.2.1 shall apply with the following addition:

The instruction handbook(s) shall include, as applicable, the following:

— information on stability;

— the noise value in accordance with EN 12053;

— the vibration value In accordance with EN 13059;

— the static test coefficient used for lifting accessory.

6.1.2 Operation of the carrier

The requirements of EN ISO 3691-6:2013, 6.2.2.1 shall apply with the following addition:

The instruction handbook(s) shall include, as applicable, the following:

— information about specific protective devices (e.g. protective screen) and their use.

6.2 Marking

6.2.1 Information plates

The requirements of EN ISO 3691-6:2013, 6.3.1 shall apply with the following modifications:

Replace EN ISO 3691-6:2013, 6.3.1 b) with the following:

b) designation of the machinery, designation of series or type and the mandatory marking [1)].

1) For industrial trucks intended to be put on the market in the EEA, CE marking as defined in the applicable European directive(s), e.g. Machinery, Outdoor Noise and Explosive Atmospheres (ATEX).

Annex A
(informative)

List of significant hazards

This annex contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this part of EN 16307, identified by risk assessment for industrial trucks and which require action to eliminate or reduce the risk. See Table A.1.

NOTE The structure of the table is based on that of EN ISO 12100:2010, Table B.1. The order of lines within a group corresponds to the truck functionalities.

Table A.1 — List of significant hazards

No.	Type or group/origin	Potential consequences	Corresponding requirement	
1	**Mechanical hazards**			
	— Acceleration, deceleration (kinetic energy) — Machinery mobility — Moving elements — Rotating elements	— Being run over — Crushing — Drawing-in or trapping — Impact	4.3 4.7 Clause 5 6.1.1 6.1.2	Brakes Visibility Verification of safety requirements Truck attachments Operation of truck
	— Angular parts — Approach of a moving element to a fixed part — Cutting parts — Sharp edges	— Crushing — Cutting or severing — Drawing-in or trapping — Entanglement — Shearing — Stabbing or puncture	4.6 Clause 5	Protection against crushing, shearing and trapping Verification of safety requirements
2	**Electrical hazards**			
	— Arc — Electromagnetic phenomena — Electrostatic phenomena — Live parts — Not enough distance to live parts under high voltage — Overload — Parts which have become live under fault conditions — Short-circuit — Thermal radiation	— Burn — Chemical effects — Electrocution — Falling, being thrown — Fire — Projection of molten particles — Shock	4.2 4.10 Clause 5	Electrical requirements Electromagnetic compatibility Verification of safety requirements
3	**Thermal hazards**			
	— Explosion — Flame	— Burn	4.5 Clause 5	Protection from burning Verification of safety requirements

No.	Type or group/origin	Potential consequences	Corresponding requirement	
4	**Noise hazards**			
	— Exhausting system — Moving parts	— Discomfort — Loss of awareness — Loss of balance — Permanent hearing loss — Stress — Tinnitus — Tiredness	4.8 Clause 5	Noise emission Verification of safety requirements
5	**Vibration hazards**			
	— Mobile equipment	— Discomfort — Low-back morbidity — Neurological disorder — Osteo-articular disorder — Trauma of the spine — Vascular disorder	4.9 Clause 5	Vibration Verification of safety requirements
6	**Radiation hazards**			
	No origin of these kind of hazards in industrial trucks is covered.			
7	**Material/substance hazards**			
	— Combustible — Explosive — Flammable — Fluid — Fume — Gas	— Explosion — Fire	4.11 Clause 5	Operation in potentially explosive atmospheres Verification of safety requirements
8	**Ergonomic hazards**			
	— Design, location or identification of control devices — Effort	— Discomfort — Fatigue — Musculoskeletal disorder — Stress	4.4 4.7 Clause 5	Operator's seat Visibility Verification of safety requirements
9	**Hazards associated with environment in which the machine is used**			
	No origin of these kind of hazards in industrial trucks is covered.			
10	**Combination of hazards**			
	No origin of these kind of hazards in industrial trucks is covered.			

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EC Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Machinery Directive 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

Bibliography

[1] EN ISO 11688-2, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design (ISO/TR 11688-2)*

[2] EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™