



# SLOVENSKI STANDARD

## SIST EN 1648-1:2012

01-oktober-2012

Nadomešča:  
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**Bivalna počitniška vozila - 12 V enosmerna električna napeljava male napetosti - 1.  
del: Počitniške prikolice**

Leisure accommodation vehicles - 12 V direct current extra low voltage electrical  
installations - Part 1: Caravans

Bewohnbare Freizeitfahrzeuge - Elektrische Anlagen für DC 12 V - Teil 1: Caravans

(standards.iteh.ai)

Véhicules habitables de loisirs - Installations électriques à très basse tension de 12 V en  
courant continu - Par-tie 1: Caravanes

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**Ta slovenski standard je istoveten z: EN 1648-1:2012**

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**ICS:**

43.040.10	Električna in elektronska oprema	Electrical and electronic equipment
43.100	Osebni avtomobili. Bivalne prikolice in lahke prikolice	Passenger cars. Caravans and light trailers

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

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English Version

## Leisure accommodation vehicles - 12 V direct current extra low voltage electrical installations - Part 1: Caravans

Véhicules habitables de loisirs - Installations électriques à très basse tension de 12 V en courant continu - Partie 1: Caravanes

Bewohnbare Freizeitfahrzeuge - Elektrische Anlagen für DC 12 V - Teil 1: Caravans

This European Standard was approved by CEN on 16 June 2012.

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.

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## Contents

	Page
Foreword.....	4
Introduction .....	6
<b>1 Scope .....</b>	<b>7</b>
<b>2 Normative references .....</b>	<b>7</b>
<b>3 Terms and definitions .....</b>	<b>7</b>
<b>4 Power supply.....</b>	<b>8</b>
4.1 General.....	8
4.2 Sources of supply.....	8
4.3 Auxiliary batteries.....	8
4.3.1 Type of battery .....	8
4.3.2 Terminals .....	8
4.3.3 Location .....	8
4.3.4 Auxiliary battery compartment.....	8
4.3.5 Warning notice .....	9
4.4 Other sources of supply .....	9
4.4.1 Generators and transformer/rectifiers unit .....	9
4.4.2 Regenerative energy sources.....	9
4.5 Protective measures.....	9
<b>5 Wiring.....</b>	<b>10</b>
5.1 Connection to electrical system of towing vehicle.....	10
5.1.1 Connecting cables .....	10
5.1.2 Protecting of disconnected plug .....	10
5.1.3 Contact allocation.....	10
5.1.4 Charging of auxiliary battery and operation of refrigerator .....	10
5.1.5 Protection of terminal block .....	11
5.2 Cable and fixed wiring cross-sectional areas.....	11
5.3 Fixed wiring .....	11
5.3.1 Cables .....	11
5.3.2 Type of cable .....	12
5.3.3 Cable installation .....	12
5.3.4 Supporting of cables .....	12
5.3.5 Connections .....	12
5.3.6 Auxiliary battery cables .....	12
5.3.7 Prohibited cable runs and LPG installations .....	12
<b>6 Overcurrent protection.....</b>	<b>12</b>
6.1 Protection of positive conductors .....	12
6.2 Types of device .....	13
6.3 Installation of fuses .....	13
6.4 Prohibited locations .....	13
<b>7 Installation of appliances .....</b>	<b>13</b>
7.1 General.....	13
7.2 Selection and connection of appliances .....	13
7.3 Socket outlets .....	13
7.4 Battery charger .....	13
7.5 External Luminaires .....	13
7.6 Voltage drop.....	14
<b>8 User's Handbook .....</b>	<b>14</b>
<b>Annex A (informative) Relation of cable cross-sectional area, current flow and cable length for fixed wiring installations .....</b>	<b>15</b>

<b>A.1</b>	<b>General</b> .....	<b>15</b>
<b>A.2</b>	<b>Graphs for obtaining minimum cross-sectional areas</b> .....	<b>15</b>
<b>A.3</b>	<b>Calculation of the minimum cross-sectional areas</b> .....	<b>16</b>
	<b>Bibliography</b> .....	<b>18</b>

### Figures

Figure 1	— Overview of relevant European Standards applying to leisure accommodation vehicles .....	6
Figure A.1	— Graph for obtaining minimum cross-sectional area for conductors for fixed wiring installations with a voltage drop of 0,8 V .....	15
Figure A.2	— Graph for obtaining minimum cross-sectional area for conductors for battery cable installations with a voltage drop of 0,3 V .....	16

### Tables

Table 1	— Functional allocation and cross-sectional areas of the single cores of the connecting cable(s) .....	11
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**EN 1648-1:2012 (E)****Foreword**

This document (EN 1648-1:2012) has been prepared by Technical Committee CEN/TC 245 "Leisure accommodation vehicles", the secretariat of which is held by AFNOR.

