

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Mobile and fixed offshore units – Electrical installations –
Part 2: System design**

**Unités mobiles et fixes en mer – Installations électriques –
Partie 2: Conception du système**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Mobile and fixed offshore units – Electrical installations –
Part 2: System design**

**Unités mobiles et fixes en mer – Installations électriques –
Partie 2: Conception du système**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 47.020.60

ISBN 978-2-8322-6667-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	12
3 Terms, definitions and abbreviated terms	13
3.1 Terms and definitions.....	13
3.2 Abbreviated terms.....	20
4 Sources of electrical power for manned units.....	20
4.1 General.....	20
4.2 Main sources of electrical power	21
4.2.1 Common requirements.....	21
4.2.2 Capacity of main and essential power source	22
4.2.3 Load shedding arrangement	22
4.3 Essential source of electrical power	23
4.4 Emergency source of electrical power	23
4.5 Starting arrangements for emergency generators.....	26
4.6 Additional requirements for periodically unattended machinery spaces	27
4.7 Uninterruptible power system (UPS) source of power.....	27
4.7.1 General	27
4.7.2 UPS functionality – Uninterruptible source of power for critical/sensitive loads	28
4.7.3 UPS – Design planning issues.....	28
4.8 Transmission systems including main power from shore	30
4.9 Alternative sources of power.....	31
5 Sources of electrical power for unmanned units.....	32
5.1 General.....	32
5.2 Power sources	32
5.2.1 Sources to be evaluated	32
5.2.2 Cable from other unit or from shore	32
5.2.3 Local generator (gas or diesel)	32
5.2.4 Alternative sources of power.....	32
5.2.5 UPS.....	33
5.3 Factors affecting power supply requirements	33
6 System earthing	33
6.1 General requirements	33
6.2 Neutral earthing for systems up to and including 1 000 V AC	34
6.3 Neutral earthing for systems above 1 000 V AC	34
6.4 Parallel operated power sources	35
6.5 Earthing resistors, connection to hull/structure.....	35
7 Distribution systems	36
7.1 DC distribution systems	36
7.1.1 Types of distribution systems.....	36
7.1.2 TN DC systems.....	37
7.1.3 IT DC systems	40
7.1.4 DC voltages.....	41
7.2 AC distribution systems	42

7.2.1	Primary AC distribution systems	42
7.2.2	Secondary AC distribution systems	42
7.2.3	TN AC systems	42
7.2.4	IT AC systems	44
7.2.5	AC voltages and frequencies	44
7.2.6	Earthing systems	46
8	Distribution system requirements	46
8.1	Methods of distribution	46
8.2	Balance of loads	47
8.2.1	Balance of load on three-wire DC systems	47
8.2.2	Balance of loads in three- or four-wire AC systems	47
8.3	Final circuits	47
8.3.1	General	47
8.3.2	Final circuits for lighting	47
8.3.3	Final circuits for heating	47
8.3.4	Final circuits for sockets	47
8.4	Control circuits	48
8.4.1	Supply systems and nominal voltages	48
8.4.2	Circuit design	48
8.4.3	Protection	48
8.4.4	Arrangement of circuits	49
8.5	Motor circuits	49
8.5.1	Starting of motors	49
8.5.2	Means of disconnection	50
8.5.3	Starters remote from motors	50
8.6	Isolation of supply to galley	50
9	Cables and wiring systems	50
9.1	Cables	50
9.2	Voltage drop	51
9.3	Demand factors	51
9.3.1	Final circuits	51
9.3.2	Circuits other than final circuits	51
9.3.3	Application of diversity and demand factors	51
9.4	Motor circuits	51
9.5	Cross-sectional areas of conductors	52
9.6	Correction factors for cable grouping	52
9.7	Separation of circuits	52
10	System study and calculations	53
10.1	Electrical studies – General	53
10.2	Electrical load study	54
10.3	Load flow calculations	55
10.4	Short-circuit calculations	56
10.5	Protection and discrimination study	58
10.6	Power system dynamic calculations	59
10.7	Calculation of harmonic currents and voltages	61
11	Protection	61
11.1	General	61
11.2	Characteristics and choice of protective devices with reference to short-circuit rating	62

