SLOVENSKI STANDARD
oSIST prEN ISO 13297-1:2026

01-september-2026

Mala plovila - Inštalacije električnih sistemov za izmenični in enosmerni tok - 1. del: Enofazni izmenični tok (AC), nizkonapetostni enosmerni tok (DC) na plovilih (ISO/DIS 13297-1:2026)

Small craft - Alternating and direct current installations of electrical systems - Part 1: Single-phase AC, Craft low voltage DC (ISO/DIS 13297-1:2026)

Kleine Wasserfahrzeuge - Wechselstrom- und Gleichstromanlagen von elektrischen Systemen - Teil 1: Niederspannung (ISO/DIS 13297-1:2026)

Petits navires - Installations à courant alternatif et continu des circuits électriques - Partie 1: Courant alternatif monophasé, courant continu à basse tension du bateau (ISO/DIS 13297-1:2026)

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ICS:

47.020.60	Električna oprema ladij in konstrukcij na morju	Electrical equipment of ships and of marine structures
47.080	Čolni	Small craft

oSIST prEN ISO 13297-1:2026 **en,fr,de**

DRAFT International Standard

ISO/DIS 13297-1

Small craft — Alternating and direct current installations of electrical systems —

Part 1: Single-phase AC, Craft low voltage DC

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small craft*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 464, *Small craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition of ISO 13297 cancels and replaces ISO 13297:2014 and ISO 10133:2012, which have been technically revised.

The main changes compared to the previous editions are as follows:

— combined the standard for alternating current (ISO 13297:2014) and the standard for direct current (ISO 10133:2012) into a single marine electrical standard.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Small craft — Alternating and direct current installations of electrical systems —

Part 1:
Single-phase AC, Craft low voltage DC

NOTE — The colours represented in the electronic file of this document can be neither viewed on screen nor printed as true representations. For the purposes of colour matching, see ISO 3864-4, which provides colorimetric and photometric properties together with, as a guideline, references from colour order systems.

1 Scope

This document specifies the requirements for the design, construction and installation of the following types of DC and AC electrical systems, installed either individually or in combination, for all small craft operational states and environmental locations:

a) craft low voltage direct current (DC) electrical systems where the highest voltage of a system does not exceed 60 V DC;

b) single-phase alternating current (AC) systems that operate at an RMS voltage not exceeding 250 V AC.

NOTE In Europe, 230 V AC single-phase systems are either polarized and unpolarized.

In North America, 120/240 V AC split-phase systems are a variation of a 3-wire single-phase system. The 120 V AC systems are wired polarized while the 240 V AC systems are wired unpolarized.

Regarding this standard, 250 V AC is rounded up to ensure variations in 240 V AC are included.

This document does not cover the following:

— electrical propulsion systems of direct current less than 1 500 V DC, single-phase alternating current up to 1 000 V AC, and three-phase alternating current up to 1 000 V AC, which are addressed by ISO 16315[1].

— any conductor that is part of a factory-built assembly and that does not extend beyond the assembly such as network cables, engines and engine management systems.

— three-phase AC installations that operate at a nominal voltage not exceeding 500 V AC, which are addressed byIEC 60092-507[2].

— craft-high voltage direct current (DC) systems where the highest voltage of a systems exceeds 60 V DC and does not exceed 1 500 V DC.

— shore power connection for general power supply and battery charging, which are not addressed by IEC 60309-2[3].

— electromagnetic compatibility (EMC) test methods and requirements.

— lithium-ion batteries which are addressed by ISO 23625[4]

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.

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

ISO 8666, *Small craft — Principal data*

ISO 8846, *Small craft — Electrical devices — Protection against ignition of surrounding flammable gases*

ISO 16750-2, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads*

ISO 19642-1, *Road vehicles — Automotive cables — Part 1: Vocabulary and design guidelines*

ISO 23625, *Small craft — Lithium-ion batteries*

IEC 60038, *IEC standard voltages*

IEC 60287-1-1, *Electric cables - Calculation of the current rating - Part 1-1: Current rating equations (100 % load factor) and calculation of losses - General*

IEC 60309-2, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 2: Dimensional compatibility requirements for pin and contact-tube accessories*

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

IEC 60695-11-10, *Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods*

IEC 60934, *Circuit breakers for equipment (CBE)*

IEC 60947-2, *Low-voltage switchgear and controlgear - Part 2: Circuit-breakers*

EN IEC 60079-0:2018/A11, *Explosive atmospheres - Part 0: Equipment - General requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
craft earth
craft ground
earthing terminal (3.7) connection onboard the *craft* (3.63) which provides both *protective-equipotential-bonding* (3.8) and *functional-equipotential-bonding* (3.19) to achieve an intentional connection to *earth* (3.5) via the water in which the *craft* (3.63) is immersed

3.2
earthing plate
ground plate
conductive device of a specific surface area affixed to the *craft* (3.63) which is immersed in the surrounding water to achieve *craft earth* (3.1)

EXAMPLE A conductive metal plate mounted externally on the hull below the waterline. It provides a low-resistance electrical path to the surrounding water, serving as a *earthing* (3.6) point for the *craft* (3.63) AC electrical systems and which may include lightning protection, radio grounding, EMC management, and bonding of metallic components to manage galvanic corrosion.

