

EU RO Mutual Recognition Technical Requirements

BATTERY CHARGERS	Version	0.4
	Adoption Date	1 January 2023
	Application Date	1 July 2023
	Tier	3
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1. PRODUCT DESCRIPTION

1.a General description of the product

- a) A battery charger is a device used to put energy into a secondary cell or rechargeable battery by forcing an electric current through it;
- b) Charger equipment shall be suitable for the type of storage batteries, the required charging characteristic, and the selected connection.

Note 1: Consideration is to be given to the temperature variation of the batteries.

1.b Application limitations[†]

- a) Restricted to Battery Chargers according to IEC 60947-1 and IEC 60255 installed onboard ships with exceptions as per SOLAS Ch. I Reg.3;
- b) Installation on board ships within locations with climatic, biological, chemically active, mechanically active and mechanical environmental conditions not exceeding those for which performance has been proved according to IEC 60721-3-6 (1987) + A2 (1997);
- c) This technical requirement is not applicable for chargers with a charging power above 2 kW and used for essential services ¹;

¹ Definition of essential services as per IACS UI SC134.

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- d) This technical requirement is not applicable for battery chargers for use in propulsion and navigation and radio communication equipment and systems;
- e) Battery chargers for Li-ion and Ni-OH batteries etc. shall be excluded from the covered items.

† The EU MR type approved product is generally not used as a stand-alone product, but integrated as component in a sub-system or system. When a product is presented with an EU RO MR Type Approval Certificate for given application, its acceptability with regards to conditions defined in 1b, 1c and 1d of this Technical Requirement will be evaluated by the EU RO in charge of classing the ship or being in charge of the unit/system certification.

1.c Intended use

- a) Power supply system characteristics as per IEC 60092-101;
- b) Environment category 6K4, 6B2, 6C2, 6S2 and 6M3 according to conditions specified in IEC 60947-1 Annex Q.

1.d System context

See 1.c above.

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

- a) In the absence of indications regarding its operation, the battery charger shall be such that the fully discharged battery can be recharged to 100% capacity (e.g. output voltage) within a period of 10hours, without exceeding the maximum permissible charging current;
- b) Battery charger units shall be constructed in accordance with IEC 62040 Series or equivalent;

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- c) A charging rate other than (a) above (e.g. fully charged within 6 hours for batteries for starting of motors) is required in relation to the use of the battery;
- d) For floating service or for any other conditions, where the load is connected to the battery while it is on charge, the maximum battery voltage shall not exceed the safe value of any connected apparatus. A voltage regulator with dropper or other means of voltage control shall be provided for this purpose;
- e) The battery charger shall be designed so that the charging current is set within the maximum current permitted by the manufacturer when the battery is discharged and the floating current to keep the battery fully charged;
- f) Trickle charging to neutralize internal losses shall be provided. An indication is to be provided to indicate a charging voltage being present at the charging unit;
- g) Battery charging facilities by means of D.C. generator and series resistor shall be provided with protection against reversal of current when the charging voltage is 20 % of the line voltage or higher. This applies even if the battery is inserted with the wrong polarity;
- h) Battery chargers shall be constructed to simplify maintenance operation. Indications are to be provided to visualize the proper operation of the charger and for troubleshooting purposes;
- i) If consumers are simultaneously supplied during charging, the maximum charging voltage shall not exceed the rated voltage described in Type testing requirements 2.b. d) below;
- j) The power demand of the consumers shall be considered for the selection of the chargers;
- k) Battery chargers shall be provided with reverse current protection;
- l) Monitoring and audible/visual alarm features shall be provided for the following (in a manned location):
 - power supply failure (V and f) to the connected load;
 - earth fault;
 - operation of battery protective device;
 - bypass operation (in UPS units).

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2.a.ii. Technical documents to be submitted

- a) Type test reports, product descriptions, operation manuals, assembly drawings, dimension drawings, etc.:
- b) Following charger's characteristics are needed to be submitted.
 - Recharging time until the battery is ready for next discharge;
 - Recharging current;
 - Float voltage and current, e.g. under normal load conditions;
 - Accuracy of D.C. voltage control and stability under variation of 0 ~100% of nominal current and A.C. input full range variation;
 - D.C. output voltage regulation between 0~100% of full load output;
 - A.C. input voltage range;
 - D.C. ripple of current and voltage;
 - harmonics, e.g. line, and through the battery.
- c) Prior to tests:
 - Proposed test program and test schedule;
 - Description of test specimens and explanation of the selected test sample(s) providing evidence that the selected sample meets the most rigorous and demanding requirements;
 - Product descriptions, manuals, data sheets, assembly drawings, dimension drawings, etc. clearly identifying the product;
 - Complete accreditation certificate of the Test laboratory;
 - Details of production sites;
 - Product specification;
 - Application, working area;
 - Instructions on fitting, assembly and operation;
 - QM-certificate according to ISO 9001 or equivalent by an accredited certifying body.

On completion of tests, a report shall be issued, identified by number and date, which accurately, clearly and unambiguously presents the test results and all other relevant information.
- d) Test report(s) shall include the following information:
 - Type of product, with type number / serial number(s) and quantity tested;

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- Test specification for the product identified by number, revision and date;
- Details of test equipment and measuring instruments stating serial numbers and calibration certificates;
- Names of the test engineer and the engineer approving the report;
- Ambient environmental conditions during the test;
- The test results with a description of any failures encountered;
- Conclusion.

Test report(s) shall be signed by the test personnel and verified by the EU RO or the agreed independent representative witnessing the tests.