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 January 2013, and conflicting national standards shall be withdrawn at the latest by January 2013.

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 supersedes EN 1648-1:2004.

The main technical changes since the previous edition are:

- a) The battery capacity is no more a requirement: sub-clause 4.3.2 "Capacity" deleted;
- b) Requirements on tube diameter deleted in 4.3.4 b);
- c) Reference to EC directive 2007/46/EC, Annex II added in 4.3.4;
- d) Clarification added to 4.3.5 and Clause 8 that the warning notice shall be written in the language(s) of the country in which the caravan is to be sold for the first time;
- e) Sub-clause 4.5 amended;
- f) Footnotes added in Table 1 for clarification;
- g) Sub-clause 5.3 "Fixed wiring" amended;
- h) Note added in 6.2;
- i) Clause 7 "Installation of appliances" amended;
- j) Normative references adapted according to above listed changes;
- k) Annex A revised editorially;
- l) Figure 1 added to Foreword.

EN 1648, Leisure accommodation vehicles - 12 V direct current extra low voltage electrical installations contains the following parts:

- *Part 1: Caravans* (the present document);
- *Part 2: Motor caravans*.

This document is based on ISO 8818 "Leisure accommodation vehicles — Caravans — 12 V direct current extra low voltage electrical installations" and takes into consideration specific aspects relating to electrical installations in caravans.

The requirements of relative ISO/IEC and CENELEC publications were taken into consideration during the preparation of this European Standard.

This document is one of a series covering the habitation aspects of leisure accommodation vehicles.

Requirements for 12 V direct current extra low voltage electrical installations for motor caravans are specified in EN 1648-2.

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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.

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## Introduction

Figure 1 gives an overview of the relevant European Standards for caravans, motor caravans and caravan holiday homes.

