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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



18/1988/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:
IEC 60092-509 ED2

DATE OF CIRCULATION:
2025-07-04

CLOSING DATE FOR COMMENTS:
2025-09-26

SUPERSEDES DOCUMENTS:
18/1863A/RR

IEC TC 18 : ELECTRICAL INSTALLATIONS OF SHIPS AND OF MOBILE AND FIXED OFFSHORE UNITS

SECRETARIAT:
Norway

SECRETARY:
Mr Arild Røed

OF INTEREST TO THE FOLLOWING COMMITTEES:
SC 18A,TC 64,TC 65,SC 65A,SC 65B,SC 65C,SC 65E,TC 80,PC 128

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:
Safety

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TITLE:

Electrical installations in ships - Part 509: Operation of electrical installations

NOTE FROM TC/SC OFFICERS:

Note that there is a related project going on in PC 128 for general purposes.MT 30 will resolve the comments to this document. National committees are encourage to nominate experts.

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ELECTRICAL INSTALLATIONS IN SHIPS –**Part 509: Operation of electrical installations****FOREWORD**

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IEC 60092-509 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units. It is an International Standard.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

- a) Shore power operation requirements
- b) Marine electrical equipment inspection and maintenance

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

194
195 Full information on the voting for its approval can be found in the report on voting indicated in the
196 above table.

197 The language used for the development of this International Standard is English.

198 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
199 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at
200 www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described
201 in greater detail at www.iec.ch/publications.

202 The committee has decided that the contents of this document will remain unchanged until the
203 stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific
204 document. At this date, the document will be

- 205 • reconfirmed,
206 • withdrawn, or
207 • revised.

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209

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212

INTRODUCTION

213 The different parts of IEC 60092 form a series of international standards for electrical installations
214 in sea-going ships, incorporating good practice and co-ordinating, as far as possible, existing rules.
215 These standards form a code of practical interpretation and amplification of the requirements of the
216 International Convention on Safety of Life at Sea (SOLAS 74/88) a guide for future regulations which
217 may be prepared and a statement of practice for use by ship owners, shipbuilders and appropriate
218 organizations.

219

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 509: Operation of electrical installations

1 Scope

This part of IEC 60092 is applicable to all operation of and work activity on electrical generation, conversion and distribution systems and other associated electrical equipment in ships, including all a.c and d.c voltages.

This standard sets out the requirements for the safe operation of work and activity on, with, or near electrical installations. These requirements also apply to operational, working and maintenance activities. It applies to all electrical work activities as well as non-electrical work activities such as structural work near electrical equipment and cables.

This standard does not apply to ordinary persons.

Note to entry: when using installations and equipment, provided that the installations and equipment are designed and installed for use by ordinary persons and comply with relevant requirements of the IEC 60092 series.

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

IEC 61310-2, *Safety of machinery – Indication, marking and actuation – Part 2: Requirements for marking*

3 Terms and definitions

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

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

— IEC Electropedia: available at <https://www.electropedia.org/>

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

3.1 General

3.1.1

electrical installation

assembly of electrical equipment which is used for the generation, transmission, conversion, distribution and use of electrical energy

Note 1 to entry: The *electrical installation* includes energy sources such as batteries, capacitors and all other sources of stored electrical energy.

Note 2 to entry: This entry was numbered 651-01-04 in IEC 60050-651:1999

[SOURCE: IEC 60050-651:2014, 651-26-01]

264 **3.1.2**265 **live part**

266 conductor or conductive part intended to be energized in normal operation.

267 Note 1 to entry : Live part including a neutral conductor. Not, by convention, a PEN conductor, combining the functions of
 268 both a protective earthing conductor and a neutral conductor; or a PEM conductor, combining the functions of both a
 269 protective earthing conductor and a mid-point conductor or a PEL conductor, combining the functions of both a protective
 270 earthing conductor and a line conductor

271 Note 2 to entry: This entry was numbered 651-01-04 in IEC 60050-651:1999.

272 Note 3 to entry: This entry was numbered 195-01-12, 195-01-13, 195-01-14 in IEC 60050-195: 1998.

273 Note 4 to entry: This concept does not necessarily imply a risk of electrical shock.

274 [SOURCE: IEC 60050-651:2014, 651-26-01]

275 [SOURCE: IEC 60050-195:2021, 195-02-19,]

276 **3.1.3**277 **operation**

278 combination of activities including work activities necessary to permit an electrical installation to
 279 function.
 280

281 Note 1 to entry: The operation includes such matters as switching, controlling, monitoring, verification of the
 282 electrical installation, inspection and maintenance as well as both electrical work and non-electrical work.

