

INTERNATIONAL STANDARD

IEC
61892-2

First edition
2005-03

Mobile and fixed offshore units – Electrical installations –

Part 2: System design

iTech Standards

(<https://standards.iteh.ai>)

Document Preview

IEC 61892-2:2005

<https://standards.iteh.ai/doc/standards/iec/e93599a4-a441-4107-a78a-1ac01194a157/iec-61892-2-2005>



Reference number
IEC 61892-2:2005(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

<https://standards.iteh.ai/catalog/standards/iec/e33599a4-a441-4107-a78a-1ae01194a157/iec-61892-2-2005>

INTERNATIONAL STANDARD

IEC 61892-2

First edition
2005-03

Mobile and fixed offshore units – Electrical installations –

Part 2: System design

iTech Standards

(<https://standards.iteh.ai>)

Document Preview

IEC 61892-2:2005

<https://standards.iteh.ai/doc/standards/iec/e93599a4-a441-4107-a78a-1ae01194a157/iec-61892-2-2005>

© IEC 2005 — Copyright - all rights reserved

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 the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

XB

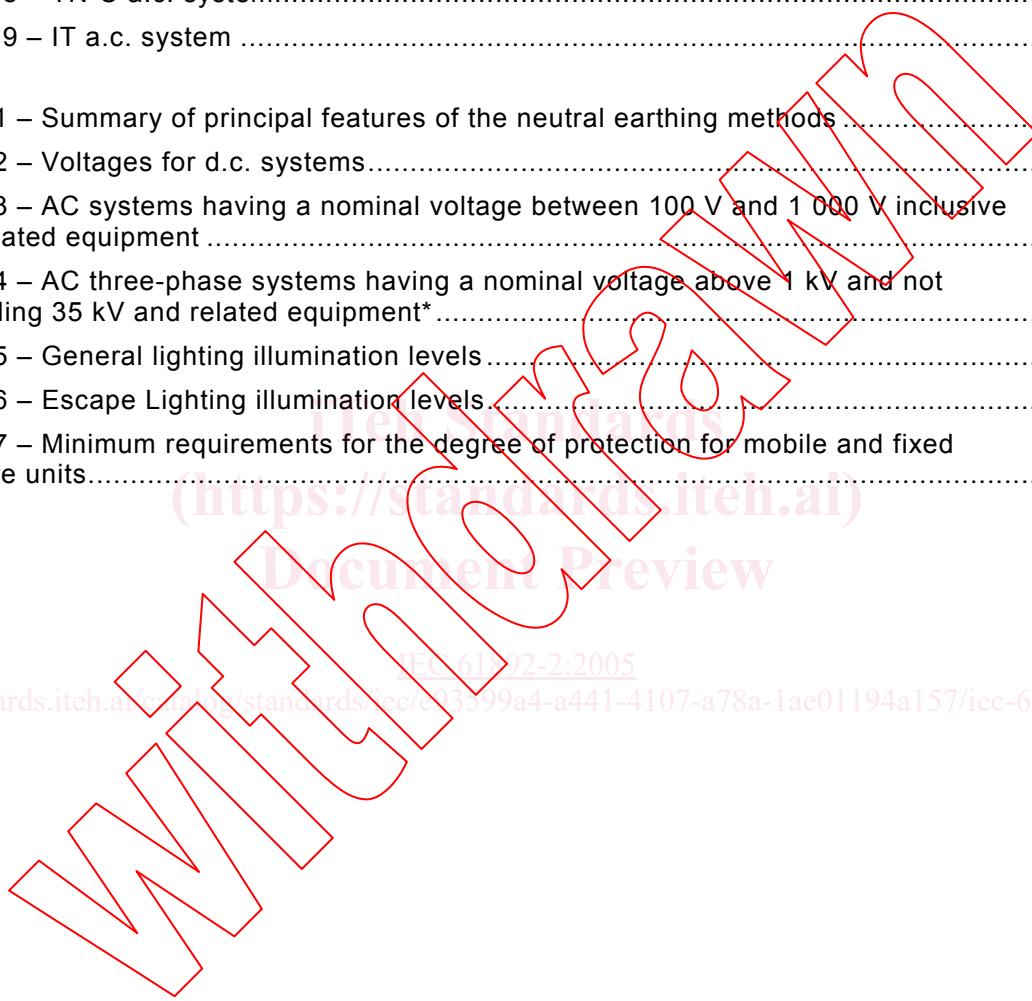
For price, see current catalogue

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
4 Sources of electrical power.....	14
4.1 General.....	14
4.2 Main source of electrical power.....	15
4.3 Emergency source of electrical power.....	15
4.4 Additional requirements for periodically unattended machinery spaces.....	17
4.5 General requirements for renewable sources of electrical power.....	17
4.6 Arrangement and location.....	18
4.7 Output.....	19
4.8 Additional requirements for electrical emergency power systems.....	20
4.9 Starting arrangements for emergency generators.....	20
5 System earthing	21
5.1 General.....	21
5.2 General requirements.....	21
5.3 Neutral earthing methods.....	21
5.4 Neutral earthing for systems up to and including 1 000 V.....	21
5.5 Neutral earthing for systems above 1 000 V.....	22
5.6 Generators operated in parallel with source transformers.....	22
5.7 Earthing resistors, connection to hull/structure.....	23
6 Distribution systems.....	24
6.1 DC distribution systems.....	24
6.2 AC distribution systems.....	29
7 Distribution system requirements.....	33
7.1 Earthed distribution systems.....	33
7.2 Methods of distribution.....	34
