Draft for Public Comment

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Part 3: Low Voltage Shore Connection (LVSC) Systems - General requirements

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Introduction

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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 com-ment**	**Commend (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.	

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18/1523/CDV

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PROJET DE COMITÉ POUR VOTE (CDV)

	Project number Numéro de projet	IEC/IEEE 80005-3 Ed.1
	IEC/TC or SC: **18** IEC/CE ou SC:	Secretariat / Secrétariat **Norway**
☐ Submitted for parallel voting in CENELEC Soumis au vote parallèle au CENELEC	Date of circulation Date de diffusion **2016-07-29**	Closing date for voting (Voting mandatory for P-members) Date de clôture du vote (Vote obligatoire pour les membres (P)) **2016-10-21**
Also of interest to the following committees Intéresse également les comités suivants **TC64, TC77, TC121, ISO/TC8, ISO/TC188, IMO, IACS**		Supersedes document Remplace le document **18/1468/CD & 18/1474A/CC**

Proposed horizontal standard
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Functions concerned
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Title :

IEC/IEEE 80005-3:

Utility connections in port – Part 3: Low Voltage Shore Connection (LVSC) Systems – General requirements

Introductory note

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UTILITY CONNECTIONS IN PORT –

Part 3: Low Voltage Shore Connection (LVSC) Systems – General requirements

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International Standard IEC/IEEE 80005-3 has been prepared by IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units, in cooperation with IEC subcommittee 23H: Plugs, socket-outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC technical committee 23: Electrical accessories, ISO technical committee 8: Ships and marine technology, subcommittee 3: Piping and machinery, and IEEE IAS Petroleum and Chemical Industry Committee (PCIC) of the Industry Applications Society of the IEEE[1].

This publication is published as an IEC/IEEE prefix standard and IEC/ISO/IEEE triple logo standard.

A list of all the parts in the IEC 80005 series, published under the general title *Utility Connections In Port*, can be found on the IEC website.

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

FDIS	Report on voting
18/XXXX/FDIS	18/XXXX/RVD

Full information on the voting for the approvals of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by XX members out of YY having a cast vote.

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- withdrawn
- replaced by a revised edition, or
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INTRODUCTION

The following standard was developed jointly between IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units, ISO technical committee 8: Ships and marine technology, subcommittee 3: Piping and Machinery, and IEEE IAS PCIC Marine Industry subcommittee.

For a variety of reasons, including environmental considerations, it is becoming an increasingly common requirement for ships to shut down ship generators and to connect to shore power for as long as practicable during stays in port.

The intention of this standard is to define requirements that support, with the application of suitable operating practices, efficiency and safety of connections by compliant ships to compliant low-voltage shore power supplies through a compatible shore-to-ship connection.

With the support of sufficient planning, cooperation between ship and terminal facilities, and appropriate operating procedures and assessment, compliance with the requirements of this standard is intended to allow different ships to connect to low-voltage shore connection (LVSC) systems at different berths. This provides the benefits of standard, straightforward connection without the need for adaptation and adjustment at different locations that can satisfy the requirement to connect for as long as practicable during stays in port.

Ships that do not apply this standard may find it impossible to connect to compliant shore supplies.

Where deviations from the requirements and recommendations in this standard may be considered for certain designs, the potential effects on compatibility are highlighted.

Where the requirements and recommendations of this standard are complied with, low-voltage shore supplies arrangements are likely to be compatible for visiting ships for connection.

Clauses 1 to 12 are intended for application to all LVSC systems. They intend to address mainly the safety and effectiveness of LVSC systems with a minimum level of requirements that would standardise on one solution. This standard includes the requirement to complete a detailed compatibility assessment for each combination of ship and shore supply prior to a given ship arriving to connect to a given shore supply for the first time.

The other annexes in this standard are ship specific annexes that include additional requirements related to agreed standardisation of solutions to achieve compatibility for compliant ships at different compliant berths and to address safety issues that are considered to be particular to that ship type. These annexes use the same numbering as Clauses 1 to 12 with an annex letter prefix. Hence, the numbering is not necessarily continuous. Where no additional requirements are identified, the clause is not shown.

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UTILITY CONNECTIONS IN PORT –

Part 3: Low Voltage Shore Connection (LVSC) Systems – General requirements

1 Scope

This part of IEC/IEEE 80005 describes low voltage shore connection (LVSC) systems, on board the ship and on shore, to supply the ship with electrical power from shore.

