

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Mobile and fixed offshore units – Electrical installations –
Part 1: General requirements and conditions**

**Unités mobiles et fixes en mer – Installations électriques –
Partie 1: Exigences générales et conditions**





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 It also gives information on projects, replaced and withdrawn publications.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.



IEC 61892-1

Edition 4.0 2019-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Mobile and fixed offshore units – Electrical installations –
Part 1: General requirements and conditions**

**Unités mobiles et fixes en mer – Installations électriques –
Partie 1: Exigences générales et conditions**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 47.020.60

ISBN 978-2-8322-6663-2

**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.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 General requirements and conditions	13
4.1 General.....	13
4.2 Acceptance of substitutes or alternatives	14
4.3 Additions and alterations.....	14
4.4 Environmental conditions	14
4.4.1 General	14
4.4.2 Ambient temperature	14
4.5 Power supply system characteristics.....	14
4.5.1 General	14
4.5.2 AC distribution systems	15
4.5.3 DC distribution systems	18
4.6 Clearance and creepage distances	19
4.7 Insulation	19
4.8 Precautions against vibration and mechanical shock.....	19
4.9 Location of electrical equipment in units.....	19
4.10 Mechanical protection	20
4.11 Protection against heat, water, steam and oil.....	20
4.12 Protection against electrical shock.....	21
4.13 Enclosures.....	21
4.14 Ignition source control.....	21
4.14.1 General	21
4.14.2 Emergency shutdown (ESD) – General.....	22
4.14.3 Emergency conditions due to drilling operations – Mobile drilling units	23
4.14.4 Manual electrical shutdown.....	23
4.15 Degree of protection of equipment by enclosures.....	23
4.16 Environmental impact.....	26
Annex A (informative) Degree of protection.....	27
Annex B (informative) Cold climate precautions	29
B.1 General.....	29
B.2 Emergency power source.....	29
B.3 Equipment – General	29
B.4 Cables and cable installations.....	29
B.5 Electrical trace heating systems.....	29
B.6 Lighting systems	30
B.6.1 General	30
B.6.2 Emergency lights	30
B.7 Electrical rotating machines	30
B.8 Explosion protected equipment	30
Annex C (informative) Specification of surface treatment and protective painting system.....	31
C.1 Objectives.....	31

C.2	General and specification.....	31
C.2.1	General	31
C.2.2	Atmospheric corrosivity categories for protective painting systems	31
C.2.3	Durability performance of a protective painting system	32
	Bibliography.....	34
	Table 1 – Voltage characteristics	16
	Table 2 – Frequency characteristics.....	17
	Table 3 – Tolerances for DC system	18
	Table 4 – Fast transients	19
	Table 5 – Minimum requirements for the degree of protection for mobile and fixed offshore units.....	24
	Table A.1 – Degrees of protection against foreign objects indicated by the first characteristic numeral.....	27
	Table A.2 – Degrees of protection against water indicated by the second characteristic numeral	28
	Table C.1 – Description of typical atmospheric environments related to the estimation of corrosivity categories	32

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MOBILE AND FIXED OFFSHORE UNITS –
ELECTRICAL INSTALLATIONS –****Part 1: General requirements and conditions**

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 61892-1 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This fourth edition cancels and replaces the third edition published in 2015. This edition constitutes a technical revision.

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

- a) voltage limitations have been removed;
- b) definitions for fixed offshore units and mobile offshore units have been included;
- c) tables for ambient air temperature and relative humidity have been removed, as this information will normally be given in owner's/operator's documentation for specific projects;

- d) the requirement as to ignition source control has been moved from IEC 61892-7 to this document;
- e) tables for voltage characteristics have been updated;
- f) requirements for a minimum degree of protection for equipment have been moved from IEC 61892-2 to this document.

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

FDIS	Report on voting
18/1649/FDIS	18/1664/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, published under the general title *Mobile and fixed offshore units – Electrical installations*, can be found 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.

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 1: General requirements and conditions

1 Scope

This part of IEC 61892 is applicable to 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

- environmental conditions,
- power supply characteristics,
- location of electrical equipment in units,
- protection against external influences,
- protection against electrical shock, and
- ignition source control.

This document gives information and guidance on topics such as

- cold climate protection, and
- surface treatment and protective painting system.

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 60364-4-41, *Low-voltage installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 61000-2-4:2002, *Electromagnetic compatibility (EMC) – Part 2-4: Environment – Compatibility levels in industrial plants for low-frequency conducted disturbances*

IEC 61892-2:2019, *Mobile and fixed offshore units – Electrical installations – Part 2: System design*

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

IEC 61892-5, *Mobile and fixed offshore units – Electrical installations – Part 5: Mobile units*

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

IEC 61892-7:2019, *Mobile and fixed offshore units – Electrical installations – Part 7: Hazardous areas*

ISO 8468, *Ships and marine technology – Ship's bridge layout and associated equipment – Requirements and guidelines*

ISO 11064 (all parts), *Ergonomic design of control centres*

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

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:

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

NOTE The terms and definitions included in this document are those that have general application in the IEC 61892 series. Terms and definitions applying to particular apparatus or equipment are included in the other parts of the IEC 61892 series.