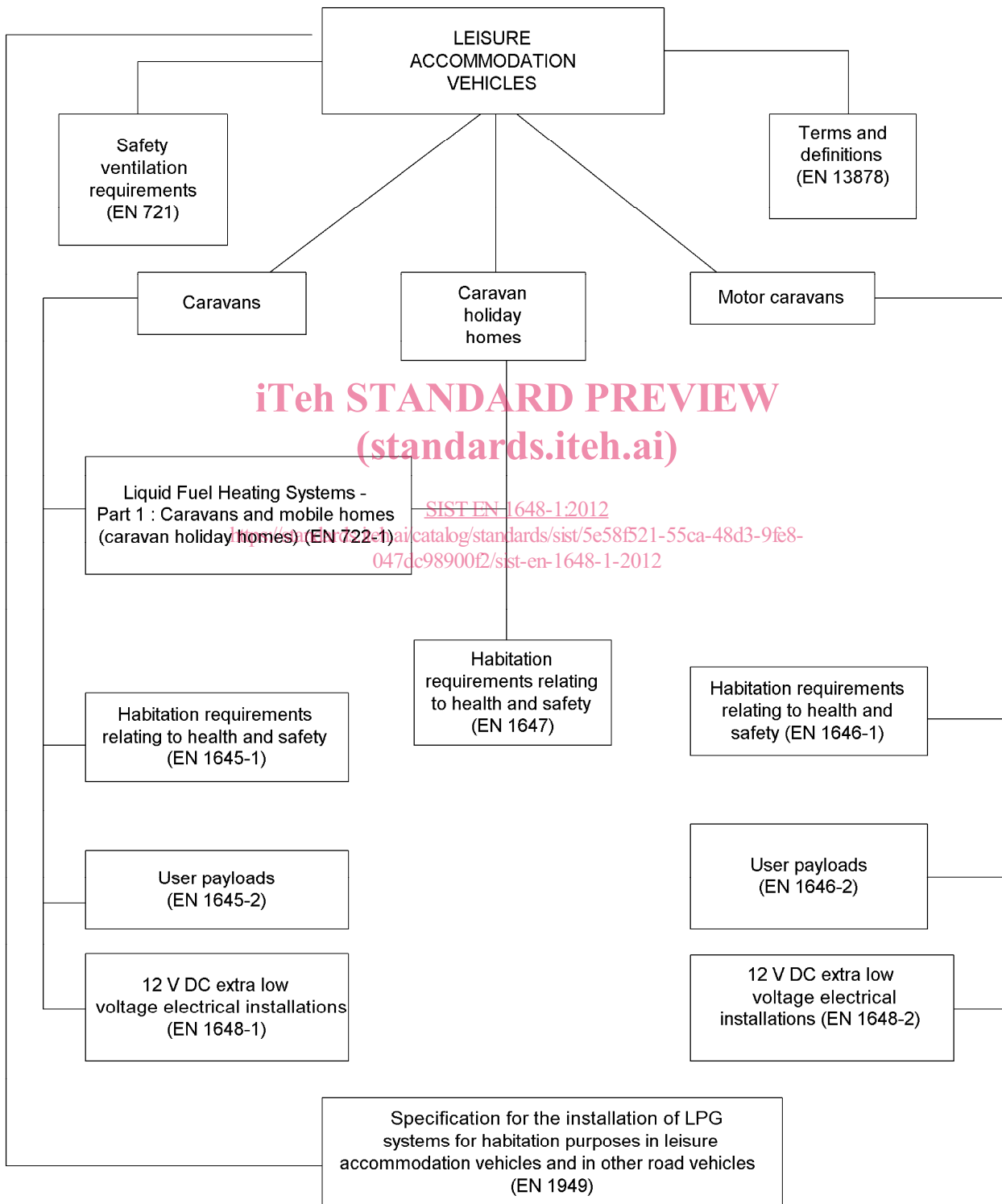


Figure 1 — Overview of relevant European Standards applying to leisure accommodation vehicles



## 1 Scope

This European Standard specifies safety, health and functional requirements for 12 V direct current (DC) extra low voltage (ELV) electrical installations for habitation aspects of caravans. It covers the design and integration of the caravan system with the towing vehicle system.

It does not apply to commercial trailers; nor does it include requirements for ELV road lighting and signalling lamps and their installations, except for safety requirements for the routing of cables in LPG storage compartments.

This European Standard also specifies the ELV output requirements of low voltage (LV) equipment that may be used to provide an ELV supply but it does not specify safety, technical and functional requirements for LV appliances and installations. Requirements for LV installations are specified in HD 60364-7-721.

## 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 1645-1, *Leisure accommodation vehicles — Caravans — Part 1: Habitation requirements relating to health and safety*

EN 13878:2003, *Leisure accommodation vehicles — Terms and definitions*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529)*

EN 60898-2, *Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations — Part 2: Circuit-breakers for a.c. and d.c. operation (IEC 60898-2)*

EN ISO 11446, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 13-pole connectors for vehicles with 12 V nominal supply voltage (ISO 11446)*

HD 21 (series), *Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation*

HD 22 (series), *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation*

ISO 1724, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 12 N (normal) for vehicles with 12 V nominal supply voltage*

ISO 3732, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 12 S (supplementary) for vehicles with 12 V nominal supply voltage*

ISO 6722 (series), *Road vehicles — 60 V and 600 V single-core cables*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 8820-1, *Road vehicles — Fuse-links — Part 1: Definitions and general test requirements*

ISO 8820-3, *Road vehicles — Fuse-links — Part 3: Fuse-links with tabs (blade type) Type C (medium), Type E (high current) and Type F (miniature)*

ISO 8820-4, *Road vehicles — Fuse-links — Part 4: Fuse-links with female contacts (type A) and bolt-in contacts (type B) and their test fixtures*

## 3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 13878:2003 apply.

**EN 1648-1:2012 (E)****4 Power supply****4.1 General**

The power supply shall be a nominal DC 12 V (minimum 11 V and maximum 15 V).

NOTE A power supply with a nominal voltage different than DC 12 V is not allowed.

**4.2 Sources of supply**

The supply shall be obtained from one or more of the following sources:

- a) the electrical installation of the towing vehicle;
- b) an auxiliary battery mounted within the caravan (see 4.3);
- c) LV supply via an on-board mounted AC/DC converter (e.g. transformer, switching power supply) that complies with the requirements of the relevant standards in accordance with directive 2006/95/EC and subsequent amendments;
- d) DC generator (see 4.4.1);
- e) regenerative energy sources (see 4.4.2).