7.3 Balance of loads.....	34
7.4 Final circuits.....	34
7.5 Control circuits.....	35
7.6 Socket-outlets.....	35
7.7 Shore connections for mobile units.....	36
7.8 Motor circuits.....	36
8 Diversity (demand) factors.....	37
8.1 Final circuits.....	37
8.2 Circuits other than final circuits.....	37
8.3 Application of diversity (demand) factors.....	37
8.4 Motive-power circuits - General.....	37
9 System study and calculations.....	38
9.1 General.....	38
9.2 Electrical load study.....	38
9.3 Load flow calculations.....	39

9.4	Short-circuit calculations.....	39
9.5	Protection and discrimination study.....	41
9.6	Power system dynamic calculations.....	41
9.7	Calculation of harmonic currents and voltages.....	43
10	Protection.....	43
10.1	General.....	43
10.2	Characteristic and choice of protective devices with reference to short-circuit rating.....	44
10.3	Choice of protective devices with reference to overload.....	45
10.4	Choice of protective devices with regard to their application.....	45
10.5	Undervoltage protection.....	48
10.6	Overvoltage protection.....	49
11	Lighting.....	49
11.1	General.....	49
11.2	General lighting system.....	50
11.3	Emergency lighting system.....	51
11.4	Escape lighting system.....	51
11.5	Lighting circuits in machinery spaces, accommodation spaces, open deck spaces, etc.....	52
11.6	Luminaires.....	53
11.6.1	Discharge lamp luminaires of voltages above 250 V.....	53
11.6.2	Searchlights.....	53
12	Control and instrumentation.....	53
12.1	Safeguarding.....	53
12.2	Supply arrangement.....	53
12.3	Dependability.....	53
12.4	Safety.....	53
12.5	Segregation.....	53
12.6	Performance.....	54
12.7	Integration.....	54
12.8	Development activities.....	54
12.9	Electromagnetic compatibility.....	54
12.10	Design.....	54
12.11	Installation and ergonomics.....	55
12.12	Specific installations.....	56
12.13	Automatic control installations for electrical power supply.....	58
12.14	Machinery control installations.....	60
12.15	Public address and general alarm systems.....	60
12.16	Computer based systems.....	61
12.17	Software.....	63
12.18	Tests.....	65
12.19	Documentation.....	66
13	Degrees of protection by enclosures.....	67
13.1	General.....	67
	Bibliography.....	69

