

BSI Standards Publication

Small craft — Electrical systems
used for electrical propulsion



This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN ISO 16315:2026. It is identical to ISO 16315:2026. It supersedes BS EN ISO 16315:2016 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/3/6, Buoyancy garments.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

© The British Standards Institution 2026
Published by BSI Standards Limited 2026

ISBN 978 0 539 25367 2

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

ICS 47.080

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2026.

Amendments/corrigenda issued since publication

Date	Text affected

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

July 2026

ICS 47.080

Supersedes EN ISO 16315:2016

English Version

Small craft - Electrical systems used for electrical propulsion (ISO 16315:2026)

Petits navires - Systèmes électriques utilisés pour la propulsion électrique (ISO 16315:2026)

Kleine Wasserfahrzeuge - Elektrische Antriebssysteme (ISO 16315:2026)

This European Standard was approved by CEN on 26 January 2026.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 16315:2026) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with Technical Committee CEN/TC 464 "Small Craft" the secretariat of which is held by SIS.

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 2027, and conflicting national standards shall be withdrawn at the latest by January 2027.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 16315:2016.

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, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 16315:2026 has been approved by CEN as EN ISO 16315:2026 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the essential requirements of Directive 2013/53/EU aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/542/C (2015) 8736 final to provide one voluntary means of conforming to essential requirements of Directive 2013/53/EU.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 and application of the edition of the normatively referenced standards as given in Table ZA.2 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2013/53/EU

Essential Requirements of Directive 2013/53/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Annex 1A, Clause 5.3 para 1	4.3 (except 4.3.1), 4.13, 5 (except 5.1.1.2), 8, 9	Electrical systems to be designed and installed so as to ensure proper operation of the watercraft under normal conditions of use
Annex 1A, Clause 5.3 para 1	4.3 (except 4.3.1), 4.13, 6, 8.5	Electrical systems to be designed and installed so as to minimise risk of fire and electric shock
Annex 1A, Clause 5.3 para 2	4.4, 7	All electrical circuits, except engine starting circuits supplied from batteries, to remain safe when exposed to overload
Annex 1A, Clause 5.3 para 3	9, 10 (except 10.3.2)	Electric propulsion circuits to not interact with other circuits in such a way that either would fail to operate as intended
Annex 1A, Clause 5.3 para 4	4.1.3 a (except 4.1.2 and 4.1.5), 8.5, Annex B(a)	Ventilation being provided to prevent the accumulation of explosive gases which might be emitted from batteries
Annex 1A, Clause 5.3 para 4	8	Batteries being secured and protected from ingress of water
Annex IA, Clause 2.5 – Owner's	4.12, 5 (except 5.1.1.2),	Clause 4.12, Figure 1 gives

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

Essential Requirements of Directive 2013/53/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Manual	Annex A	enclosure hazard markings Clause 5 provides elements on system alerts and alarms to be included in the owner's manual Annex A provides elements necessary for safe use of the product drawing particular attention to set up, maintenance, regular operation, the prevention of risks and risk management

Table ZA.2 — Normative references from Clause 2 of this document and their corresponding European publications

Column 1 Reference in Clause 2	Column 2 International Standard Edition	Column 3 Title	Column 4 Corresponding European Standard Edition
ISO 8665-2	ISO 8665-2:2024	<i>Small craft — Power measurements and declarations —Part 2: Electric marine propulsion</i>	EN ISO 8665-2:2024
ISO 8846	ISO 8846:1990	<i>Small craft — Electrical devices — Protection against ignition of surrounding flammable gases</i>	EN ISO 8846:2026
ISO 13297	ISO 13297:2020 ISO 13297:2020/Amd 1:2022	<i>Small craft — Electrical systems — Alternating and direct current installations</i>	EN ISO 13297:2021 EN ISO 13297:2021/A1:2022 EN ISO 13297:2021/A11:2023
ISO 25197	ISO 25197:2020 ISO 25197:2020/Amd 1:2022	<i>Small craft — Electrical/electronic control systems for steering, shift and throttle</i>	EN ISO 25197:2020 EN ISO 25197:2020/A1:2022 EN ISO 25197:2020/A12:2026
IEC 60034-1	IEC 60034-1:2022	<i>Rotating electrical machines – Part 1: Rating and performance</i>	EN 60034-1:2010 EN 60034-1:2010/corrigendum Oct. 2010
IEC 60092-202	IEC 60092-202:2016	<i>Electrical installation in ships — Part 202:</i>	For applicable standard edition see Column 2

