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Title: Draft BS EN 1459-7 BS Rough-terrain trucks - Safety requirements and verification. Part 7: Electrification.

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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.

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Submission of Comments

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- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

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.	

English Version

Rough-terrain trucks - Safety requirements and verification - Part 7: Electrification

Chariots tout-terrain - Exigences de sécurité et vérification - Partie 7 : Électrification

Geländegängige Stapler - Sicherheitstechnische Anforderungen und Verifizierung - Teil 7: Elektrifizierung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 150.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (prEN 1459-7:2025) has been prepared by Technical Committee CEN/TC 150 “Industrial Trucks - Safety”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA and Annex ZB, which are an integral part of this document.

EN 1459 consists of the following parts, under the general title Rough-terrain trucks — Safety requirements and verification:

- Part 1: Variable-reach trucks;
- Part 2: Slewing variable-reach trucks;
- Part 3: Interface between the variable-reach truck and the work platform;
- Part 4: Additional requirements for variable-reach trucks handling freely suspended loads;
- Part 5: Attachment interface;
- Part 6: Application of EN ISO 13849-1 to slewing and non-slewing variable-reach rough-terrain trucks;
- Part 7: Electrification;
- Part 9: Variable-reach trucks equipped with work platforms having a front guard that can be opened.

Introduction

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

1 Scope

This document specifies electrical safety requirements for electrical systems of rough-terrain variable-reach trucks and slewing rough-terrain variable-reach trucks powered by one or more electric motors (hereafter referred to as trucks), namely pure electric and hybrid electric trucks, including when hydraulic systems are electrically powered. This document applies to electrical systems with maximum voltage greater than 32 up to 1500 V DC or greater than 21 up to 1000 V AC r.m.s.

This document deals with all significant hazards, hazardous situations and events relevant to the trucks when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

The significant hazards (see EN ISO 12100:2010, Annex B) dealt with in this document are listed in Annex A.

This document does not deal with hazards which could occur:

- during construction;
- when operating trucks in potentially explosive atmospheres.

This document does not cover:

- electrical systems of trucks with maximum working voltage up to 32 V DC or 21 V AC r.m.s (see relevant requirements in EN 1459-1 or EN 1459-2, as applicable);
- electric regenerative braking systems;
- electrical systems of externally-powered trucks designed for operation only when mains-connected.

NOTE Electrical systems of trucks designed to be both externally-powered and self-propelled are covered in this document when not mains-connected.

This document does not deal with sales literature.

This document does not address hazards specifically related to:

- trucks designed to operate with varying levels of autonomy (autonomous trucks), including trucks which move autonomously to the charging station, or when truck has embedded safety-systems with fully or partially self-evolving behaviour or logic using machine learning approaches;
- trucks with communication network connection.

This document is not applicable to trucks manufactured before the date of its publication.

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.

EN 60529:1991,¹ *Degrees of protection provided by enclosures (IP Code)*

EN ISO 6682:2008, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

ISO 7000:2019, *Graphical symbols for use on equipment — Registered symbols*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

EN ISO 17409:2020, *Electrically propelled road vehicles — Conductive power transfer — Safety requirements (ISO 17409:2020)*

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

EN 60947-5-5:1997,² *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function*

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

EN 1459-1:2025, *Rough-terrain trucks — Safety requirements and verification — Part 1: Variable-reach trucks*

EN 1459-2:2015+A1:2018, *Rough-terrain trucks — Safety requirements and verification — Part 2: Slewing variable-reach trucks*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1459-1:2025, EN 1459-2:2015+A1:2018 and the following apply.

ISO and IEC maintain terminology 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

voltage class

classification of an electric component or circuit according to its maximum working voltage (3.2)

[SOURCE: ISO 6469-3:2021, definition 3.36]

¹ As impacted by EN 60529:1991/corrigendum May 1993, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013 and EN 60529:1991/AC:2016-12.

² As impacted by EN 60947-5-5:1997/A1:2005, EN 60947-5-5:1997/A2:2017 and EN 60947-5-5:1997/A11:2013.

Table 1 — Voltage classes

Voltage class	Maximum working voltage	
	V DC	V AC r.m.s.
VC-A	$0 < U \leq 60$	$0 < U \leq 30$
VC-A1	$0 < U \leq 32$	$0 < U \leq 21$
VC-A2	$32 < U \leq 60$	$21 < U \leq 30$
VC-B	$60 < U \leq 1500$	$30 < U \leq 1000$
VC-B1	$60 < U \leq 75$	$30 < U \leq 50$
VC-B2	$75 < U \leq 1500$	$50 < U \leq 1000$
VC-C	$1500 < U \leq 36000$	$1000 < U \leq 36000$
U = maximum working voltage		
NOTE The classification of voltage classes VC-A, VC-B and VC-C is according to ISO 6469-3:2021.		

3.2**maximum working voltage**

highest value of AC voltage (r.m.s) or of DC voltage that can occur under any normal operating conditions according to the manufacturer's specifications, disregarding transients and ripple

[SOURCE: ISO 6469-3:2021, definition 3.26]

3.3**direct contact**

electric contact of human beings or livestock with live parts

[IEV ref 195-06-03]

3.4**live part**

conductor or conductive part intended to be energized in normal use

Note 1 to entry: This concept does not necessarily imply a risk of electric shock.