Figure 1 – Continuity of supply/continuity of service.....	14
Figure 2 – TN-S d.c. system.....	25
Figure 3 – TN-C d.c. system.....	26
Figure 4 – TN-C-S d.c. system	27
Figure 5 – IT d.c. system	28
Figure 6 – TN-S a.c. system.....	30
Figure 7 – TN-C-S a.c. system	30
Figure 8 – TN-C a.c. system.....	31
Figure 9 – IT a.c. system	31
Table 1 – Summary of principal features of the neutral earthing methods	23
Table 2 – Voltages for d.c. systems.....	29
Table 3 – AC systems having a nominal voltage between 100 V and 1 000 V inclusive and related equipment	32
Table 4 – AC three-phase systems having a nominal voltage above 1 kV and not exceeding 35 kV and related equipment*	33
Table 5 – General lighting illumination levels.....	50
Table 6 – Escape Lighting illumination levels.....	52
Table 7 – Minimum requirements for the degree of protection for mobile and fixed offshore units.....	67



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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.

The text of this standard is based on the following documents:

FDIS	Report on voting
18/965/FDIS	18/995/RVD

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

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

IEC 61892 consists of the following parts, under the general title: *Mobile and fixed offshore units – Electrical installations*:

Part 1: General requirements and conditions

Part 2: System design

Part 3: Equipment

Part 4: Cables¹⁾

Part 5: Mobile units

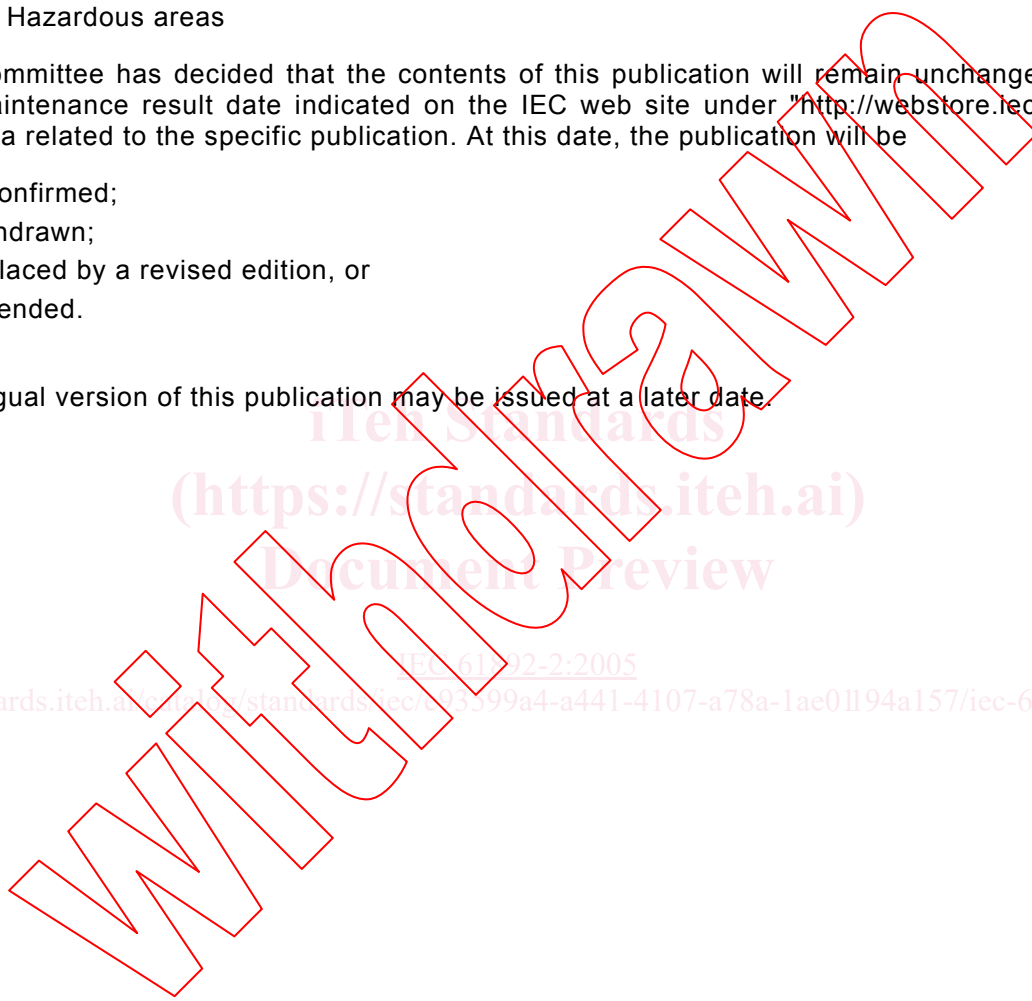
Part 6: Installation

Part 7: Hazardous areas

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

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

A bilingual version of this publication may be issued at a later date.