3.3
shore earth
shore ground
earthing terminal (3.7) connection onboard the *craft* (3.63) which provides *protective-equipotential-bonding* (3.8) to the shore earth electrode

Note 1 to entry: The *shore earth* (3.3) */ground* (3.5) is active only when the *shore power* (3.23) is connected to the *craft* (3.63) by a *cable* (3.32).

3.4
local earth
ground
part of the Earth that is in electric contact with an earth electrode and that has an electric potential not necessarily equal to zero

[SOURCE: IEV 195-01-03]

3.5
earth
ground
to make an electric connection between a conductive part and a *local earth* (3.4)

Note 1 to entry: The connection to *local earth* (3.4) can be:

— intentional, or

— unintentional or accidental

and can be permanent or temporary.

[SOURCE: IEV 195-01-08, added note 1]

3.6
earthing
DC grounding
electric connections between conductive parts and *local earth* (3.4)

[SOURCE: IEV 195-01-24]

3.7
earthing terminal
grounding terminal, US
terminal provided on equipment and intended for the electric connection with the *earthing* (3.6) arrangement

[SOURCE: IEV 195-02-31]

3.8
protective-equipotential-bonding
equipotential bonding for the purposes of electrical safety

EXAMPLE The green or green with yellow stripe insulated *conductor* (3.33) connecting AC equipment and circuits to the *craft earth* (3.1).

Note 1 to entry: Utilized for craft AC circuits and craft HV DC circuits for managing the risk of harm caused by electricity. Where designed, it may serve as a redundant means of managing fault currents.

[SOURCE: IEV 195-01-15, added note 1 and example]

3.9
protective equipotential bonding system
PEBS
equipotential bonding system providing *protective-equipotential-bonding* (3.8)

[SOURCE: IEV 195-02-23]

3.10
protective bonding conductor
protective conductor (3.27) provided for *protective-equipotential-bonding* (3.8)

[SOURCE: IEV 195-02-10]

3.11
protective bonding terminal
equipotential bonding terminal (3.22) intended for *protective-equipotential-bonding* (3.8)

[SOURCE: IEV 195-02-42]

3.12
common equipotential bonding system
common bonding network (CBN)
equipotential bonding system providing both *protective-equipotential-bonding* (3.8) and *functional-equipotential-bonding* (3.19)

[SOURCE: IEV 195-02-25]

3.13
radio earthing plate
communication ground plate
low impedance conductive device of a high surface area affixed to the *craft* (3.63) which is immersed in the surrounding water to for high frequency communication systems

3.14
radio counterpoise
network of conductive wires or cables oriented horizontally to earths surface utilized as a radio earth which is not in contact with the water surrounding the *craft* (3.63) and not in contact with other craft earthing circuits

3.15
main earthing bus
main grounding bus
defined point for the interconnection of the *DC main negative bus* (3.16), AC *protective equipotential bonding system* (3.9), *functional equipotential bonding system* (3.20) and *craft earth* (3.1)

Note 1 to entry: The connection to *earth* (3.5) for a *craft* (3.63) is either intentional or accidental. An intentional connection to earth ground is dependent upon the installed system type.

3.16
DC main negative bus
in a DC *chassis* (3.44) negative system, a portion of the craft's negative circuit to which all DC negative voltage potential is referenced, and which provides for the interconnection of DC sources of power, loads, and the *main earthing bus* (3.15)

Note 1 to entry: Commonly consisting of *bus* (3.17) bar(s), *conductor(s)* (3.33), battery terminal(s) and/or *engine negative terminal(s)* (3.18).

3.17
bus
single circuit consisting of *conductors* (3.33) (cables, bus bar and interconnected bus bars) used as a connection point to distribute electrical current from multiple circuits

Note 1 to entry: Commonly capable of the maximum current and voltage drop requirements of the electrical system.

3.18
engine negative terminal
terminal on the engine, starter or solenoid to which the negative battery cable is connected

3.19
functional-equipotential-bonding
equipotential bonding for reasons other than electrical safety

EXAMPLE The green or green with yellow stripe insulated *conductor* (3.33) connecting conductive cases of DC electrical devices which contain live conductors or extraneous conductive parts to either the *DC main negative bus* (3.16) or *main earthing bus* (3.15).

Note 1 to entry: Utilized for all other equipotential circuits not associated with electrical shock. Where designed, it may serve as a redundant means of managing fault currents.