[SOURCE: IEC 60050-826:2004, definition 826-12-08, modified – Reference to PEN, PEL and PEM conductors removed, reference to running rails added. IEC 62128-1:2013, definition 3.1.13]

3.5**indirect contact**

electric contact of human beings or livestock with exposed-conductive-parts that have become live under fault conditions

[IEV ref 195-06-04]

3.7**connector**

device designed for providing connection and disconnection to a suitable mating component

[IEV ref 482-05-55]

Note 1 to entry: A connector has one or more contact members.

3.8

end-of-charge voltage

voltage attained at the end of a charging step, at a specified constant current

[IEV ref 151-12-19, MOD]

3.9

exposed conductive part

conductive part of equipment that can be touched *under the provisions of the protection degree IPXXB* and that is not live under normal conditions, but that can become live when basic insulation fails

[IEV ref 195-06-10, MOD]

3.10

hybrid truck

truck powered by at least two different on-board energy storage systems and two different energy converters, where at least one converter converts electrical energy

3.11

rechargeable electrical energy storage system

REESS

rechargeable system with maximum voltage greater than 32 up to 1500 V DC that provides electrical energy

Note 1 to entry: REESS includes the necessary systems for physical support, the battery management system and the casing.

3.12

conductive part

part which can carry electric current

[IEV ref 195-01-06]

3.13

basic insulation

insulation applied to live parts for protection against direct contact under fault-free conditions

Note 1 to entry: Where insulation is not provided by solid insulation only, it is complemented with protective barriers or protective enclosures to prevent access to live parts in order to achieve basic protection.

3.14

REESS nominal voltage

value of the voltage used by the manufacturer or supplier to designate or identify a REESS

[IEV ref 482-03-31, MOD]

3.15

battery management system

BMS

electronic system associated with a battery which has functions to control current in case of overcharge, overcurrent, overdischarge, and overheating, and which monitors and/or manages the state of the

battery, calculates secondary data, reports that data and/or controls its environment to influence the battery's safety, performance and/or service life

Note 1 to entry: Overdischarge cut off is not mandatory if there is an agreement on this between the cell manufacturer and the customer.

Note 2 to entry: The function of the battery management system (BMS) can be assigned to the battery pack or to equipment that uses the battery.

Note 3 to entry: The BMS can be divided and it can be found partially in the battery pack and partially on the equipment that uses the battery.

Note 4 to entry: The BMS is sometimes also referred to as a BMU (battery management unit).

3.16

truck inlet

part of a truck equipped with an on-board charger enabling the connection of a flexible cable for charging the REESS

3.17

regenerative braking

braking with conversion of kinetic energy into electric energy for charging the rechargeable electrical energy storage system (REESS)

4 Safety requirements and/or protective measures

4.1 General

4.1.1 Context

Trucks shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, trucks shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

4.1.2 Specific relation with EN 1459-1 and EN 1459-2

Trucks shall comply with EN 1459-1:2025 or EN 1459-2:2015+A1:2018, as applicable, for the significant hazards not covered by this document (see Annex A).

4.1.3 Voltage range

Electrical systems of trucks powered by REESS of the lead-acid type shall be designed to operate in the voltage range from 70 % up to 120 % of the REESS nominal voltage or as indicated by the REESS instructions.

Electrical systems of trucks powered by REESS other than lead-acid type shall be designed to operate in the voltage range as indicated by the REESS instructions.

Verification by design check.

4.2 Protection against direct contact with live parts

4.2.1 Protections

The protections against direct contact with live parts (e.g. solid insulator, barrier, enclosure) shall not be able of being opened, disassembled or removed without the use of tools or keys.

Verification by design check.

4.2.2 Protection degree

The minimum protection degree in accordance with EN 60529:1991¹ shall be as given in Table 2:

Table 2 — Protection degree

Cab type	Zone	VC-A2	VC-B
Non-enclosed cab	zone of reach ^a	IPXXB	IPXXD
	elsewhere on the truck	IPXXB	IPXXB
Enclosed cab	inside the cab	IPXXB	IPXXD
	outside the cab	IPXXB	IPXXB
^a Zone of reach according to EN ISO 6682:2008.			

Verification by type-test in accordance with EN 60529:1991¹, Clause 15.

4.2.3 Specific requirements for connectors

4.2.3.1 Truck inlet

The truck inlet shall comply with the applicable standard (for example EN 60309, EN 62196).

Verification by design check.

For REESS with an end-of-charge voltage exceeding 60 V, switching of external power shall be controlled via the connector auxiliary contacts or via other devices connected to the Batteries Management System to prevent arcing at the connector and to ensure that the charger is not energised until it is connected to the REESS.

Verification by design check.

4.2.3.2 Other connectors

Connectors shall be protected against accidental contacts with live parts. Connectors are deemed to meet this requirement if:

- they comply with the protection degree IPXXB when separated without the use of tools or keys; or
- they are provided with a locking mechanism and other components shall first be removed with the use of tools or keys in order to separate the connector; or
- the voltage of the live parts becomes $\leq$ DC 60 V or $\leq$ AC 30 V r.m.s within one second after the connector is separated.

Verification by design check or measurement.

4.2.3.3 Service disconnection

It shall be possible to electrically disconnect the REESS for maintenance and replacement operations.

Verification by design check.

Where a service disconnection can be opened, disassembled or removed without the use of tools or keys, the protection degree IPXXB shall be met.

Verification by design check.