IEC Standards
(<https://standards.iteh.ai>)
Document Preview

IEC 61892-2:2005

<https://standards.iteh.ai/catalog/standards/iec/e93599a4-a441-4107-a78a-1ae01194a157/iec-61892-2-2005>

¹⁾ Under consideration. Before IEC 61892-4 is published, reference is made to the IEC 60092-35X series.

INTRODUCTION

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

This part of IEC 61892 also incorporates and co-ordinates, as far as possible, existing rules and forms a code of interpretation, where applicable, of the requirements of the International Maritime Organisation, a guide for future regulations which may be prepared and a statement of practice for offshore unit owners, constructors and appropriate organisations.

This standard is based on equipment and practices, which are in current use, but it is not intended in any way to impede development of new or improved techniques.

The ultimate aim has been to produce a set of International standards exclusively for the offshore petroleum industry.

Withdrawing

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61892-2:2005](https://standards.iteh.ai/standards/iec/61892-2:2005)

<https://standards.iteh.ai/standards/iec/61892-2:2005>

MOBILE AND FIXED OFFSHORE UNITS – ELECTRICAL INSTALLATIONS –

Part 2: System design

1 Scope

This part of IEC 61892 contains provisions for system design of electrical installations in mobile and fixed units used in the offshore petroleum industry for drilling, production, processing and for storage purposes, including pipeline, pumping or 'pigging' stations, compressor stations and exposed location single buoy moorings.

It applies to all installations, whether permanent, temporary, transportable or hand-held, to a.c. installations up to and including 35 000 V and d.c. installations up to and including 750 V.(a.c. and d.c. voltages are nominal values)

This standard does not apply either to fixed equipment used for medical purposes or to the electrical installations of tankers.

2 Normative references

The following referenced documents are indispensable for the application 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 60038:2002, *IEC standard voltages*

IEC 60092-101:2002, *Electrical installations in ships – Part 101: Definitions and general requirements*

IEC 60092-504:2001, *Electrical installations in ships – Part 504: Special features – Control and instrumentation*

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*

IEC 60617-DB:2001²⁾ *Graphical symbols for diagrams – Architectural and topographical installation plans and diagrams*

IEC 60947-2:2003, *Low voltage switchgear and controlgear – Part 2: Circuit-breakers*

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

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

²⁾ "DB" refers to the on-line IEC database.

IEC 61511, (all parts), *Functional safety – Safety instrumented systems for the process industry sector*

IEC 61892-1:2001, *Mobile and fixed offshore units – Electrical installations – Part 1: General requirements and conditions*

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

IEC 61892-5:2000, *Mobile and fixed offshore units – Electrical installations – Part 5: Mobile units*

IEC 61892-7:1997, *Mobile and fixed offshore units – Electrical installations – Part 7: Hazardous areas*

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

SOLAS, *International Convention for the Safety of Life at Sea*

IMO MODU Code:1990, *Code for the Construction and Equipment of Mobile Offshore Drilling Units,*

3 Terms and definitions

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

NOTE The definitions included in this part are those having general application in the IEC 61892 series. Definitions applying to particular apparatus or equipment are included in the other parts of IEC 61892.