3.1 offshore unit

construction, buoyant or non-buoyant, designed and built for installation or operation at an offshore location

Note 1 to entry: Topside interface of subsea installed equipment which is an integral part of production and transport systems assigned to fixed and floating offshore units, as well as a temporary interface to mobile offshore units, are also considered as part of the offshore unit.

3.2 unmanned offshore unit

offshore unit normally unmanned, remote controlled without need of human presence for operability and without living quarter facilities

Note 1 to entry: An unmanned offshore unit may also contain a survival shelter to support occasional site maintenance.

3.3

fixed offshore unit

buoyant or non-buoyant construction engaged in offshore operations including drilling, production, storage or support functions, and which is designed and built for installation at a particular offshore location

Note 1 to entry: LNG production units and LNG storage and regasification unit terminals are also considered to be fixed offshore units. FPSO/FSO on location is also considered as a fixed offshore unit. Floating LNG terminals and FPSOs with detachable arrangements are also considered to be fixed offshore units.

3.4

mobile offshore unit

buoyant construction engaged in offshore operations including drilling, production, storage, accommodation or support functions, not intended for service at one particular offshore site and which can be relocated without major dismantling or modification, for example barges, semisubmersible or jack-up unit and drill-ships

3.5

manned unit

offshore unit with need of human presence for operation and maintenance, and provided with living quarter facility

3.6

satellite unit

small offshore unit, normally unmanned, connected to a larger unit by means of a pipeline, power cable and/or umbilical

3.7

appropriate authority

governmental body and/or classification society with whose rules a unit is required to comply

3.8

equipment

single apparatus or set of devices or apparatuses, or the set of main devices of an installation, or all devices necessary to perform a specific task

EXAMPLE Power transformer, measuring equipment.

[SOURCE: IEC 60050-151:2001, 151-11-25, modified – The words "the equipment of a substation" have been removed from the example.]

3.9

apparatus

device or assembly of devices which can be used as an independent unit for specific functions

[SOURCE: IEC 60050-151:2001, 151-11-22, modified – The note has been deleted.]

3.10

IP

degree of protection of enclosure

numerical classification according to IEC 60529 preceded by the symbol IP applied to the enclosure of electrical apparatus to provide:

- protection of persons against contact with, or approach to, live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure,
- protection of the electrical apparatus against ingress of solid foreign objects, and
- where indicated by the classification, protection of the electrical apparatus against harmful ingress of water

Note 1 to entry: Explanation of the numerals used for classification of degree of protection is given in Tables A.1 and A.2.

[SOURCE: IEC 60050-426:2008, 426-04-02, modified – Note 1 to entry has been added.]

3.11

primary distribution system

system which is galvanically connected to the generator or, in offshore units with power supply from another unit or shore via cable, connected to the switchboard where the voltage regulation takes place

3.12

secondary distribution system

system without galvanic connection to the generator or to the switchboard where the voltage regulation takes place

3.13

distribution board

assembly containing different types of switchgear and controlgear associated with one or more outgoing electric circuits fed from one or more incoming electric circuits, together with terminals for the neutral and protective conductors, if required

[SOURCE: IEC 60050-826:2004, 826-16-08, modified – The words "if required" have been added.]

3.14

earth

ground, US, CA

general mass of the metal structure or hull of the unit

3.15

earthed

connected to the general mass of the metal structure or hull of the unit in such a manner as to ensure at all times an immediate discharge of electrical energy without danger

3.16

emergency service

services required to allow safe shutdown of the unit and provide safety oriented services for the personnel on the unit during an emergency situation for a defined time

EXAMPLE Emergency shutdown system, emergency lighting, firefighting, alarm and telecommunication systems are examples of emergency services.

3.17

essential service

services required to maintain the unit in a defined state of readiness and habitation for a period defined by the user for situations other than normal operation and without recourse to the emergency source of power except than in an emergency situation

EXAMPLE Services required to maintain the unit in a minimum comfortable condition of habitability, maintaining heading control thrusters for turret moored floating units and fuel transfer/bunkering operations are examples of essential services.

3.18

frequency

3.18.1

cyclic frequency variation

periodic deviation in frequency during normal operation such as might be caused by regularly repeated loading

$$\pm \frac{(f_{\max.} - f_{\min.}) \times 100}{2f_{\text{nominal}}} \%$$

3.18.2

frequency tolerance

maximum departure from nominal frequency during normal operation conditions excluding transient and cyclic frequency variations

Note 1 to entry: Frequency tolerance is a steady state tolerance and includes variations caused by loads and governor characteristics.