[SOURCE: IEV 195-01-16, added note 1 and example]

3.20
functional equipotential bonding system
FEBS
equipotential bonding system providing *functional-equipotential-bonding* (3.19)

[SOURCE: IEV 195-02-24]

3.21
functional bonding conductor
conductor (3.33) provided for *functional-equipotential-bonding* (3.19)

Note 1 to entry: normally non-current-carrying *conductor* (3.33) used to put various exposed conductive parts of direct current electrical devices and extraneous conductive parts at a substantially equal potential

[SOURCE: IEV 195-02-16, note 1 added]

3.22
equipotential bonding terminal
terminal provided on equipment and intended for the electric connection with an equipotential bonding system

[SOURCE: IEV 195-02-32]

3.23
shore power
off-board power connection mode 1
transmission of an earthed AC *source of power* (3.64) originating from shore, external to the *craft* (3.63), which includes an electrical connection consisting of a cable plug, mating inlet fitting and conductor termination

EXAMPLE Terms used include: AC shore power, shore power inlet, shore power cable, shore power connection or shore appliance inlet.

Note 1 to entry: An "off-board power connection mode 1" is considered a those found in IEC 60309-2.

3.24
polarization transformer
transformer that automatically orientates the neutral and *line conductor* (3.28) in the system in the same polarity orientation as the *polarized system* (3.40) of the *craft* (3.63)

3.25
isolation transformer
transformer installed in the *shore power* (3.23) supply circuit on a *craft* (3.63) to electrically isolate all the normally *live conductors* (3.29) and the *protective conductor* (3.27) on the *craft* (3.63) from the AC system conductors of the *shore power* (3.23) supply

3.26
neutral conductor
conductor (3.33) intentionally maintained at *earth* (3.5) potential and capable of contributing to the transmission of electrical energy

Note 1 to entry: IEV 195-02-06 states that a *neutral conductor* (3.26) is electrically connected to the neutral point and capable of contributing to the distribution of electric energy which applies to AC 3-phase systems.

3.27
protective conductor
protective grounding conductor
conductor (3.33), not normally carrying current, used for some measure of protection against *electric shock* (3.87), for electrically connecting any of the following parts of electrical equipment to the craft's ground/ earth and to the shore AC grounding *conductor* (3.33) through the shore power cable:

a) exposed conductive parts of electrical equipment;

b) extraneous conductive parts;

c) the main grounding point or Craft earth/ground;

d) earth electrode(s);

e) the earth point of a source, or an artificial neutral

EXAMPLE See *protective bonding conductor* (3.10) definition.

3.28
line conductor
conductor (3.33) intended to be energized and capable of contributing to the transmission or distribution of electric energy but which is not a AC *neutral conductor* (3.26) or mid-point *conductor* (3.33), or a DC negative ground conductor

EXAMPLE DC Chassis Two-Wire Negative Systems:

— L+ = Positive DC Line/Live Conductor (DC+, POS)

— L- = Negative DC Live Conductor (DC-, NEG)

DC Fully Chassis Isolated Two-Wire Isolated Systems:

— L+ = Positive DC Line/Live Conductor (DC+, POS)

— L- = Negative DC Line/Live Conductor (DC-, NEG)

AC Systems (TN-S)

— L1 = Active (Phase) AC Line/Live Conductor

— N = Neutral AC Live Conductor

— PE = Protective Earth Conductor

[SOURCE: IEV 195-02-08, modified - added example, added DC term to definition]

3.29
live conductor
line conductor (3.28) or other *conductor* (3.33) which is energized in normal use, including an AC *neutral conductor* (3.26) or DC negative *conductor* (3.33) for both *chassis* (3.44) negative and isolated DC systems

3.30
live
qualifies a conductive part intended to be energized in normal operation

Note 1 to entry: A live part may be temporarily dead when it is not energized. A *neutral conductor* (3.26) is considered as *live* (3.30) but *earthing* (3.6) conductors are not.

[SOURCE: IEV: 151-15-60]

3.31
wire
flexible cylindrical *conductor* (3.33) the length, with or without an insulating covering, the length of which is large with respect to its cross-sectional dimensions

EXAMPLE Used in *craft* (3.63) to define DC system types and cross-sectional dimensions of conductors.

Note 1 to entry: The cross-section of a *wire* (3.31) may have any shape, but the term "wire" is not generally used for ribbons or tapes.

[SOURCE: IEV 151-12-28, clarifying example]

3.32
cable
assembly of one or more conductors and/or optical fibres, with a protective covering and possibly filling, insulating and protective material

[SOURCE: IEV 151-13-38]

3.33
conductor
conductive part intended to carry electric current

EXAMPLE 1 Craft conductors without an insulating covering include: busbars, engine blocks, power posts and terminals.

EXAMPLE 2 Craft conductors with an insulating covering include: battery cables, stranded copper conductors, bonding conductors, and protective conductors.

Note 1 to entry: [SOURCE: IEV 151-12-05, element intended to carry electric current, Note 1 – The term "*conductor* (3.33)" is often used for an element the length of which is large with respect to the cross-sectional dimensions, e.g. conductors of a line or of a *cable* (3.32).]

[SOURCE: IEV 195-01-07]

3.34
plain conductor
metal *cable* (3.32)*conductor* (3.33) in which the *wire* (3.31) or wires are not coated with an additional metal

[SOURCE: IEV 461-01-02]

3.35
tinned conductor
metal-coated *conductor* (3.33) in which the metal coating is of tin

[SOURCE: IEV 461-01-04]