3.1

a.c. systems of distribution

3.1.1

single-phase two-wire a.c. system

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

NOTE In some countries this is designated as a two-phase system

3.1.2

three-phase three-wire a.c. system

system comprising three conductors connected to a three-phase supply

3.1.3

three-phase four-wire a.c. system

system comprising four conductors of which three are connected to a three-phase supply and the fourth to a neutral point in the source of supply

3.2

appropriate authority

governmental body with whose rules a unit is required to comply

3.3

availability

the state of an item of being able to perform its required function
[IEV 603-05-04]

3.4

back-up protection³⁾

equipment or system which is intended to operate when a system fault is not cleared in due time because of:

- failure or inability of a protective device closest to the fault to operate, or
- failure of a protective device, other than the protective device closest to the fault, to operate

3.5

centralized control

control of all operations of a controlled system from one central control position

3.6

computer-based system

system that consists of one or more programmable electronic devices with their connections, peripherals and software necessary to carry out automatically specified functions

3.7

continuity of service³⁾

condition. that after a fault in a circuit has been cleared, the supply to the healthy circuits is re-established

NOTE See circuit 3 in Figure 1.

3.8

continuity of supply

condition that during and after a fault in a circuit, the supply to the healthy circuits is permanently ensured

NOTE See circuit 3 in Figure 1.

3.9

control functions

functions intended to regulate the behaviour of equipment or systems

3.10

control position (control station)

group of control devices by which an operator can control the performance of a machine, apparatus, process or assembly of machines and apparatus

3.11

d.c. systems of distribution

3.11.1

two-wire d.c. system

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

3.11.2

three-wire d.c. system

system comprising two conductors and a middle wire, the supply being taken from the two outer conductors or from the middle wire and either outer conductor, the middle wire carrying only the difference-current

3.12

diversity factor (demand factor)

ratio of the estimated total load of a group of consumers under their normal working conditions to the sum of their nominal ratings

³⁾ The International Electrotechnical Vocabulary (IEV) definition for this term is not applicable for this standard.

3.13**fail-to-safe**

principle by which a failure or malfunction of a component of the system causes its output to automatically adjust to a predetermined safe state

[IEV 191-15-04 modified]

3.14**function**

elementary operation performed by the system which, in conjunction with other elementary operations (system functions), enables the system to perform a task

3.15**high voltage**

the set of voltage levels in excess of low voltage

[IEV 601-01-27 modified]

3.16**hull-return system**

system in which insulated conductors are provided for connection to one pole or phase of the supply, the structure of the unit or other permanently earthed structure being used for effecting connections to the other pole or phase

3.17**integrity**

capability of a system to satisfactorily perform the required functions under all the stated conditions within a stated period of time

[IEV 191-19-07 modified]

3.18**low voltage**

a set of voltage levels used for the distribution of electricity and whose upper limit is generally accepted to be 1 000 V a.c.

[IEV 601-01-26]

3.19**machinery control room**

room or spaces where centralized controls and measuring and monitoring equipment for main equipment and essential auxiliary machinery are located together with the appropriate means of communication

3.20**maintainability**

ability of an item under given condition of use, to be retained in, or restored to, a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources

[IEV 191-02-07]

3.21**monitoring functions**

functions intended to collect data from equipment and systems for the purpose of display and recording

3.22

over-current

a current exceeding the rated current

[IEV 441-11-06]

3.23

over-current discrimination

co-ordination of the operating characteristics of two or more over current protective devices such that, on the incidence of over-currents within stated limits, the device intended to operate within these limits does so, while the other(s) does (do) not

[IEV 441-17-15]

3.24

overload

operating conditions in an electrically undamaged circuit, which cause an over-current

[IEV 441-11-08]

3.25

partial discrimination (partial selectivity)⁴⁾

over-current discrimination where, in the presence of two or more over-current protective devices in series, the protective device closest to the fault effects the protection up to a given level of short-circuit current without causing the other protective devices to operate

3.26

primary distribution system

system having electrical connection with the main source of electrical power

3.27

rated load

highest value of load specified for rated conditions

3.28

reliability

the probability that an item can perform a required function under given conditions for a given time interval

[IEV 191-12-01]

3.29

safety functions

functions intended to prevent harm or danger to personnel

3.30

secondary distribution system

system having no electrical connection with the main source of electrical power, e.g. isolated therefrom by a double-wound transformer or motor-generator

3.31

short-circuit

accidental or intentional conductive path between two or more conductive parts forcing the electric potential difference between these conductive parts to be equal to or close to zero

[IEV 195-04-11]

4) The International Electrotechnical Vocabulary (IEV) definition for this term is not applicable for this standard.