283 Note 2 to entry: This entry was numbered 651-01-05 in IEC 60050-651:1999. It has been modified as follows: the
 284 reference to IEC 60050-151 has been added.

285 [SOURCE: IEC 60050-651:2014, 651-26-02 modified, the term “verification of the electrical installation” was
 286 added in Note 1 to entry.]

287 **3.1.4**288 **risk**

289 combination of the probability of occurrence of harm and the severity of that harm

290

291 Note 1 to entry: The term “harm” in this context relates to damage to either persons and/or electrical installations.

292 [SOURCE: IEC 60050-351:2013, 351-57-03 modified, Note 1 to entry was added.]

293 **3.1.5**294 **electrical hazard**

295 potential source of harm when electric energy is present in an electrical installation

296

297 Note 1 to entry: The term “harm” in this context relates to damage to either persons and/or electrical
 298 installations.

299 Note 2 to entry: This entry was numbered 651-01-30 in IEC 60050-651:1999.

300 [SOURCE: IEC 60050-651:2014, 651-26-05]

301 **3.1.6**302 **electrical danger**

303 risk of electrical injury when electrical energy is present in an electrical installation

304

305 [SOURCE: IEC 60050-651:2014, 651-26-07]

306 **3.1.7**307 **measurement**

308 all activities to measure physical data within electrical installations

3.1.8**inspection**

process of verifying that an electrical installation is in accordance with specified technical and safety requirements of the relevant standards and may include verification of the normal state of that installation

3.1.9**survey**

process of verifying that an electrical installation is in accordance with specified technical and safety requirements and regulations of the appropriate authority

3.1.10**electrical injury**

death or personal injury from electric shock, electric burn, arcing, or from fire or explosion initiated by electrical energy caused by any *operation* of an *electrical installation*

[SOURCE: IEC 60050-651:2014, 651-26-08 modified, the definition was reworded to use the defined terms of this document]

3.2 Personnel, organization and communication**3.2.1****installation manager****IM**

designated person with the overall responsibility to ensure the safe *operation* of the *electrical installation* by setting rules and organization or framework

Note 1 to entry: The wording "Person responsible for an electrical installation" was the term used in the previous version EN 50110-1:2013.

Note 2 to entry: This person can be the owner, employer, proprietor or a delegated person or legal entity represented by a natural person.

Note 3 to entry: Some of these duties can be delegated to others as required. For large or complex *electrical installations* or networks, the duties can be delegated for parts of the installations or the network (see 4.3).

Note 4 to entry: See Figure B.1, classification **a**).

3.2.2**operation controller****OC**

designated person who is responsible during work activities for the safe *operation* of the *electrical installation*

Note 1 to entry: The wording "Nominated person in control of an electrical installation during *work activities*" was the term used in the previous version EN 50110-1:2013

Note 2 to entry: This person has to judge the possible effects of the work activities on the *electrical installation* or parts of it which are under their responsibility and the effects of the *electrical installation* on persons carrying out the work activities. Some of these duties can be delegated to others as required (see 4.3).

Note 3 to entry: See Figure B.1, classification **b**).

3.2.3**work controller****WC**

designated person with direct management responsibility for the work activity at *work location*

Note 1 to entry: The wording “nominated person in control of a *work activity*” was the term used in previous version EN 50110-1:2013.

Note 2 to entry: Parts of this responsibility may be delegated to others as required.

