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Part 1: High Voltage Shore Connection (HVSC) Systems – General requirements

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UTILITY CONNECTIONS IN PORT –

Part 1: High Voltage Shore Connection (HVSC) Systems – General requirements

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International Standard IEC/ISO/IEEE 80005-1 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: Industrial plugs and socket-outlets, 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/ISO/IEEE triple logo and prefix standard.

This document cancels and replaces IEC/PAS 60092-510 published in 2009.

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
18/1254/FDIS	18/1268/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 9 members out of 9 having a cast vote.

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The IEC Technical Committee, the ISO Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC, ISO and IEEE web site in the data related to the specific publication. At this date, the publication will be

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- withdrawn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

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1 A list of IEEE participants can be found at the following URL: http://standards.ieee.org/downloads/80005-1/80005-1-2012/80005-1-2012_wg-participants.pdf

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 scenario of receiving electrical power and other utilities from shore is historically known as “cold ironing”.

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 high-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 high-voltage shore connections (HVSC) 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, high-voltage shore supplies arrangements are likely to be compatible for visiting ships for connection.

Clauses 1 to 12 are intended for application to all HVSC systems. They intend to address mainly the safety and effectiveness of HVSC 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

Annex A includes cabling recommendations that should be used in HVSC systems.

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.

It should be noted that Annex A is considered informative for the purposes of this document. This annex contains performance-based requirements for shore connection cable, and was developed by technical experts from a number of countries. IEC technical committee 18, subcommittee 18A and IEC technical committee 20 were consulted regarding cable requirements. It was determined that existing standards for cable can be used at this time and there is presently no need to develop a separate standard for shore connection cables.

UTILITY CONNECTIONS IN PORT –

Part 1: High Voltage Shore Connection (HVSC) Systems – General requirements

1 Scope

This part of IEC 80005 describes high voltage shore connection (HVSC) 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 HVSC systems and addresses:

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

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 HVSC systems will have practicable applications for ships requiring 1 MW or more or ships with HV main supply.

Low-voltage shore connection systems are not covered by this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

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

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

IEC 60092-503:2007, *Electrical installations in ships – Part 503: Special features – AC supply systems with voltages in the range of above 1 kV up to and including 15 kV*

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 60204-11:2000, *Safety of machinery – Electrical equipment of machines – Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV*

IEC 60332-1-2:2004, *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 60502-2:2005, *Power cables with extruded insulation and their accessories for rated voltages from 1kV(U_m=7,2 kV) up to 30 kV(U_m=36 kV) – Part 2: Cables for rated voltages from 6 kV(U_m=7,2 kV) up to 30 kV(U_m=36 kV)*

IEC 60502-4:2005, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) up to 30 kV (U_m = 36 kV) – Part 4: Test requirements on accessories for cables with rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)*

IEC 60947-5-1:2003, *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 61936-1:2002, *Power installations exceeding 1 kV a.c. – Part 1: Common rules*

IEC 62271-200:2003, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62613-1:2011, *Plugs, socket-outlets and ship couplers for high-voltage shore connection systems (HVSC systems) – Part 1: General Requirements*

IEC 62613-2:2011, *Plugs, socket-outlets and ship couplers for high-voltage shore connection systems (HVSC-systems) – Part 2: Dimensional compatibility and interchangeability requirements for accessories to be used by various types of ships*

SOLAS 2009, Chapter II-1/D, Regulations 42, 43 and 45

MIL-DTL-38999K, *General specification for connectors, electrical, circular, miniature, high density, quick disconnect (bayonet, threaded, and breech coupling), environment resistant, removable crimp and hermetic solder contacts*

MIL-STD-1560A, *Interface standard: Insert arrangements for MIL-C-38999 and MIL-C-27599 electrical, circular connectors*

MIL-PRF-29504/5C, *Performance specification sheet. Termini, fiber optic, connector, removable, environment resisting, socket terminus, size 16, rear release, MIL-DTL-38999, SERIES III*