If several sources of supply are used it shall be ensured that there is no unfavourable interaction.

**4.3 Auxiliary batteries****4.3.1 Type of battery**

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An auxiliary battery shall be of the rechargeable type. Non-rechargeable batteries are not auxiliary batteries according to 4.3. They may be used however, provided that they are used in circuits separated from other sources of electrical supply.

**4.3.2 Terminals**

Auxiliary battery terminals shall be clearly and durably marked “+” and “-“. Connections to auxiliary battery terminals shall be securely clamped or bolted to ensure continuous contact and shall be insulated unless the auxiliary battery is provided with an insulating cover.

**4.3.3 Location**

An auxiliary battery shall be placed in a compartment according to 4.3.4, which is designed to protect it from mechanical damage, with easy access for maintenance or removal and secured to prevent movement of the battery, e.g. when the caravan is in motion.

**4.3.4 Auxiliary battery compartment**

An acid resistant liquid tight tray shall be installed under an auxiliary battery whose electrolyte is liquid capable of holding at least 20 % of the electrolyte capacity of the recommended battery, when in place.

The interior of an auxiliary battery compartment shall be ventilated and protected against the corrosive effect of acid-laden gases, either by

- a) installing a sealed auxiliary battery that incorporates an external ventilating kit that is taken to the exterior of the caravan; or

- b) installing an auxiliary battery in an enclosed battery compartment that is protected internally against corrosion and is ventilated directly to the exterior of the caravan by means of a suitable tube in accordance with the battery manufacturer's instructions or as supplied by the manufacturer of the auxiliary battery; or
- c) ventilating the compartment at both low-level and high-level to the exterior of the caravan. The construction of the interior of the compartment shall have gas tight joints and seams, including the sides of the ventilator openings, be of acid-resistant material or have an anti-corrosive finish. The minimum size of ventilation shall be not less than 80 mm<sup>2</sup> at low level and not less than 80 mm<sup>2</sup> at high level. If the compartment opens into the interior of the caravan, the lid shall provide an air seal.

The requirements concerning the protection against corrosion and ventilation are not applicable if batteries with bound electrolytes are used.

If an auxiliary battery is not provided, then the position and instructions for the installation of the battery and compartment, in accordance with a), b) or c), shall be included in the User's Handbook according to Clause 8 and a notice shall be fixed in or near the proposed location stating:

"For instructions on auxiliary battery installation, see User's Handbook".

When the manufacturer makes no provision for the installation of an auxiliary battery, the following statement shall be made in the User's Handbook:

"This caravan has not been designed to accommodate an auxiliary battery. Do not fit one."

For underslung battery, a minimum ground clearance shall be observed in compliance with directive 2007/46/EC, Annex II.

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#### 4.3.5 Warning notice

A warning notice shall be fixed in a prominent position near the auxiliary battery or displayed on the lid of the auxiliary battery compartment. This warning shall be in the official language(s) of the country in which the caravan is to be sold for the first time and shall state:

"Switch off all appliances and lamps before connecting or disconnecting the auxiliary battery."

The auxiliary battery compartment shall be additionally marked "smoking prohibited" in accordance with ISO 7010-P003 and in the language(s) of the country in which the caravan is to be sold for the first time.

#### 4.4 Other sources of supply

##### 4.4.1 Generators and transformer/rectifiers unit

If a supply is obtained from a generator or from a low voltage supply via a transformer/rectifier unit without a battery in the circuit, the extra low voltage at the output terminals of the supply unit shall be maintained between 11 V minimum and 15 V maximum. The voltage ripple shall not exceed 1,2 V.

##### 4.4.2 Regenerative energy sources

Regenerative energy sources, such as wind energy, solar energy etc., shall only be used in conjunction with voltage or charging regulators with an output voltage according to 4.4.1.

If one of these energy sources is used for charging batteries, protection against overcharging shall be provided.

#### 4.5 Protective measures

The ELV installation shall be so installed that the protective measures of the LV installation for basic protection and for fault protection are not impaired.

It shall be ensured that the protective conductors of the LV installation are not loaded by operating currents of the ELV installation.