Note 3 to entry: This entry was numbered 651-01-36 in IEC 60050-651:1999. It has been modified as follows: Use of more appropriate English to provide greater clarity to the definition

Note 4 to entry: See Figure B.1, classification **c)**

[SOURCE: IEC 60050-651:2014, 651-26-09 modified, the term “work controller” was added and also the symbol “WC”, addition of “work location” in the definition]

3.2.4**worker****W**

person carrying out work activities

Note 1 to entry: See Figure B.1, classification **d)**

3.2.5**skilled person, <electricity>**

person with relevant education, knowledge and experience to enable them to analyse risks and to avoid hazards which electricity can create

[SOURCE: IEC 60050-651:2014, 651-26-11 modified, the term “training” was deleted, “perceive” was replaced by “analyse”; “danger” was replaced by “hazard”]

3.2.6**instructed person, <electricity>**

person adequately advised by a *skilled person* to enable them to perceive risks as instructed and to avoid hazards which electricity can create

[SOURCE: IEC 60050-651:2014, 651-26-12 modified, the term “supervised” was deleted, “electrically” was deleted “danger” was replaced by “hazard” and added “as instructed”]

3.2.7**ordinary person, <electricity>**

person who is neither a *skilled person* nor an *instructed person*

[SOURCE: IEC 60050-826:2004, 826-18-03]

3.2.8**notification**

messages or instructions which are either verbal or in writing associated with *operation* of any *electrical installation*

410 **3.2.9**411 **Person in charge (PIC)**

412 individual responsible for HVSC systems operations.

413 **3.3 Working zone**414 **3.3.1**415 **work location**416 any site, place or area where a *work activity* is to be, is being, or has been carried out

417 [SOURCE: IEC 60050-651:2014, 651-26-03]

418 **3.3.2**419 **live working zone**420 space around live parts in which the insulation level to prevent electrical danger is not assured when
421 reaching into or entering it without protective measures422
423 Note 1 to entry: The outer limit of the *live working zone* is denoted as the distance D_L (see Figures 1, 2 and 3).424 **3.3.3**425 **vicinity zone**426 limited space outside the *live working zone*427
428 Note 1 to entry: The outer limit of the *vicinity zone* is denoted as the distance D_V (see Figures 1, 2 and 3). Note429 2 to entry: In this zone, specific precautions are taken to avoid encroaching into the *live working zone*.430 **3.4 Working**431 **3.4.1**432 **work activity**433 any form of *electrical work* or *non-electrical work* where there is the possibility of an *electrical hazard*434 **3.4.2**435 **electrical work**436 work on, with or near an *electrical installation* such as testing and measurement, repairing, replacing,
437 modifying, extending, erecting, maintaining and inspecting438
439 [SOURCE: IEC 60050-651:2014, 651-26-04, modified, the definition was reworded by combining the
440 definition and the Note 1 to entry. Note 2 and 3 were deleted]441 **3.4.3**442 **non-electrical work**443 work near to an *electrical installation* such as construction, excavation, cleaning, painting, etc444 **3.4.4**445 **live working**446 all work in which a *worker (W)* deliberately makes contact with live parts or reaches into the *live working*
447 *zone* with either parts of their body or with tools, equipment or devices being handled448
449 Note 1 to entry: At low voltage, live working is carried out by the *worker (W)*, when making contact with bare live parts.
450 At high voltage, live working is carried out by the *worker (W)*, when entering the *live working zone*, regardless of whether
451 contact is made with bare live parts or not.

452
453 [SOURCE: IEC 60050-651:2014, 651-21-01, modified, the definition was reworded; the three Notes to entry
454 deleted and a new Note 1 to entry is created]

455 **3.4.5**

456 **working within the vicinity zone**

457 all *work activity* in which a *worker (W)* with part of their body, with a tool or with any other object enters into
458 the *vicinity zone* without encroaching into the *live working zone*

459 **3.4.6**

460 **isolate, verb**

461 disconnect completely a device or an electric circuit from other devices or electric circuits

462 [SOURCE: IEC 60050-151:2001, 151-15-37]

463 **3.4.7**

464 **dead, adj,**

465 at an electric potential equal to or not significantly different from that of earth at the worksite

466
467 Note 1 to entry: This entry was numbered 651-01-15 in IEC 60050-651:1999

468
469 [SOURCE: IEC 60050-651:2014, IEV 651-21-09]

470 **3.4.8**

471 **dead working**

472 work activity on *electrical installations* which are neither live nor charged, carried out after having taken all
473 measures to prevent electrical danger

474 **3.4.9**

475 **authorization**

476 formal approval to perform planned work, in writing or instruction

477 **3.4.10**

478 **permission to start work**

479 direct instruction to the *workers (W)* at *work location* to commence work after all safety measures are taken

480 **3.4.11**

481 **supervision**

482 task to apply electrical safety control to the work activity

483 **3.5 Protective devices**

484 **3.5.1**

485 **screen**

486 any device, which may be insulated or not, which is used to prevent approach to any equipment or part of
487 *electrical installation* which presents *electrical danger*

