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# INTERNATIONAL STANDARD

**Utility connections in port -**
**Part 3: Low-voltage shore connection (LVSC) systems - General requirements**

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# Utility connections in port - Part 3: Low-voltage shore connection (LVSC) systems - General requirements

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IEC/IEEE 80005-3 was 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;
– IEEE IAS Petroleum and Chemical Industry Committee (PCIC) of the IEEE Industry Applications Society.

This document is published as a triple logo (IEC, ISO and IEEE) standard.

This first edition cancels and replaces IEC PAS 80005-3:2014. This edition constitutes a technical revision.

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

| Draft | Report on voting |
|---|---|
| 18/1970/FDIS | 18/1993A/RVD |

Full information on the voting for its approval can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 8 members out of 8 having a cast vote.

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

This document was drafted in accordance with the rules given in the ISO/IEC Directives, Part 2, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications/.

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 IEC Technical Committee and IEEE Technical Committee have decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

# INTRODUCTION

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 document 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 document 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 document can find it impossible to connect to compliant shore supplies.

In relation to the 1 MVA upper scope limitation of this document, ship types that fall under the annexes of IEC/IEEE 80005-1 and require less than 1 MVA when connected to shore power can be designed in accordance with IEC/IEEE 80005-1 with a high-voltage shore connection to ensure interoperability.

Where deviations from the requirements and recommendations in this document are considered for certain designs, it is important to highlight the potential effects on compatibility.

Where the requirements and recommendations of this document 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 standardize on one solution.

This document includes the requirements to complete a detailed compatibility assessment for ship and shore supply prior to a ship arriving to connect to a shore supply for the first time.

Annex A includes cabling recommendations that can be used in LVSC systems and contains performance-based requirements for shore connection cables. Annex A was developed by technical experts from several countries. IEC technical committee 18, subcommittee 18A and IEC technical committee 20 were consulted regarding the cable requirements.

Annex B describes ship to shore cable management and connector to be used in LVSC systems.

## 1 Scope

This document specifies provisions for the design, installation and testing of low-voltage shore connection (LVSC) systems, onboard ships and on shore, to supply the ship with electrical power from shore.

This document is applicable to:

– ships requiring up to 1 MVA while at berth;
– three-phase shore connection systems rated 250 A and above, and with a nominal voltage rating of 400 V AC to 1 000 V AC;
– shore-side connection systems;
– shore-to-ship connection and interface equipment;
– transformers and reactors;
– semiconductor and rotating frequency convertors;
– ship-side connection systems;
– protection, control, monitoring, interlocking and power management systems.

This document does not apply to:

– inland navigation vessels;
– high-voltage shore connection systems, including ships built in accordance with the annexes of IEC/IEEE 80005-1;
– the electrical power supply during docking periods, for example dry docking and other out-of-service maintenance and repair;
– systems to be operated by ordinary persons as defined in 3.19.

NOTE 1 Other standards are available specifically for inland navigation vessels in Europe.

NOTE 2 IEC 60092-507 is applicable to small vessels.

NOTE 3 Additional or alternative requirements can be imposed by national administrations or the authorities within whose jurisdiction the ship is intended to operate and by the owners or authorities responsible for a shore power supply or distribution system.

NOTE 4 High-voltage shore connection systems are covered by IEC/IEEE 80005-1.

NOTE 5 Some existing 380 V AC ship systems can be supplied by 400 V AC.

## 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 60034 (all parts), *Rotating electrical machines*

IEC 60079 (all parts), *Explosive atmospheres*

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

IEC 60092-201:2019, *Electrical installations in ships - Part 201: System design - General*

IEC 60092-301, *Electrical installations in ships - Part 301: Equipment - Generators and motors*

IEC 60092-302-2, *Electrical installations in ships - Part 302-2: Low voltage switchgear and controlgear assemblies - Marine power*

IEC 60092-352, *Electrical installations in ships - Part 352: Choice and installation of electrical cables*

IEC 60092-401, *Electrical installations in ships - Part 401: Installation and test of completed installation*

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

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

IEC 60309-1, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 1: General requirements*

IEC 60309-5:2017, *Plugs, socket-outlets and couplers for industrial purposes - Part 5: Dimensional compatibility and interchangeability requirements for plugs, socket-outlets, ship connectors and ship inlets for low-voltage shore connection systems (LVSC)*

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 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-6*, Low-voltage electrical installations - Part 6: Verification*

IEC 60909 (all parts), *Short-circuit currents in three-phase AC systems*

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

IEC 60947-5-1, *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.*

IEC 62477-1, *Safety requirements for power electronic converter systems and equipment - Part 1: General*

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