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

Column 1 Reference in Clause 2	Column 2 International Standard Edition	Column 3 Title	Column 4 Corresponding European Standard Edition
		<i>System design — Protection</i>	
IEC 60092-303	IEC 60092-303:2023	<i>Electrical installation in ships — Part 303: Equipment — Transformers for power and lighting</i>	For applicable standard edition see Column 2
IEC 60092-352	IEC 60092-352:2005	<i>Electrical installation in ships — Part 352: Choice and installation of electrical cables</i>	For applicable standard edition see Column 2
IEC 60092-507	IEC 60092-507:2014	<i>Electrical installations in ships — Part 507: Small vessels</i>	EN 60092-507:2015 EN 60092- 507:2015/AC:2015
IEC 60146-1- 1:2024	IEC 60146-1-1:2024	<i>Semiconductor converters — General requirements and line commutated converters — Part 1-1: Specification of basic requirements</i>	EN IEC 60146-1-1:2024
IEC 60445	IEC 60445:2021	<i>Basic and safety principles for man- machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors</i>	EN IEC 60445:2021 EN IEC 60445:2021/A1:2026
IEC 60898-1	IEC 60898- 1:2015+AMD1:2019 CSV Consolidated version	<i>Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations — Part 1: Circuit- breakers for a.c. operation</i>	EN 60898-1:2019 EN 60898- 1:2019/A1:2024 EN 60898- 1:2019/A11:2024
IEC 60947-1	IEC 60947-1:2020	<i>Low-voltage switchgear and controlgear — Part 1: General rules</i>	EN IEC 60947-1:2021 EN IEC 60947- 1:2021/AC:2023-01 EN IEC 60947- 1:2021/AC:2024-05

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

Column 1 Reference in Clause 2	Column 2 International Standard Edition	Column 3 Title	Column 4 Corresponding European Standard Edition
IEC 61558-2-4	IEC 61558-2-4:2021	<i>Safety of transformers, reactors, power supply units and combinations thereof — Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications</i>	EN IEC 61558-2-4:2025

The documents listed in the Column 1 of Table ZA.2, in whole or in part, are normatively referenced in this document, i.e. are indispensable for its application. The achievement of the presumption of conformity is subject to the application of the edition of Standards as listed in Column 4 or, if no European Standard Edition exists, the International Standard Edition given in Column 2 of Table ZA.2.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 General requirements	5
4.1 General	5
4.2 Components of an electric propulsion system	6
4.3 Electric propulsion systems	6
4.4 Configuration of electrical systems sharing a common energy source for propulsion and service power	8
4.4.1 DC systems	8
4.4.2 AC systems	8
4.5 Environmental factors	9
4.6 Electrical ratings	9
4.7 Equipment	10
4.7.1 Transformers	10
4.7.2 Converters	10
4.7.3 Motors	10
4.8 Enclosures	10
4.9 Identification of equipment and conductors	10
4.10 Electromagnetic compatibility (EMC)	11
4.11 Electrical equipment in the vicinity of batteries	11
4.12 Hazardous areas	12
4.13 Fire protection	12
5 Controls, monitoring, system alerts and trip alarms	12
5.1 Electrical/electronic controls for electric propulsion systems	12
5.1.1 Controls	12
5.1.2 Emergency stop	13
5.1.3 Fault trip reset	13
5.2 Instruments, alerts and trip alarms	13
5.2.1 General	13
5.2.2 Operating mode and status	14
5.2.3 System alerts	14
5.2.4 Fault trip alarms	14
6 Protection against electric shock	14
6.1 Protection against direct contact	14
6.2 Automatic disconnection of supply to the electric propulsion system under fault-to-earth conditions (earthed two-wire DC systems and earthed neutral AC systems)	15
6.3 Fault-to-earth monitoring for DC fully insulated systems and DC three-wire systems	15
6.4 Fault-to-earth tripping in AC non-neutral earthed systems (IT-type system)	16
7 Protection against overcurrent	16
7.1 General	16
7.2 Characteristics of protective devices	16
7.3 Overcurrent protection devices in the outgoing circuit(s) from a battery	17
7.4 Overcurrent protection devices in fully insulated systems	17
7.4.1 Single pole overcurrent protection	17
7.4.2 Dual pole overcurrent protection	17
8 Battery monitoring and installation	17
8.1 General arrangements	17
8.2 Isolation of batteries or battery banks	18
8.3 Operational switching of battery(s) or battery bank(s)	18

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

9	Electrical installation	19
9.1	General.....	19
9.2	Segregation of electrical propulsion system cables.....	19
10	Testing	19
10.1	General.....	19
10.2	Earthing and bonding.....	20
10.3	Insulation resistance.....	20
10.3.1	General.....	20
10.3.2	DC electrical propulsion systems.....	20
10.3.3	AC electrical propulsion systems.....	20
10.3.4	Switchboards, panel boards and distribution boards.....	20
10.3.5	Power and lighting final circuits.....	20
10.3.6	Generators and motors.....	21
10.3.7	Transformers.....	21
10.4	Electrical/electronic controls systems for propulsion motor control.....	21
10.5	On load test and inspection of electrical propulsion systems, and associated switch gear and control gear.....	21
10.6	Voltage drop.....	21
Annex A (normative)	Information and instructions for the owner's manual	22
Annex B (normative)	Installation documentation	23
Annex C (informative)	Electromagnetic compatibility documents	24
Bibliography		25

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 second edition cancels and replaces the first edition (ISO 16315:2016), which has been technically revised.