488 **3.5.2**

489 **barrier**

490 part providing protection against direct contact from any usual direction of access

491
492 [SOURCE: IEC 60050-826:2004, 826-12-23 modified by deleting the words “(electrically)” and “protective”]
493

494 **3.5.3**495 **insulating covering**

496 rigid or flexible cover made of insulating material used to cover live and/or un-energised parts and/or
 497 adjacent parts in order to prevent accidental contact

498 **3.5.4**499 **enclosure**

500 part providing protection of equipment against certain external influences and, in any direction, protection
 501 against direct contact

502 **3.5.5**503 **voltage detector**

504 portable device used to detect reliably the presence or the absence of the operating voltage and used to
 505 verify that the electrical installation is ready for earthing

506
 507 Note 1 to entry: These devices are generally described as either capacitive types or resistive types.
 508

509 [SOURCE: IEC 60050-651:2014, 651-24-02, modified by replacing “diagnostic” by “portable” and by
 510 completing the definition with the following words: “and used to verify that the electrical installation is ready
 511 for earthing”]

512 **3.5.6**513 **portable equipment for earthing and short-circuiting**

514 equipment which is portable and is connected by insulating component(s) to parts of an *electrical installation*
 515 for earthing, short-circuiting or earthing and short-circuiting purposes

516
 517 Note 1 to entry: The *portable equipment for earthing and short-circuiting* comprises earthing components, short-
 518 circuiting components and one or more insulating components, for instance earthing sticks

519
 520 Note 2 to entry: This entry was numbered 651-14-01 in IEC 60050-651:1999. It has been modified to precise the
 521 definition and make use of preferred terms

522
 523 [SOURCE: IEC 60050-651:2014, 651-25-01]
 524

525 **3.5.7**526 **personal protective equipment**527 **PPE**

528 any device or appliance designed to be worn or held by an individual for protection against one or more
 529 health and safety hazards

530
 531 Note 1 to entry: This entry was numbered 651-07-01 in IEC 60050-651:1999. It has been modified for greater clarity on
 532 the role of *PPE*

533
 534 [SOURCE: IEC 60050-651:2014, 651-23-01, modified by “whilst performing live working” was deleted]
 535

536 **3.6 Voltages**537 **3.6.1**538 **extra-low voltage**539 **ELV**

540 normally not exceeding 50 V alternating current AC or 120 V ripple free direct current DC whether between
 541 conductors or to earth

542
 543 Note 1 to entry: This definition includes SELV, PELV and FELV (see HD 60364-4-41).
 544

545 **3.6.2**546 **low voltage**547 **LV**

548 normally not exceeding 1 000 V AC or 1 500 V DC

549 **3.6.3**550 **high voltage**551 **HV**

552 normally exceeding 1 kV AC or 1,5 kV DC

553 **3.6.4**554 **operating voltage**555 value of the voltage under normal conditions, at a given instant and a given point of the system or an
556 electrical installation557
558 Note 1 to entry: This value can be expected, estimated or measured.559
560 [SOURCE: IEC 60050-601:2001, 601-01-22 modified by adding: "or an electrical installation"]561 **3.7 Distances**562 **3.7.1**563 **live working limit distance**564 D_L

565 distance defining the outer limit of the live working zone

566 **3.7.2**567 **vicinity limit distance**568 D_V

569 distance defining the outer limit of the vicinity zone

570 **3.7.3**571 **minimum approach distance for live working**572 D_A 573 minimum distance in air for live working to be maintained between any part of the body of a worker (**W**),
574 including any object (except tools appropriate for live working) being handled directly, and any part(s) at
575 different electric potential(s)576
577 Note 1 to entry: The minimum approach distance for live working is the sum of the electrical distance appropriate for
578 the maximum nominal voltage and of the selected ergonomic distance.579
580 [SOURCE: IEC 60050-651: 2014, 651-21-11 modified by adding "for live working"]581 **3.7.4**582 **minimum working distance**583 D_W 584 minimum distance in air to be maintained between any part of the body of a worker (including tools, objects
585 and equipment) and bare live parts when working near a bare live part during work activities within or
586 outside the vicinity zone587
588 Note 1 to entry: For minimum working distance within the vicinity zone the symbol is D_{WL} 589
590 Note 2 to entry: For minimum working distance outside the vicinity zone the symbol is D_{WW}