3.18.3

frequency transient

sudden change in frequency which goes outside the frequency tolerance limits and returns to and remains inside these limits within a specified recovery time after initiation of the disturbance (time range: seconds)

3.19

live part

conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN conductor or PEM conductor or PEL conductor

Note 1 to entry: This concept does not necessarily imply a risk of electric shock.

[SOURCE: IEC 60050-195:1998, 195-02-19]

3.20

PEN conductor

conductor combining the functions of both a protective earthing conductor and a neutral conductor

[SOURCE: IEC 60050-195:1998, 195-02-12]

3.21

PEM conductor

conductor combining the functions of both a protective earthing conductor and a mid-point conductor

[SOURCE: IEC 60050-195:1998, 195-02-13]

3.22

PEL conductor

conductor combining the functions of both a protective earthing conductor and a line conductor

[SOURCE: IEC 60050-195:1998, 195-02-14]

3.23

petroleum

complex mixture of hydrocarbons that occurs in the earth in liquid or gaseous forms

3.24

point

<wiring> termination of the fixed wiring intended for the attachment of a luminaire or for connecting to the supply of a current-using appliance

3.25 voltages

3.25.1

voltage tolerance

maximum departure from nominal user voltage during normal operating conditions, excluding transient and cyclic voltage variations

Note 1 to entry: Voltage tolerance is a steady state tolerance and includes voltage drop in cables and voltage regulator characteristics. It also includes variations due to environmental conditions.

3.25.2

voltage unbalance tolerance

maximum permissible unbalance, expressed in percent of nominal voltage, between the highest and lowest phase voltage

3.25.3

cyclic voltage variation

periodic voltage deviation (max. to min. RMS values) of the nominal voltage, such as might be caused by regularly repeated loading

$$\frac{\pm (U_{\max.} - U_{\min.}) \times 100}{2 U_{\text{nominal}}} \%$$

3.25.4

voltage transient

sudden change in voltage (excluding spikes) which goes outside the nominal voltage tolerance limits and returns to and remains inside those limits within a specified recovery time after the initiation of the disturbance (time range: seconds)

3.26

recovery time

3.26.1

voltage transient recovery time

time elapsed from exceeding the steady state voltage tolerance until the voltage recovers and remains within the steady state tolerance limits

3.26.2

frequency transient recovery time

time elapsed from exceeding the steady state frequency tolerance until the frequency recovers and remains within the steady state tolerance limits

3.27

waveform

3.27.1

THD

total harmonic distortion

ratio of the RMS value of the sum of all the harmonic components up to a specified order (recommended notation "H") to the RMS value of the fundamental component

$$\text{THD} = \sqrt{\sum_{h=2}^{h=H} \frac{(Q_h)^2}{(Q_1)^2}}$$

where

Q represents either current or voltage;

Q_1 is the RMS value of the fundamental component;

h is the harmonic order;

Q_h is the RMS value of the harmonic component of order h ;

H is 50 for the purpose of the compatibility levels in this document.

Note 1 to entry: THD takes account of harmonics only. For the case where interharmonics are to be included, reference is made to IEC 61000-2-4:2002, A.3.1.

Note 2 to entry: This note applies to the French language only.

[SOURCE: IEC 61000-2-4:2002, 3.2.7, modified – Note 1 to entry has been rephrased, and Note 2 to entry has been added.]

3.27.2

single harmonic content

ratio of the effective RMS value of the harmonic to the RMS value of the fundamental, expressed as a percentage

3.28

umbilical

group of functional components, such as electrical cables, optical fibre cables, hoses and tubes, laid up or bundled together or in combination with each other, that generally provides hydraulics, fluid injection, power and/or communication services

[SOURCE: ISO 13628-5:2009, 3.1.47, modified – Note 1 to entry has been omitted.]

3.29

equipment protection level

EPL

level of protection assigned to equipment based on its likelihood of becoming a source of ignition and distinguishing the differences between explosive gas atmospheres, explosive dust atmospheres, and the explosive atmospheres in mines susceptible to firedamp

Note 1 to entry: This note applies to the French language only.

[SOURCE: IEC 60079-0:2017, 3.33, modified – The note to entry has been added in English.]

4 General requirements and conditions

4.1 General

This clause contains requirements and conditions which are common to all equipment and electrical installations in the IEC 61892 series.

Electrical installations shall be such that:

- a) the safety of the unit and any people present onboard is ensured;
- b) the requirements with respect to safety in this document are followed;
- c) the requirements of the International Convention for the Safety of Life at Sea (SOLAS) are met as far as applicable;
- d) the requirements of the IMO MODU Code are met as far as applicable.

For buoyant units, all machinery and equipment shall operate satisfactorily under the static and dynamic inclination limits according to IEC 61892-5.

The appropriate authority may have additional requirements which have to be complied with.