This standard is applicable to the design, installation and testing of LVSC systems and addresses:

- LV shore distribution systems;
- shore-to-ship connection and interface equipment;
- transformers/reactors;
- semiconductor/rotating convertors;
- ship distribution systems; and
- protection, control, monitoring, interlocking and power management systems.

NOTE it does not apply to the electrical power supply during docking periods, e.g. dry docking and other out-of-service maintenance and repair.

Additional and/or alternative requirements may be imposed by national administrations or the authorities within whose jurisdiction the ship is intended to operate and/or by the owners or authorities responsible for a shore supply or distribution system.

It is expected that LVSC systems will have practicable applications for ships requiring up to 1 MVA while at berth. Low-voltage shore connection systems exceeding 250 A, equal or exceeding 400 V a.c. and up to 1000 V a.c. nominal voltage are covered by this standard. High-voltage shore connection systems are covered by Part 1 of this standard.

This standard does not cover marinas and boatyards, or systems intended to be operated by ordinary persons as defined by IEC 61439.

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 60034 (all parts), *Rotating electrical machines*

IEC 60076 (all parts), *Power transformers*

IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*

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

IEC 60092-201:1994, *Electrical installations in ships – Part 201: System design – General*

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IEC 60092-301:1995 Ed. 3.0, *Electrical installations in ships – Part 301: Equipment – Generators and motors*

IEC 60092-401: 1980, Ed. 3.0, Electrical installations in ships – Part 401: Installation and test of completed installation

IEC 60092-502:1999, Ed. 5.0, *Electrical installations in ships – Part 502: Tankers – Special features*

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

IEC 60146-1 (all parts), *Semiconductor convertors – General requirements and line commutated convertors*

IEC 60228:2004, *Conductors of insulated cables*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60309-1: *Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements*

IEC 60332-1-2: *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60947-2:2013 Ed. 4.2, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-5-1:2003 Ed. 3.0, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

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.*

International Convention for the Safety of Life at Sea (SOLAS):1974, *Consolidated edition 2009, Ch. II-1/D, Regulations 42, 43 and 45*

3 Terms and definitions

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

3.1
cable management system

all equipment designed to control, monitor and handle the flexible cables, for power and control, and their connection devices

3.2
plug and socket-outlet

a means enabling the connection of a flexible cable to fixed wiring. It consists of two parts:

NOTE For the use of plugs, socket-outlets, and ship couplers, see Figure 5 – Diagram showing the use of accessories.

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[SOURCE: IEC 60309-1:2012, 2.1]

3.2.1
socket-outlet

the part intended to be installed with the fixed wiring (shore side) or incorporated in equipment

NOTE A socket-outlet may also be incorporated in the output circuit of an isolating transformer.

[SOURCE: IEC 62613-1:2011, 3.2 modified as follows: the words in the bracket and Note to entry have been added]

3.2.2
plug

the part intended to be attached directly to one flexible cable, and to be connected to the shore socket-outlet

[SOURCE: IEC 62613-1:2011, 3.3 modified as follows: the words “and to be connected to the shore socket-outlet” have been added]

3.3
ship coupler

a means enabling the connection of a flexible cable to the ship. It consists of two parts:

[SOURCE: IEC 62613-1:2011, 3.4]

3.3.1
ship connector

the part intended to be attached to one flexible cable connected to the supply, and to be connected to the ship inlet

[SOURCE: IEC 62613-1:2011, 3.5 modified as follows: the words “and to be connected to the ship inlet” have been added]

3.3.2
ship inlet

the part incorporated in, or fixed to, the ship

[SOURCE: IEC 62613-1:2011, 3.6]

3.4
equipotential bonding
provision of electric connections between conductive parts, intended to achieve equipotentiality

[SOURCE: IEC 60050-195:1998, 195-01-10]

3.5
low voltage (abbreviation: LV)
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.

[SOURCE: IEC 60050-601, 601-01-26]

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3.6
person in charge
PIC
person responsible for LVSC system operation

3.7
pilot contact
a contact of the plug, ship inlet, socket-outlet and ship connector which signals correct connection and which is a safety-related component

3.8
receiving point
connection point of the flexible cable on the ship

3.9
safe
condition in which safety risks are minimized to an acceptable level

3.10
supply point
the connection point of the flexible cable on shore

3.11
fail safe
a design property of an item which prevents its failures from resulting in critical faults

[SOURCE: IEC 60050-195:1998, 191-15-04]

3.12
IT power system
ungrounded power system

3.13
safety relay
is a fail safe relay as defined by the standards:

[EN ISO 13849-1 and IEC/EN 62061]

3.14

physical connectors
electrical connectors between shore and ship are defined as in Annexes

4 General requirements

4.1 System description

A typical LVSC system described in this standard consists of hardware components as shown in Figure 1.