2.b Type testing requirements

The following tests specified in IACS UR E10, IEC 60529 or IEC60947-1 shall be performed in the presence of an EU RO surveyor. In cases where the tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO's surveyor may be omitted†. Test specimens shall be taken from the production line or from stocks†:

- a) Visual Inspection (IACS UR E 10);
- b) Performance test (current and voltage regulation, quick, slow, floating charge, alarms and ventilation rate) (IACS UR E10);
- c) Temperature rise measurement;
- d) Electrical Power supply variation test (IACS UR E10);
- e) Dry heat (IACS UR E10);
- f) Damp heat (IACS UR E10);
- g) Vibration (IACS UR E10);
- h) Insulation resistance (dielectric strength test and insulation resistance measurement) (IACS UR E10);
- i) High voltage (IACS UR E10);
- j) Cold (IACS UR E10);
- k) Electrostatic discharge immunity (IACS UR E10);
- l) Radiated radio frequency immunity (IACS UR E10);
- m) Conducted low frequency immunity (IACS UR E10);
- n) Conducted high frequency immunity (IACS UR E10);
- o) Burst/Fast transient immunity (IACS UR E10);

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- p) Surge immunity (IACS UR E10);
- q) IP test (IEC60529);
- r) Shock test (IEC 60947-1).

† For further clarification of witnessing of tests and sampling the test specimen(s), refer to paragraphs 6, 7 and 8 of the EU RO "Design Evaluation Scheme" procedure (Appendix V of EU RO Framework Document for the Mutual Recognition of Type Approval found on <https://www.euomr.org/technical-requirements>).

2.c Type testing requirement for certificate renewal

The manufacturer is to notify the RO of any modification or changes to the manufacturing specifications that may affect the MR TA to be renewed.

3. PRODUCTION REQUIREMENTS

Refer to EU RO "Product Quality Assurance (PQA)" procedure (Appendix VI of EU RO Framework Document for the Mutual Recognition of Type Approval).

4. MARKING REQUIREMENTS

Manufacturers of the approved equipment are, in principle, to mark the product before shipment for identification of approved equipment as per referenced standard. In addition, and as a minimum, the following items to be marked at the suitable place:

- a) Manufacturer's name or equivalent;
- b) Type designation under which the product is type approved;
- c) Rated Voltage;
- d) Rated current;
- e) Rated frequency;
- f) Operating temperature range;
- g) Charge voltage 'absorption' (VDC);
- h) Charge voltage 'float' (VDC);
- i) Battery capacity;
- j) Humidity;
- k) IP class.

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5. TYPE APPROVAL CERTIFICATE CONTENT

The EU RO MR Type Approval Certificate shall contain the minimum information as defined in the “EU RO Framework Document for the Mutual Recognition of Type Approval” - see Appendix I EU RO MR Type Approval Certificate Information.

The following information is specifically applicable to products relevant to this technical requirement and shall be included on the EU RO MR Type Approval Certificate:

- a) Input voltage;
- b) Frequency;
- c) Maximum input current;
- d) Recommended battery capacity [Ah];
- e) Boost charge voltage;
- f) Float charge voltage;
- g) Output voltage range;
- h) Maximum output current;
- i) IP grade;
- j) List of approval documents.

6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
31 January 2014	0.0	Approved by the Advisory Board
31 January 2015	0.1	CRF018 – Revision to par. 2.a.ii - Technical documents to be submitted in English; CRF020 – Revision to par. 5 - ‘Type Approval Certificate Content’
1 April 2016	0.2	CRF025 – Updated to new MR TR document format incl. par. 8; CRF026/026a – Witness testing & control of test specimen; CRF028 – addition of 6-month application clause.
1 July 2018	0.3	CRF032 - Corrected reference to standard IEC 60721-3-6 (1987) + A2 (1997)
1 January 2023	0.4	Added para. 2.c Added para. 9 Copyright (ref. 21030_)

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7. BACKGROUND INFORMATION / REFERENCES

- a) IACS UR E10 “Test Specification for Type Approval”;
- b) IEC60529 “Degrees of protection provided by enclosures (IP Code)”;
- c) IEC61000-3-2 “Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)”;
- d) IEC61000-3-3 “Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection”;
- e) IEC60721-3-6 “Classification of environmental conditions. Part 3: Classification of groups of environmental parameters and their severities. Ship environment”;
- f) IEC60947-1 “Low-voltage switchgear and control-gear - Part 1: General rules”
- g) IEC60092-101 “Electrical installations in ships - Part 101: Definitions and general requirements”;
- h) IEC62040-1 “Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS”;
- i) IEC62040-2 “Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements”;
- j) IEC62040-3 “Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements”;
- k) IEC62040-4 “Uninterruptible power systems (UPS) - Part 4: Environmental aspects - Requirements and reporting”;
- l) EN 45510-2-3 “Guide for procurement of power station equipment - Part 2-3: Electrical equipment - Stationary batteries and chargers”;
- m) EU RO Framework Document for the Mutual Recognition of Type Approval.

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8. MAINTENANCE / CLARIFICATION OF TECHNICAL REQUIREMENTS

Anyone wishing to propose changes to this document or request clarification of technical issues should contact the EU RO MR Group Secretariat in the first instance: Secretariat@euomr.org.

Review and approval of change requests shall follow the EU RO MR Maintenance Process detailed in the EU RO Framework Document for the Mutual Recognition of Type Approval: <https://www.euomr.org/technical-requirements>.

9. LEGAL PROVISIONS / COPYRIGHT

- a) Underlying legal provisions in accordance with EU RO Framework Document for the Mutual Recognition of Type Approval;
- b) Copyright © 2022. All EU RO MR Group rights reserved.
For a list of EU RO MR Group members please see <https://www.euomr.org/about-us>.

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