11.2.1	General	62
11.2.2	Protective devices	62
11.2.3	Backup protection	63
11.2.4	Rated short-circuit breaking capacity	63
11.2.5	Rated short-circuit making capacity	64
11.2.6	Co-ordinated choice of protective devices with regard to discrimination requirements	65
11.3	Choice of protective devices with reference to overload	65
11.3.1	Protective devices	65
11.3.2	Fuses for overload protection	65
11.4	Choice of protective devices with regard to their application	65
11.4.1	General	65
11.4.2	Generator protection	65
11.4.3	Protection of UPS	66
11.4.4	Protection of transformers	67
11.4.5	Transformers – Isolation of windings	67
11.4.6	Circuit protection	67
11.4.7	Motor protection	67
11.4.8	Protection of lighting circuits	68
11.4.9	Protection of power from external sources	68
11.4.10	Secondary cells and battery protection	68
11.4.11	Protection of static or solid-state devices	68
11.4.12	Protection for heat tracing systems	69
11.5	Undervoltage protection	69
11.5.1	Generators	69
11.5.2	AC and DC motors	69
11.6	Overvoltage protection	69
11.6.1	General	69
11.6.2	AC machines	69
11.6.3	DC networks	69
12	Lighting	70
12.1	General	70
12.2	General lighting system	70
12.3	Emergency lighting system	70
12.4	Escape lighting system	71
12.5	Lighting circuits in machinery spaces, accommodation spaces, open deck spaces, etc.	71
12.6	Navigation and obstruction signals and lights	71
13	Energy control, monitoring and alarm system	72
13.1	General	72
13.2	Alarm system	72
13.3	Network topology	72
13.4	Router communication	72
13.5	Communication protocols	72
13.6	Monitoring and fault diagnosis	73
13.7	Cybersecurity	73
13.8	Energy management and control systems (EMCS)	73
13.8.1	General	73
13.8.2	EMCS architecture	73

13.8.3	Interaction with protection system	74
13.8.4	Performance	74
13.9	Electromagnetic compatibility	74
13.10	Time identification and event logs	75
13.11	Remote controls	75
13.11.1	Continuous status information	75
13.11.2	Independent control	75
13.11.3	Exclusive control	75
13.11.4	Interlocks in operative command	75
13.12	Human-machine interface	75
13.13	Emergency stop	75
13.14	Automatic control of electrical power sources	75
13.14.1	Initiation of starting commands	75
13.14.2	Pre-starting conditions	76
13.14.3	Standby indication	76
13.15	Automatic connecting onto a dead busbar	76
13.15.1	Connection at blackout	76
13.15.2	Short-circuit	76
13.16	Delayed disconnection	76
13.17	Automatic starting arrangements for electrical motor-driven auxiliaries	76
13.17.1	Prevention of overload via sequential restart	76
13.17.2	Start inhibit	76
13.18	General alarm systems	76
13.18.1	Audibility	76
13.18.2	Minimum sound level	77
13.18.3	Fault tolerance	77
13.18.4	Power supplies	77
13.19	System integration	77
13.19.1	Alarm functions	77
13.19.2	Essential and emergency control functions	77
13.20	Software	78
13.20.1	Version control of software	78
13.20.2	Configuration – Support functions	78
13.20.3	Documentation	78
13.21	Tests	79
13.21.1	General	79
13.21.2	Hardware	79
13.21.3	Software	79
13.21.4	System testing	79
14	Special facilities – Swivel/turret	80
14.1	Standards, codes and regulations	80
14.2	Bonding and protective earthing of power swivel	80
Annex A (informative)	Essential source of electrical power	81
Annex B (informative)	Emergency source of electrical power	82
Annex C (informative)	Applicable examples of HVDC VSC technologies	83
Annex D (informative)	Swivel/turret	87
D.1	General	87
D.2	Swivel design and service location	87

D.3	Fault exposure of high-voltage electrical swivels	88
D.4	Enclosure and purging system	88
D.5	Ingress protection	88
D.6	Anti-condensation	89
D.7	Inspection and functional testing of swivel unit.....	89
Annex E	(informative) Guidelines for design of unmanned units	90
E.1	Factors affecting power supply requirements	90
E.2	Guideline for defining power sources requirement.....	90
E.2.1	One main power supply and UPS.....	90
E.2.2	One emergency power supply and UPS	91
E.2.3	One main power supply, one emergency power supply and UPS	91
E.2.4	Renewable sources of energy.....	91
E.3	Layout.....	92
E.4	Switchboard arrangements.....	92
E.5	High-voltage equipment	94
E.6	Lighting system.....	95
Annex F	(informative) Alternative sources of electrical power	96
F.1	General.....	96
F.2	Photovoltaic system	96
F.3	Wind turbine system	97
F.4	Microturbines	100
F.5	Closed cycle vapour turbines (CCVT).....	101
F.6	Thermoelectric generators (TEG).....	102
Annex G	(informative) Illumination level.....	104
G.1	General illumination level.....	104
G.2	Emergency lighting	104
G.3	Escape lighting	104
G.4	Verification of lighting level	105
Annex H	(informative) Enhanced software simulation.....	106
H.1	General.....	106
H.2	Scope of HiL testing.....	106
H.3	Schedule and work process	106
H.4	Requirements relating to the control system vendor or system integrator	106
H.5	Documentation and approval.....	107
Annex I	(informative) Architecture for energy control, monitoring and alarm system – Level reference and segmentation architecture	108
Bibliography		109
Figure 1	– Continuity of supply/continuity of service.....	15
Figure 2	– Power system hierarchy in an offshore unit	21
Figure 3	– TN-S DC system	38
Figure 4	– TN-C DC system	39
Figure 5	– TN-C-S DC system.....	40
Figure 6	– IT DC system	41
Figure 7	– TN-S AC system	43
Figure 8	– TN-C-S AC system.....	43
Figure 9	– TN-C AC system	44