The main changes are as follows:

- the overcurrent protection requirements have been clarified;
- the fault monitoring requirements for isolated DC systems have been revised.

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.

This is a preview of BS EN ISO 16315:2026. [Click here to purchase the full version from the ANSI store.](#)

Electrical propulsion systems are becoming more common in recreational craft and other small craft and propulsion system voltages of up to AC 1 000 V and DC 1 500 V are possible together with variable speed drives operating at frequencies which differ from 50/60 Hz or DC.

Electric propulsion systems for small craft are generally designed and constructed from a number of component parts many of which can be of proprietary origin and all of the electrical and control items are interconnected by cables and operated as a system.

A propulsion system designer/installer should be competent with all components of the system addressed by this standard, as well as all aspects of any other equipment included in the design of a system such that the component parts of the propulsion system are integrated in a complete and safe manner.

There are a significant number of electrical propulsion system architectures for small craft and the main types are the following.

- DC sourced. The main power source is a propulsion battery or battery bank which is either recharged from on-board DC generators, or on-board AC generators/an AC shore supply through battery chargers. The electric propulsion system(s) can be variable speed through a DC motor controller or AC through a Variable Frequency Drive (VFD) or be fixed speed with a variable pitch propeller or other mechanical means of providing thrust. The electric propulsion system can be electrically separate from other electrical systems on-board (e.g. be fully insulated via the motor controller, or be an AC IT system via a VFD or motor starter). Or the electrical propulsion system can be integrated with the whole craft DC electrical system using converters DC/DC, DC/AC to provide for different services/consumers.
- AC sourced. The main power source is AC generator(s). The electric propulsion system(s) can be DC variable speed through an AC/DC converter and DC motor controller, or AC through a VFD, or be fixed speed with a variable pitch propeller or other mechanical means of providing thrust. The electric propulsion system can be DC fully insulated system or be an AC IT system via a galvanically isolated VFD or via an isolating transformer. A DC propulsion system(s) can be supported by a propulsion battery or battery bank.
- Also possible are hybrid systems similar to the types being introduced for road vehicles where the source is an internal combustion engine providing, for example, energy to a relatively lightweight energy storage system with power take-off via converters to propulsion motor(s) and other electrical consumers.

It is essential that the electric propulsion system designer/installer be competent with all aspects of the equipment included in the design of a particular system such that the component parts of the propulsion system are integrated in a coherent and safe manner.

Current electrical standards for small craft of less than 24 m L_H are as follows:

- a) ISO 13297, which covers extra-low-voltage direct current (DC) electrical systems that operate at nominal potentials of 50 V DC or less and single-phase alternating current (AC) systems that operate at a voltage not exceeding AC 250 V. It does not include requirements for electrical propulsion systems.
- b) IEC 60092-507, which is applicable to small craft up to 50 m/500 GT and includes requirements for three-phase systems not exceeding AC 500 V and single-phase systems not exceeding AC 250 V, and for DC systems and sub-systems not exceeding DC 50 V nominal. It includes a section on electric propulsion systems.

Small craft — Electrical systems used for electrical propulsion

1 Scope

This document specifies the design and installation of alternating current (AC) and direct current (DC) electrical systems used for the purpose of electrical propulsion and/or the electrical part of a hybrid propulsion system (system with both a rechargeable battery and a fuelled power source).

This document is applicable to electrical propulsion systems operated in the following ranges either individually or in combination:

- direct current of less than 1 500 V DC;
- single-phase alternating current up to AC 1 000 V;
- three-phase alternating current up to AC 1 000 V.

This document is applicable to electrical propulsion systems installed in small craft up to 24 m length of the hull (L_H in accordance with ISO 8666).

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 8665-2, *Small craft — Power measurements and declarations — Part 2: Electric marine propulsion*

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

ISO 13297, *Small craft — Electrical systems — Alternating and direct current installations*

ISO 25197, *Small craft — Electrical/electronic control systems for steering, shift and throttle*

IEC 60034-1, *Rotating electrical machines — Part 1: Rating and performance*

IEC 60092-202, *Electrical installation in ships — Part 202: System design — Protection*

IEC 60092-303, *Electrical installation in ships — Part 303: Equipment — Transformers for power and lighting*

IEC 60092-352, *Electrical installation in ships — Part 352: Choice and installation of electrical cables*

IEC 60092-507, *Electrical installations in ships — Part 507: Small vessels*

IEC 60146-1-1:2024, *Semiconductor converters — General requirements and line commutated converters — Part 1-1: Specification of basic requirements*

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors*

IEC 60898-1, *Electrical accessories — Circuit-breakers for overcurrent protection for household and similar installations — Part 1: Circuit-breakers for a.c. operation*

IEC 60947-1, *Low-voltage switchgear and controlgear — Part 1: General rules*