

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

| | |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| See Eesti standard EVS-EN 1648-1:2012 sisaldab Euroopa standardi EN 1648-1:2012 ingliskeelset teksti. | This Estonian standard EVS-EN 1648-1:2012 consists of the English text of the European standard EN 1648-1:2012. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 25.07.2012. | Date of Availability of the European standard is 25.07.2012. |
| Standard on kättesaadav Eesti Standardikeskusest. | The standard is available from the Estonian Centre for Standardisation. |

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 43.040.10, 43.100

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

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.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

| | |
|----------------------------------------------------------------------------------------------------------------------------------|----|
| Foreword..... | 4 |
| Introduction | 6 |
| 1 Scope | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 7 |
| 4 Power supply..... | 8 |
| 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 |
| 5 Wiring..... | 10 |
| 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 |
| 6 Overcurrent protection..... | 12 |
| 6.1 Protection of positive conductors | 12 |
| 6.2 Types of device | 13 |
| 6.3 Installation of fuses | 13 |
| 6.4 Prohibited locations | 13 |
| 7 Installation of appliances | 13 |
| 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 |
| 8 User's Handbook | 14 |
| Annex A (informative) Relation of cable cross-sectional area, current flow and cable length for fixed wiring installations | 15 |

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

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 |
|----------------------------------------------------------------------------------------------------------------|----|

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.

Introduction

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

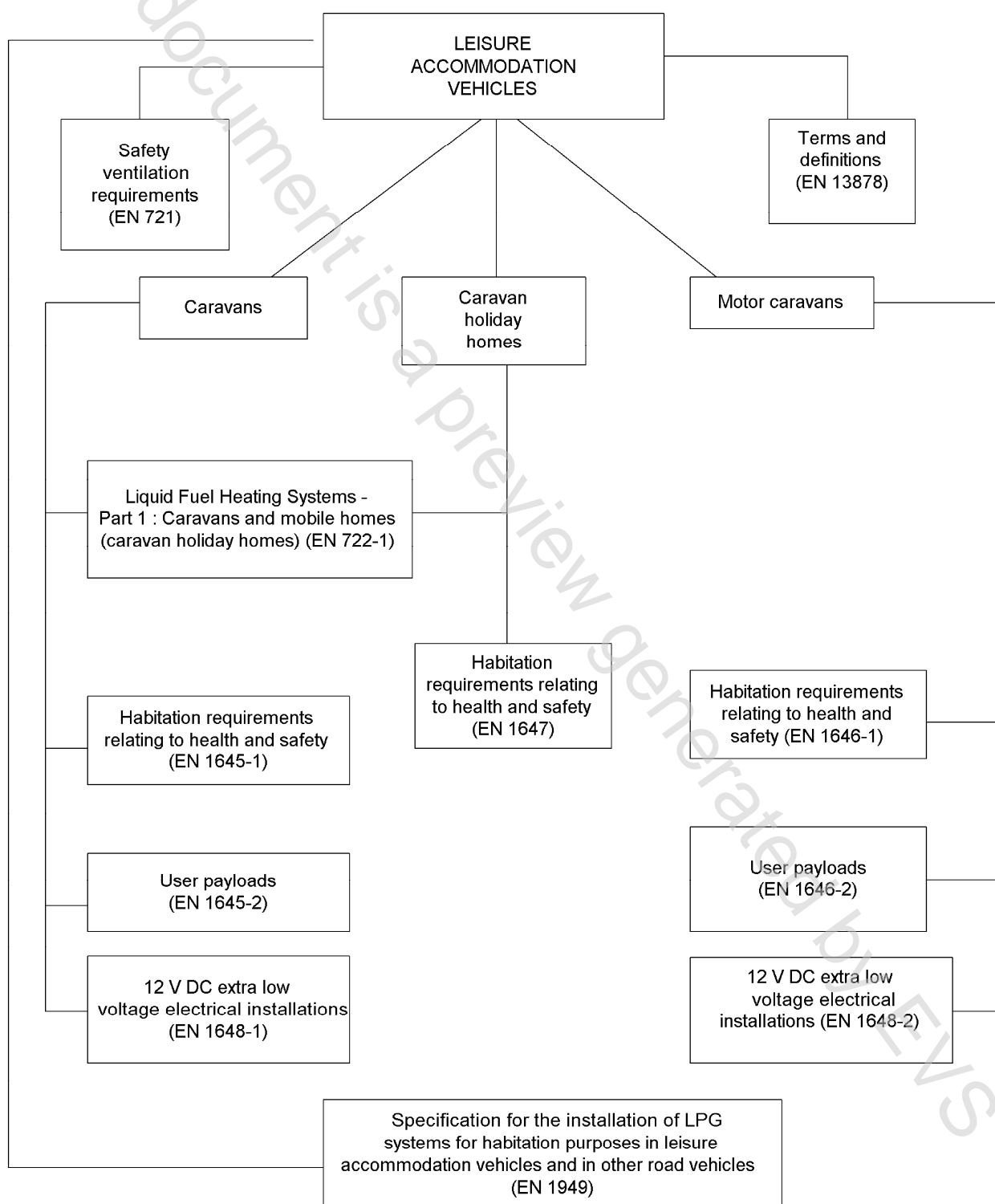


Figure 1 — Overview of relevant European Standards applying to leisure accommodation vehicles

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.