Figure 10 – IT AC system	44
Figure 11 – Use of FCL in emergency switchboard	64
Figure C.1 – Typical HVDC VSC transmission between onshore grid and offshore petroleum unit; symmetric monopole	84
Figure C.2 – Typical symmetric and asymmetric monopole and bipole HVDC VSC arrangement	84
Figure C.3 – Principle drawings of possible topology arrangements for two-level (left) and multi-level (right) types with indication of corresponding filtered (blue) and non-filtered (green) output voltage wave forms	86
Figure E.1 – Example of electrical arrangement for an unmanned unit	93
Figure E.2 – Example of electrical arrangement for an unmanned unit	94
Figure E.3 – Example of electrical arrangement for an unmanned unit	94
Figure F.1 – PV Power generating system – Major functional elements, subsystems and power flow diagram	97
Figure F.2 – Typical diagram for the island function of a wind generation system – Unmanned unit	98
Figure F.3 – Typical diagram for the island function of a wind generation system – Manned unit	99
Figure F.4 – Microturbine typical block diagram	100
Figure F.5 – CCVT operating principle block diagram	101
Figure F.6 – Typical diagram for the thermoelectric generation system (TEG)	102
Figure I.1 – IEC 62443 reference architecture	108
Table 1 – Summary of principal features of the neutral earthing methods	36
Table 2 – Voltages for DC systems	41
Table 3 – AC systems having a nominal voltage between 100 V and 1 000 V inclusive and related equipment	45
Table 4 – AC three-phase systems having a nominal voltage above 1 kV and not exceeding 35 kV and related equipment	46
Table G.1 – General lighting illumination levels	104
Table G.2 – Recommended measuring points for measuring illumination in an area	105

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MOBILE AND FIXED OFFSHORE UNITS –
ELECTRICAL INSTALLATIONS –****Part 2: System design****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61892-2 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the requirement for sources of electrical power has been rewritten. Requirements both for manned and unmanned units are given. Requirements for essential services of electrical power have been added;
- b) the requirement in relation to dead start has been added;
- c) the requirement for emergency stop for motor-driven fuel-oil transfer and fuel-oil pressure pumps has been added;

- d) general requirements regarding cables and wiring systems have been added;
- e) the description of unit interfaces to electrical transmission systems has been included;
- f) requirements in relation to energy control, monitoring and alarm system have been rewritten;
- g) new clauses regarding swivel/turret and unmanned facilities have been added;
- h) informative annexes regarding the following have been added:
 - essential source of electrical power;
 - emergency source of electrical power;
 - applicable examples of HVDC VSC technologies;
 - swivel/turret;
 - power sources for unmanned units, with separate or combined main and emergency switchboard;
 - alternative power sources of electrical power – general requirements;
 - illumination level;
 - enhanced software simulation;
 - architecture for energy control, monitoring and alarm system.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
18/1650/FDIS	18/1661/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61892 series can be found, under the general title *Mobile and fixed offshore units – Electrical installations*, on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 61892 forms a series of International Standards for safety in the design, selection, installation, maintenance and use of electrical equipment for the generation, transmission, storage, distribution and utilization of electrical energy for all purposes in offshore units which are used for the purpose of exploration or exploitation of petroleum resources.

This part of IEC 61892 incorporates and coordinates, as far as possible, existing rules and forms a code of interpretation, where applicable, of the requirements of the International Maritime Organization (IMO), and constitutes a guide for future regulations which may be prepared and a statement of practice for offshore unit owners, designers, installers and appropriate organizations.

This document is based on solutions and methods which are in current use, but it is not intended to impede the development of new or improved techniques.

In this revision, voltage limitations have been removed. However, voltage limitations may be given in the referenced equipment standards. The removal of voltage limitations is considered necessary due to the interconnection of, and supply from shore to offshore units. In such cases, transmission voltages up to 132 kV AC and 150 kV DC are used and higher voltages are being planned.

