



**SLOVENSKI STANDARD**  
**SIST EN 1648-1:2000**  
**01-december-2000**

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

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

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

Véhicules habitables de loisirs - Installations électriques a tres basse tension de 12 V en courant continu - Partie 1: Caravanés

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**ICS:**

43.040.10	Ò\^ dã } æ Á \^ d [ ] • \ æ [ ] ! ^ { æ	Electrical and electronic equipment
43.100	Osebni avtomobili. Bivalne prikolice in lahke prikolice	Passenger cars. Caravans and light trailers

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**en**

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EUROPEAN STANDARD

EN 1648-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 1997

ICS 43.040.10; 43.100

Descriptors: electrical installation, extra low voltage, direct current, caravans, safety requirements, accident prevention, specifications, electric power supply, wiring, overcurrent protection, installation

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 18 September 1997.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 245 "Leisure accommodation vehicles", 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 April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

This European Standard 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 European Standard 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 prEN 1648-2.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## 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.

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 384-7-708.S1.

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

prEN 1645-1

Leisure Accommodation Vehicles - Caravans - Part 1: Habitation requirements relating to health and safety

EN 27418

Leisure accommodation vehicles - Vocabulary (ISO 7418:1989)

EN 50102

Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

EN 60335-1

Safety of household and similar electrical appliances - Part 1: General requirements

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EN 60335-2-29  
Safety of household and similar electrical appliances - Part 2: Particular requirements for battery chargers

EN 60529  
Degrees of protection provided by enclosures (IP code)(IEC 529:1989)

EN 60742  
Isolating transformers and safety isolating transformers - Requirements (IEC 742:1983 + A1:1992, modified)

HD 21.1 S2  
Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements (IEC 227-1:1989)

HD 21.3 S3  
Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 3: Non-sheathed cables for fixed wiring (IEC 227-3:1993, modified)

HD 21.4 S2  
Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 4: Sheathed cables for fixed wiring

HD 21.5 S3  
Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords) (IEC 227-5:1979, modified)

HD 22.1 S2  
Rubber insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements (IEC 245-1:1980, modified)

HD 22.4 S3  
Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables (IEC 245-4:1994, modified)

HD 384-7-708.S1  
Electrical installations of buildings - Part 7: Requirements for special installations or locations - Section 708: Electrical installations in caravan parks and caravans (IEC 364-7-708:1988, modified)

ISO/DIS 1724  
Passenger cars and light commercial vehicles with 12 V systems - 7-pole connectors between towing vehicles and trailers - Type 12 N (normal)

ISO/DIS 3732  
Passenger cars and light commercial vehicles with 12 V systems - 7-pole connectors between towing vehicles and trailers - Type 12 N (supplementary)

ISO 6309  
Fire protection - Safety signs

ISO 6722-1  
Road vehicles - Unscreened low-tension cables - Part 1: Test methods

ISO 6722-2  
Road vehicles - Unscreened low-tension cables - Part 2: Requirements

ISO 8820-2  
Road vehicles - Blade-type electric fuse-links - Part 2: Dimensions

ISO 11446  
Passenger cars and light commercial vehicles equipped with 12 V systems - 13-pole connectors between towing vehicles and trailers - Dimensions and contact allocation

### 3 Definitions

For the purposes of this standard the definitions given in EN 27418 apply.

### 4 Power supply

#### 4.1 General

The power supply shall be a nominal DC 12 V (see also 4.4.1 and 7.1).

#### 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 on the caravan (see 4.3);
- c) LV supply via a transformer/rectifier unit that complies with the requirements of EN 60335-1 and EN 60742;
- d) DC generator that is driven by any form of energy (see 4.4);
- e) solar energy cells (see 4.4).

#### 4.3 Auxiliary batteries

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##### 4.3.1 Type of battery

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

##### 4.3.2 Capacity

An auxiliary battery shall have a minimum capacity of 40 ampere-hours (Ah) at 20 h discharge rate.

NOTE: It is recommended to use a battery designed to be discharged over long periods at a relatively low current.

##### 4.3.3 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 device.

##### 4.3.4 Location

An auxiliary battery shall be placed in a separate compartment, with easy access for maintenance or removal and secured to prevent movement of the battery, e. g. when the caravan is in motion.

##### 4.3.5 Auxiliary battery compartment

A tray shall be installed under an auxiliary battery if the electrolyte of this battery is liquid.

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 to the exterior of the caravan by means of a suitable tube with a minimum inside diameter of 10 mm at the top of the auxiliary battery compartment in accordance with the battery manufacturer's instructions or as supplied by the manufacturer of the auxiliary battery; or
- c) ventilating the compartment at low-level and high-level to the exterior of the caravan and constructing the interior of the compartment, including the sides of the ventilator openings, of acid-resistant material or providing it with an anti-corrosive finish. If the compartment opens into the interior of the caravan, the lid shall provide an air seal.

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".

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

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."

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**4.3.6 Warning notice** <https://standards.iteh.ai/catalog/standards/sist/8c31e54-2f1c-4733-a790-5c05f95a808e/sist-en-1648-1-2000>

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 and shall state:

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

The auxiliary battery compartment shall be additionally marked "Smoking prohibited" in accordance with ISO 6309 and in the language(s) of the country in which the caravan is to be sold.

## 4.4 Other sources of supply

### 4.4.1 Generators and transformer/rectifier units

If a supply is obtained from a generator or from a low voltage supply via a transformer/rectifier unit, the extra low voltage at the output terminals of the supply unit shall be maintained between 11 V min. and 14 V max. with applied loads varying from 0,5 A min. up to the max. rated load of the supply unit. Over the same load range, alternating voltage ripple shall not exceed 10 %.

### 4.4.2 Regenerative sources

Regenerative energy sources, such as wind energy, solar energy etc., shall be applied only for charging batteries.

They shall only be operated with a device which prevents overcharging of the battery(ies).



## 4.5 Protective measures

The ELV installation shall be so installed that the protective measures of the LV installation against direct contact, or in case of indirect contact 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.

## 5 Wiring

### 5.1 Connection to electrical system of towing vehicle

#### 5.1.1 Connecting cables

The connection between the fixed wiring of a caravan and the electrical connector to the towing vehicle shall be by means of flexible connecting cable(s) that has cores with a minimum cross-sectional area as shown in table 1. The length of the cables shall not exceed 5 m. To these cables shall be attached plugs with contact allocations in accordance with ISO/DIS 1724 and ISO/DIS 3732 or ISO 11446. A connecting cable shall be of sufficient length to allow the plug to extend 500 mm in front of the coupling head of the caravan.

#### 5.1.2 Protection of disconnected plug

When the plug is disconnected it shall be protected against the ingress of water, foreign bodies and accidental damage.

#### 5.1.3 Contact allocation

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The functional allocation of the single cores of the connecting cables shall be in accordance with table 1.

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#### 5.1.4 Charging of auxiliary battery and operation of refrigerator

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**5.1.4.1** The circuit to charge an auxiliary battery shall be separate from a circuit to operate a refrigerator.

**5.1.4.2** The charging circuit for an auxiliary battery shall be completed only when the ignition of the towing vehicle is switched on.

**5.1.4.3** The 12 V heating facility of a refrigerator shall be completed only when the ignition of the towing vehicle is switched on. This may be performed by a device built into the refrigerator.