591

3.7.5**electrical distance** D_U

distance in air required to prevent a disruptive discharge between energised parts or between energised parts and earthed parts during live working

Note 1 to entry: This entry was numbered 651-01-21 in IEC 60050-651:1999. It has been modified as follows: Editorial, to take into consideration the changes being made to IEC 60050-604

[SOURCE: IEC 60050-651: 2014, 651-21-12]

3.7.6**ergonomic distance, <live working>** D_E

distance in air, to take into account inadvertent movement and errors in judgement of distances while performing live working

Note 1 to entry: This distance is not fixed because it is necessary to make an evaluation for different situations of work

Note 2 to entry: This entry was numbered 651-01-22 in IEC 60050-651:1999. It has been modified as follows: Revision for clarification and suppression of the parenthesis in the second preferred term.

[SOURCE: IEC 60050-651: 2014, 651-21-13, modified by addition of Note 1 to entry to be suitable for this document and by deleting “added to the electrical distance, existing Note 1 to entry was renumbered as Note 2 to entry”]

3.7.7**ergonomic distance, <vicinity>** E

distance in air, to take into account inadvertent movement and errors in judgement of distances while performing work within or outside the vicinity zone

Note 1 to entry: This distance is not fixed because it is necessary to make an evaluation for different situations of work

3.7.8**floating conductive distance, <live working>** F

sum of all lengths, in the direction of the gap axis, of all floating conductive objects in the air gap [SOURCE:

EN 61472:2013, 4.3.1] modified by adding after the term: “<live working>”

3.7.9**distance of the equipment, <vicinity>** L

distance in air corresponding to longitudinal dimensions of equipment, objects or tools, while performing work within or outside the vicinity zone

3.8 Symbols

The following symbols are used in this document:

- D_A minimum approach distance for live working
- D_E ergonomic distance, <live working>
- D_L live working limit distance

- D_U electrical distance
- D_V vicinity limit distance
- D_W minimum working distance
- D_{WL} minimum working distance within the vicinity zone
- D_{WW} minimum working distance outside the vicinity zone
- E ergonomic distance, <vicinity>
- ELV extra low voltage
- F floating conductive distance, <live working>
- HV high voltage
- IM installation manager
- IR infrared
- L distance of the equipment, <vicinity>
- LV low voltage
- OC operation controller
- PPE personal protective equipment
- UV ultraviolet
- W Worker
- WC work controller

637 4 Basic principles

638 4.1 Safe operation

639 Before carrying out any operation on an electrical installation an assessment of the electrical risks shall be
 640 made. This assessment shall specify how the operation shall be carried out and which safety measures and
 641 precautions are to be implemented to ensure safety. If it is determined, that the work cannot be carried out
 642 as planned work shall be stopped immediately or not be started.

643 If defects or any failure are observed on or in electrical installations, which may result in an electrical hazard,
 644 the installation manager (**IM**) for this electrical installation shall immediately be notified and necessary
 645 measures shall be taken.

646 4.2 Personnel

647 National legislation can provide additional rules on the responsibilities placed upon persons for the safety of
 648 those engaged in a work activity and those who are or may be affected by the work activity.

649 All personnel involved in a work activity on, with, or near an electrical installation shall be instructed in the
 650 safety requirements, safety rules and company instructions applicable to their work. These instructions shall
 651 be repeated during the course of the work where the work activity is of long duration or is complex. The
 652 personnel involved shall be required to comply with these requirements, rules and instructions.

653 Personnel shall wear clothing suitable for the locations and conditions where they are working. This could
 654 include the use of close-fitting clothing or additional personal protective equipment (PPE).

655 Before any work activity is started and during that work activity, the work controller (**WC**) shall ensure that
 656 all relevant requirements, rules and instructions are complied with.

657 The work controller (**WC**) shall instruct all persons engaged upon the work activities of all reasonably
 658 foreseeable dangers that are not immediately apparent to them.

659 No person shall undertake any work activity where technical knowledge or experience is needed to prevent
 660 electrical danger or injury, unless that person has such technical knowledge or experience, or is under such
 661 supervision (see 4.10) as is necessary for the work undertaken.

662 National legislation can set out the minimum age and the criteria for competence of persons.