The IEC 61892 series aims to constitute a set of International Standards for the offshore petroleum industry, but it is not intended to prevent their use beyond petroleum installations.

MOBILE AND FIXED OFFSHORE UNITS – ELECTRICAL INSTALLATIONS –

Part 2: System design

1 Scope

This part of IEC 61892 is applicable to system design of electrical installations and equipment in mobile and fixed offshore units including pipeline, pumping or "pigging" stations, compressor stations and single buoy moorings, used in the offshore petroleum industry for drilling, production, accommodation, processing, storage and offloading purposes.

It applies to all installations, whether permanent, temporary, transportable or hand-held, to AC installations and DC installations, without any voltage level limitation. Referenced equipment standards may give voltage level limitations.

This document specifies requirements such as those concerning

- sources of electrical power for manned and unmanned units,
- system earthing, both for low-voltage and high-voltage installations,
- interface for electric transmission systems with power supplied from shore, between interconnected offshore units, and with power supplied by offshore units to subsea installations,
- distribution systems,
- cables and wiring systems,
- system studies and calculations,
- protection against electrical faults,
- lighting,
- energy control, monitoring and alarm systems, and
- turret/swivel.

This document gives information and guidance on topics such as

- applicable examples of HVDC VSC technology, and
- guidelines for illumination level.

This document does not apply to

- fixed equipment for medical purposes,
- electrical installations of tankers, and
- control of ignition sources other than those created by electrical equipment.

NOTE 1 For medical rooms, IEC 60364-7-710 provides specific requirements. Requirements for tankers are given in IEC 60092-502.

NOTE 2 Guidance on protection of non-electrical equipment can be found in ISO 80079-36, ISO 80079-37 and IMO 2009 MODU Code, 6.7.

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.

IEC 60038:2009, *IEC standard voltages*

IEC 60092-504:2016, *Electrical installations in ships – Part 504: Automation, control and instrumentation*

IEC 60331-1, *Tests for electric cables under fire conditions – Circuit integrity – Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm*

IEC 60331-2, *Tests for electric cables under fire conditions – Circuit integrity – Part 2: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20 mm*

IEC 60331-21, *Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV*

IEC 60447, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles*

IEC 60533, *Electrical and electronic installations in ships – Electromagnetic compatibility (EMC) – Ships with a metallic hull*

IEC 60909-0, *Short-circuit currents in three-phase a.c. systems – Part 0: Calculation of currents*

IEC TR 60909-1, *Short-circuit currents in three-phase a.c. systems – Part 1: Factors for the calculation of short-circuit currents according to IEC 60909-0*

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-4-2, *Low-voltage switchgear and controlgear – Part 4-2: Contactors and motor-starters – AC semiconductor motor controllers and starters*

IEC 61131-1, *Programmable controllers – Part 1: General information*

IEC 61131-2, *Industrial-process measurement control – Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61363-1, *Electrical installations of ships and mobile and fixed offshore units – Part 1: Procedures for calculating short-circuit currents in three-phase a.c.*

IEC 61892-1:2019, *Mobile and fixed offshore units – Electrical installations – Part 1: General requirements and conditions*

IEC 61892-3:2019, *Mobile and fixed offshore units – Electrical installations – Part 3: Equipment*

IEC 61892-4:2019, *Mobile and fixed offshore units – Electrical installations – Part 4: Cables*

IEC 61892-6:2019, *Mobile and fixed offshore units – Electrical installations – Part 6: Installation*

IEC 61892-7, *Mobile and fixed offshore units – Electrical installations – Part 7: Hazardous areas*

IEC 62040-1, *Uninterruptible power systems (UPS) – Part 1: Safety requirements*

IEC 62040-2, *Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*

IEC 62040-3:2011, *Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*

IEC 62271-100, *High-voltage switchgear and controlgear – Part 100: Alternating current circuit-breakers*

IALA, *Recommendation O-139 on The Marking of Man-Made Offshore Structures*

ICAO, *Convention on International Civil Aviation, Annex 14, Aerodromes*

IMO, *Code on Alerts and Indicators*

IMO, *Convention on the International Regulations for Preventing Collisions at Sea (COLREG)*, 1972

IMO, *International Convention for the Safety of Life at Sea (SOLAS)*, consolidated edition 2014

IMO, 2009 MODU Code, *Code for the Construction and Equipment of Mobile Offshore Drilling Units*, 2009, 2010 edition

IMO, MSC/Circ. 645, *Guidelines for vessels with dynamic positioning systems*, Annex

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 61892-1 and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

AC systems of distribution

3.1.1.1

single-phase two-wire AC system

AC system comprising two conductors only, between which the load is connected

Note 1 to entry: This system can be used for phase-to-phase connection of the load and phase-to-neutral connection of the load.