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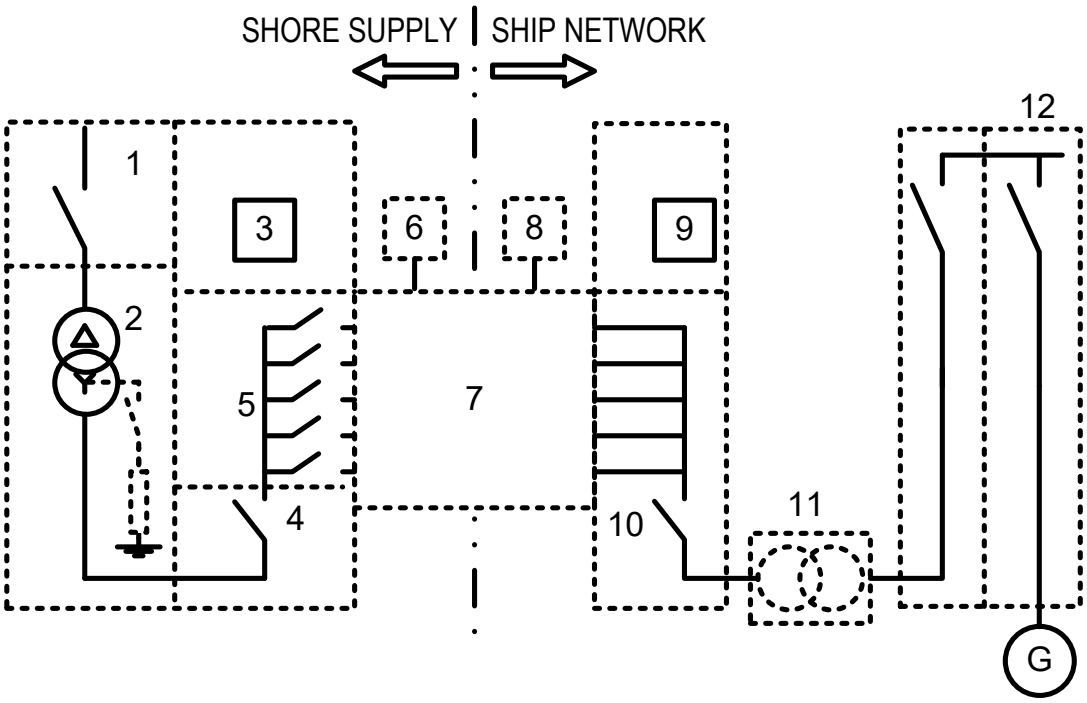

KEYS

1. SHORE SUPPLY SYSTEM
2. SHORE-SIDE TRANSFORMER AND NEUTRAL GROUNDING RESISTOR OR/AND IT POWER SYSTEM
3. SHORE-SIDE PROTECTION RELAYING NON INTEGRATED IN SHORE-SIDE CIRCUIT-BREAKER
4. SHORE-SIDE CIRCUIT-BREAKER
5. SHORE-SIDE FEEDERS CIRCUIT-BREAKERS
6. CONTROL SHORE
7. SHORE-TO-SHIP CONNECTION AND INTERFACE EQUIPMENT
8. CONTROL SHIP
9. SHIP PROTECTION RELAYING NON INTEGRATED IN ON-BOARD SHORE CONNECTION SWITCHBOARD
10. ON-BOARD SHORE CONNECTION SWITCHBOARD
11. ON – BOARD TRANSFORMER (WHERE APPLICABLE)
12. ON-BOARD RECEIVING SWITCHBOARD

Figure 1 – Block diagram of a typical LVSC system

4.2 Distribution system

4.2.1 General

Typical distribution systems requirements used on shore are given in IEC 60364. Typical ship distribution systems requirements are given in IEC 60092-101.

NOTE IEEE 45 provides additional information on typical ship distribution systems.

4.2.2 Equipotential bonding

An equipotential bonding between the ship's hull and shore earthing electrode shall be established by the earth contacts of the plug, socket-outlet, ship connector and ship inlet.

Equipotential bonding shall be periodically checked (see 11.2.2).

NOTE The terms earth(ing) and ground(ing) are used throughout this standard and have the same meaning. See IEC 60050-195:1998.

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