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PRE-STANDARD

Electrical installations in ships –
Part 510: Special features – High-voltage shore connection systems

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CONTENTS

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FOREWORD

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A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public.

IEC-PAS 60092-510 has been processed by subcommittee IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This PAS has been prepared in cooperation with ISO technical committee 8: Ships and marine technology, Subcommittee 3: Piping and machinery.

It is published as a double logo PAS.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document
Draft PAS	**Report on voting**
18/1094/PAS	18/1103/RVD

In ISO, the PAS was approved by 7 P members of 8 having cast a vote.

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

INTRODUCTION

This PAS was ultimately developed jointly between IEC TC18 MT 26/PT 60092-510 and the technical committee of ISO TC8, Ships and Marine Technology Subcommittee SC 3, Piping and Machinery, WG11.

IEC 60092 forms a series of International Standards for electrical installations in sea-going ships, incorporating good practice and co-ordinating, as far as possible, existing rules.

These standards form a code of practical interpretation and amplification of the requirements of the International Convention for the Safety of Life at Sea, a guide for future regulations which may be prepared and a statement of practice for use by shipowners, shipbuilders and appropriate organizations.

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 PAS is to define requirements that support, with the application of suitable operating practices, compliant ships to connect quickly to compliant high-voltage shore power supplies through a compatible shore to ship connection.

With the support of sufficient planning and appropriate operating procedures and assessment, compliance with the requirements of this PAS is intended to allow different ships to connect to high-voltage shore connections 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 PAS may find it impossible to connect to compliant shore supplies.

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

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

Low-voltage shore connection is covered by IEC 60092-201, Clause 14 and IEC 60092-507.

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 510: Special features – High-voltage shore connection systems

1 Scope

This PAS describes high-voltage shore connection (HVSC)-Systems, on board the ship and on shore, to supply the ship with electrical power from shore during the port lay period.

This PAS is applicable to the specification, installation and testing of HVSC- Systems and plants and addresses:

- high-voltage shore distribution system,
- shore-to-ship connection,
- transformers/reactors,
- semiconductor convertors and rotating convertors,
- ship distribution system, and
- control, monitoring, interlocking and power management system.

This PAS does not apply to the electrical power supply during docking periods and shall not apply to HVSC-Systems that existed before the validity date of this PAS.

NOTE 1 Additional requirements and/or restrictions may be imposed by the National Administration or 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.

NOTE 2 It is expected that HVSC-Systems will have practicable applications for ships requiring 1 MW or more or ships with high voltage main supply.

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), *Explosive atmospheres*

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

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

IEC 60092-301:1980, *Electrical installations in ships – Part 301: Equipment – Generators and motors*

IEC 60092-303, *Electrical installations in ships – Part 303: Equipment – Transformers for power and lighting*

IEC 60092-350:2008, *Electrical installations in ships – Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications*

IEC 60092-351:2004, *Electrical installations in ships – Part 351: Insulating materials for shipboard and offshore units, power, control, instrumentation, telecommunication and data cables*

IEC 60092-352:2005, *Electrical installations in ships – Part 352: Choice and installation of electrical cables*

IEC 60092-354:2003, *Electrical installations in ships – Part 354: Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)*

IEC 60092-376:2003, *Electrical installations in ships – Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)*

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, *Electrical installations in ships – Part 504: Special features – Control and instrumentation*

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

IEC 60228:2004, *Conductors of insulated cables*

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

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 60502-4:2005, *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 60529, *Degrees of protection provided by enclosures (IP-Code)*

IEC 60664-1 Ed. 2.0, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60721-3-6:1987, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities –Ship environment*

IEC/TR 60721-4-6:2001, *Classification of environmental conditions – Part 4-6: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 – Ship environment*
Amendment 1(2003)

IEC 60793-2:2007, *Optical fibres – Part 2: Product specifications – General*

IEC 60811 (all parts)*, Common test methods for insulating and sheathing materials of electric cables and optical cables*

IEC 60811-1-4, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section four: Test at low temperature*

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

IEC 61241 (all parts), *Electrical apparatus for use in the presence of combustible dust*

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 61378-1:1997, *Convertor transformers – Part 1: Transformers for industrial applications*

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

IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

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*

ISO 4649, *Rubber, vulcanized or thermoplastic – Determination of abrasion resistance using a rotating cylindrical drum device*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

DIN VDE 0472 Part 512, *Widerstand zwischen Schutzleiter und Leitschicht*

MIL-DTL 38999K, *General Specification for connectors, electrical, circular, miniature, high density, quick disconnect (bayonet, threaded, and breech coupling), environmental 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, environmental resisting, socket terminus, size 16, rear release, MIL-DTL-38999, SERIES III*