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Ships and marine technology — Installation and operational requirements for swappable batteries on ships

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

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Ships and marine technology — Installation and operational requirements for swappable batteries on ships

1 Scope

This document specifies the installation and operational requirements for the utilization of swappable batteries aboard ships.

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.

ISO 668, *Series 1 freight containers — Classification, dimensions and ratings*

ISO 9367-2, *Lashing and securing arrangements on road vehicles for sea transportation on Ro/Ro ships — General requirements — Part 2: Semi-trailers*

ISO 10055, *Mechanical vibration — Vibration testing requirements for shipboard equipment and machinery components*

ISO 15371, *Ships and marine technology — Fire-extinguishing systems for protection of galley cooking equipment*

ISO 17631, *Ships and marine technology — Shipboard plans for fire control, damage control, life-saving appliances and means of escape*

ISO 17905, *Ships and marine technology — Installation, inspection and maintenance of container securing devices for ships*

IEC 60068-2-27, *Environmental testing — Part 2— 27: Tests — Test Ea and guidance: Shock*

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

IEC 60529:1989/AMD1:1999+AMD2:2013 CSV, *Degrees of protection provided by enclosures (IP Code)*

IEC 61851-1, *Electric vehicle conductive charging system — Part 1: General requirements*

IEC 62619:2022, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for secondary lithium cells and batteries, for use in industrial applications*

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:

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

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

3.1
rechargeable battery
battery designed for repeated charge and discharge cycles and subsequently delivered as electrical power to drive an electric propulsion system

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3.2
swappable battery
rechargeable battery (3.1) system designed to be swapped on a ship to provide electrical power, typically housed within a container

3.3
lashing
device made of wire, rope, sling, or similar material used to secure an object

4 Requirements

4.1 General requirements

The following general safety requirements apply.

— The swappable batteries shall have emergency disconnect switch.

— The swappable batteries shall be protected from vibration and shocks.

— The passengers and crew members shall be protected from the swappable batteries, such as electric shock.

Swappable batteries shall be monitored when connected to an electric power supply in order to avoid abnormal situations.

Abnormal information concerning swappable batteries shall be uploaded to the supervisory and control system in real time. If an abnormality occurs, then action can be taken to avoid hazardous conditions.

Inspection and maintenance of the swappable batteries shall be performed in accordance with the battery manufacturer's instructions.

4.2 Installation

Swappable batteries loaded onto vessels shall be storable in containers compliant with ISO 668. In such cases, the weight of the loaded batteries shall not exceed the maximum gross mass specified for the container type.

When swappable batteries are transported and used onboard a vessel while mounted on a semi-trailer, the semi-trailer shall be turned off during battery use and securely lashed to the vessel.

The ship using the swappable batteries shall be equipped with standardized electrical and mechanical interfaces compliant with IEC 61851-1 to ensure safe connection and convenient swapping of batteries. Equivalent standards may also be applied.

4.3 Operation

4.3.1 Vibration and mechanical shock

Swappable batteries shall meet the safety performance requirements under mechanical loads caused by vibration and mechanical shock, as specified in 5.3.1.

4.3.2 Immersion into water

Swappable batteries, including all connectors, air ducts, and cooling interfaces, shall meet the safety performance requirements as specified in 5.3.2 when exposed to water due to immersion. They shall provide at least IPX5 protection against water ingress in accordance with IEC 60529, or shall be housed within a container that ensures equivalent watertightness.

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