

EU RO Mutual Recognition Technical Requirements

POWER SUPPLY UNITS (<5kVA)	Version	0.0
	Adoption Date:	01 January 2022
	Application Date:	01 July 2022
	Tier	9
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1. PRODUCT DESCRIPTION

1.a General description of the product

A power supply unit (PSU) converts mains AC or DC power for supplying, for instance, process control, automation, instrumentation or communication systems. Conversion may be AC/DC, AC/AC, DC/AC or DC/DC using switched-mode power supplies.

1.b Application limitations[†]

- a) Restricted to standalone Power Supply Units.
- b) This technical requirement is not applicable to Uninterruptible Power Supply (UPS) and battery chargers.
- c) This technical requirement is not applicable to Power Supply Units of a power above or equal to 5 kVA;
- d) 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;
- e) Suitable for installation in weather exposed areas when type tested in accordance with 2.b. v).

[†]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

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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) The Power Supply Unit is designed for installation in an enclosure, as cabinet, box or console, and is intended for use in process control, monitoring and measurement equipment.
- b) Power supply system characteristics as per IEC 60092-101;
- c) Environment category 6K6, 6B2, 6C2, 6S2 and 6M2 according to conditions specified in IEC 60721-3-6 Tables I to V.

1.d System context

Application of the control, monitoring, alarm and safety systems are subject for approval of the individual EU RO classing the vessel.

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

- a) Output of PSU is to be protected against overload, no-load and short-circuits;
- b) PSU shall include a limitation of input Inrush current after turn on input voltage. This limitation of input inrush current shall be documented;
- c) PSU shall be suitable for operations up to 55°C, regardless of location;
- d) For units including forced cooling, internal temperature is to be monitored, generating a signal for an external visual and audible alarm when maximal permissible temperature inside equipment is exceeded.
- e) All electrical equipment shall be constructed and installed so as not to cause injury when handled and touched in a normal manner;
- f) Insulating materials and insulated windings shall be resistant to moisture, sea air and oil vapours;
- g) Bolts, nuts, pins, screws, terminals, studs, springs and such other small parts shall be made of corrosion resistant material or to be suitably protected against corrosion.

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- h) For products where the function of the product is based on software, the quality management system of the manufacturer has to maintain procedures for the life cycle activities and the version control.

2.a.ii. Technical documents to be submitted

IMPORTANT: The English Language shall be used for all submitted documents.

- a) As a minimum, but not limited to, the following documents must be submitted:
- Type test reports,
 - product descriptions,
 - operation manuals,
 - assembly drawings,
 - Circuit diagrams
 - dimension drawings,
 - part list
- b) Following Power supply Unit's characteristics are to be submitted.
- Rated voltage and current;
 - Accuracy of Output voltage control and stability under variation of 0 ~100% of nominal current and AC input full range variation;
 - AC or DC output voltage regulation between 0~100% of full load output;
 - AC or DC input voltage range;
 - DC ripple of current and voltage;
 - harmonics
 - Index of protection
 - Limitation of input inrush current
- c) Prior to tests:
- Proposed test program and test schedule including acceptance criteria (e.g. tolerance range to be clearly defined)
 - 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;
 - Complete accreditation certificate of the Test laboratory;
 - Details of production sites;
 - Product specification;
 - Application, working area;
 - Instructions on fitting, assembly and operation;

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– 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;
 - 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.

2.b Type testing requirements

The following tests specified in IACS UR E10, IEC 60529 and IEC 60068-2-27 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 in accordance with manufacturer's specification (e.g. current and voltage regulation, alarms and ventilation rate if relevant) (IACS UR E10);
- c) Temperature rise measurement (IEC 62477-1, §5.2.3.10)
- d) Electrical power supply variation test (IACS UR E10);
- e) External power supply failure test according to IACS UR E10;
- f) Dry heat (IACS UR E10), in accordance with IEC 60068-2-2 - Test Be for heat dissipating equipment and as per IACS UR E10 Note 1;
- g) Damp heat (IACS UR E10);
- h) Vibration (IACS UR E10);
- i) Insulation resistance (dielectric strength test and insulation resistance measurement) (IACS UR E10);
- j) High voltage (IACS UR E10);
- k) Cold (IACS UR E10) with test duration 16 hours;
- l) Electrostatic discharge immunity (IACS UR E10);

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- m) Electromagnetic field immunity (IACS UR E10);
- n) Conducted low frequency immunity (IACS UR E10);
- o) Conducted radio frequency immunity (IACS UR E10);
- p) Burst/Fast transient immunity (IACS UR E10);
- q) Surge immunity (IACS UR E10);
- r) Radiated emissions test according to IACS UR E10;
- s) Conducted emission test according to IACS UR E10.
- t) IP test (IEC 60529);
- u) flame retardant test (IACS UR E10) for products of non-metallic enclosure
- v) Salt mist test (IACS UR E10).

The version of each type of installed software at the time of testing is to be identified.

* 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

- a) 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.
- b) If the specified standard(s) is(are) amended or revised, the product is to be re-approved prior to it being supplied to vessels to which the amended standards apply.
- c) The Software history to be provided for review.

3. PRODUCTION REQUIREMENTS

- a) Refer to EU RO "Product Quality Assurance (PQA)" procedure (Appendix VI of EU RO Framework Document for the Mutual Recognition of Type Approval) found on <https://www.euomr.org/technical-requirements>

Changes to the embedded software (firmware/ system software), if software changes of relevance will void the EU RO certification. The EU RO shall be kept informed of all new version numbers including a description and impacts of

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change.

4. MARKING REQUIREMENTS

Manufacturers of the approved equipment are, in principle, to mark the product before shipment for identification of approved equipment and, in addition, at least the following items to be marked at the suitable place:

- a) Certificate Heading;
- b) Type designation under which the product is type approved;
- c) Rated Voltage;
- d) Rated current;
- e) Rated frequency;
- f) Operating temperature range;
- g) Humidity;
- h) IP Code;
- i) Date of manufacture.

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) Reference to approved technical documents;
- b) Reference to testing standards and relevant test reports;
- c) Environmental conditions;
- d) Application and limitations.
- e) Input voltage;
- f) Frequency;
- g) Maximum input current;
- h) Output voltage range;
- i) Maximum output current;
- j) IP Code grade.

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6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
2021-07-01	0.0	Approved by EU RO MR Steering Committee

7. BACKGROUND INFORMATION / REFERENCES

- a) EU RO Framework Document for the Mutual Recognition of Type Approval;
- b) IACS UR E10 "Test Specification for Type Approval";
- c) IEC 60529 "Degrees of protection provided by enclosures (IP Code)";
- d) IEC 61000-3-2 "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)";
- e) IEC 61000-3-3 "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";
- f) IEC 60721-3-6 "Classification of environmental conditions. Part 3: Classification of groups of environmental parameters and their severities. Ship environment";
- g) IEC 60092-101 "Electrical installations in ships - Part 101: Definitions and general requirements";
- h) IEC 60092-504 "Electrical installations in ships - Part 504 : Automation, control and instrumentation";
- i) IEC 61204 "Low-voltage power supply devices, d.c. output - Performance characteristics and safety requirements
- j) IEC 60950-1 Information Technology Equipment - Safety - Part 1: General requirements
- k) IEC 62477-1 Safety requirements for power electronic converter systems and equipment -Part 1: General

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.

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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>

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