

EU RO Mutual Recognition Technical Requirements

ACCUMULATOR BATTERY	Version	0.3
	Adoption Date	1 April 2016
	Application Date	1 October 2016
	Tier	2
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1. PRODUCT DESCRIPTION

1.a General description of the product

- a) Accumulator battery also known as storage battery is secondary battery designed to be electrically rechargeable. Lead acid battery is a type of accumulator battery widely used on board as main or emergency power source for automatic system and equipment, communication, lighting appliance etc. and for engine starting. The lead acid battery can be subdivided into two types-**vented type** and **valve regulated type**:

- **Vented (flooded) battery**: a vented battery is a secondary battery having a cover provided with one or more openings through which gaseous products may escape;
- **Valve-regulated (with gas recombination) battery**: a valve-regulated battery is a secondary battery that is closed under normal conditions and has an arrangement that allows the escape of gas if the internal pressure exceeds a predetermined value. The battery cannot normally receive an addition of water or electrolyte. In this type of battery, the electrolyte is immobilised

1.b Application limitations

- a) These technical requirements only apply to permanently installed lead acid accumulator batteries of the vented and valve- regulated type;
- b) These technical requirements do not apply to batteries for propulsion purpose and to batteries used in explosion-proof appliances.

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1.c Intended use

- a) Starter batteries - engine starting;
- a) Stationary lead-acid batteries;
- b) Battery powered system for automatic and alarm system and equipment, e.g. control and alarm, communication, and lighting systems;
- c) Uninterrupted Power Supply (UPS)

Note:

Although starter and stationary batteries require different characteristics, some products can meet the technical requirements of both categories.

End of Note

1.d System context

Selection, application and installation of the accumulator battery is subject to approval by the EU RO responsible for the classification of the vessel.

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

Environmental conditions

- a) The environmental conditions given in **Table 2.1**, **Table 2.2** and **Table 2.3** in Appendix 1 shall be applied, unless otherwise specified;
- b) Accumulator battery shall be suitable for operations at a temperature range 0°C to 45°C. When designed to work at other temperature ranges, due consideration should be given by the individual EU RO;
- c) Accumulator battery shall be designed to be sufficiently robust as to withstand the inclinations and vibrations as specified in **Table 2.2** and **Table 2.3** in Appendix 1;

Construction, Materials and Installations

- d) All pole plates shall be of a rigid construction, and shall be so designed to keep the shedding of active material to a minimum. The cells shall be so constructed as to prevent spilling of electrolyte due to an inclination of 40° from the normal, and

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to prevent emission of acid spray.

- e) The battery container shall be of flame retardant and moisture-resistant material;
- f) The cells shall be grouped in crates or trays of rigid construction and suitable material and equipped with means to facilitate handling. The weight of the assembled batteries shall not exceed 100kg. This requirement does not apply to cells that cannot be assembled in the above-mentioned crates or trays due to their weight;
- g) The batteries to be so designed and arranged as to ensure that they will function satisfactorily at full rated power when the ship is upright or when inclined at any angle up to 22.5°, or inclined up to 10° either way in the fore or aft direction, or in any combination of angles within the afore-said limits;
- h) Crates and covers of the battery shall be made of solid and corrosion-resistant materials. The battery posts shall be of adequate size to carry the charge/discharge current. Means to effectively lock the battery posts and cable terminals shall be provided;

2.a.ii. Technical documents to be submitted

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

- a) List of product or product range applied for approval;
- b) Product descriptions, list of major parts or components, data sheets, assembly drawings, dimension drawings, etc. clearly identifying the product;
- c) Product specifications including the Discharge characteristic curves and temperature characteristic curves as the basis of required capacity calculation for the services to be supplied;
- d) Proposed test program and/or test schedule including description of the test specimens and explanation of the principle of sampling;
- e) A certificate of accreditation for the selected laboratory (if any);
- f) Documentation about the production quality assurance system;
- g) Production flow chart with quality control point marking;
- h) Instruction manual, user manuals, Installation manual etc.as relevant and special operational limitations, if any;
- i) Description of product's marking;
- j) Certificate of conformity to IEC Standards issued by one of the Certification Body under the ILAC or LOVAG or IECEE mutual recognition agreement (if any).

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2.b Type testing requirements

- a) Tests given in **Table 2.4** in Appendix 2 shall be carried out in accordance with approved test program. The test conditions, test sequence and test methods shall be in accordance with the accepted IEC standards listed in the test program, unless otherwise specified in the program;
- b) Test specimens shall be taken from the production line or from stock[†].
The tests shall be conducted at test site or laboratory agreed by the EU RO in the presence of the EU RO Surveyor. In cases where tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO's surveyor may be omitted[†].
- c) It is the manufacturer's responsibility to make sure that the type testing is performed in accordance with the approved test program.

[†] 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 <http://www.euromr.org/Guidance%20for%20Mutual%20Recognition>)

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 and address;
- b) Type designation;
- c) Voltage;
- d) Capacity in ampere-hour at a specific rate of discharge and the chosen reference temperature;
- e) Nominal cranking current(for starter battery);

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- f) Serial number or batch number and the date of manufacture;
- g) Certificate Number and EU RO;
- h) Electrolyte density (for vented type) / open circuit voltage (for valve regulated type) in full charged condition at the chosen reference temperature;
- i) Charge retention storage time.

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.

6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
30 April 2013	0.0	Accepted by Advisory Board
31 January 2014	0.1	CRF006 - Corrected title and content to 'Accumulator battery';
31 January 2015	0.2	CRF018 – Revision to par. 2.a.ii - Test results to be in English; CRF020 – Revision to par. 5 - 'Type Approval Certificate Content'.
1 April 2016	0.3	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.

7. BACKGROUND INFORMATION / REFERENCES

- a) IACS UR E10 Test specification for type approval;
- b) IEC 60092-305 Electrical installations in ships Part 305: Equipment - Accumulator (storage) batteries;
- c) IEC 60095-1 Lead-acid starter batteries –Part 1: General requirements and methods of test;
- d) IEC 60896-21 Stationary lead-acid batteries Part 21: Valve regulated types -Methods of test;
- e) IEC 60896-22 Stationary lead-acid batteries Part 22: Valve regulated types-Requirements;
- f) IEC 60896-11 Stationary lead-acid batteries Part 11: vented types-General requirements and methods of test;
- g) 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@euromr.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: <http://www.euromr.org/Guidance%20for%20Mutual%20Recognition>.

- See Appendices 1 and 2 below:

CONTROLLED DOCUMENT

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Appendix 1 Environmental conditions

Table 2.1 Ambient Air Temperatures

Location, arrangement	Temperature (°C)
In enclosed spaces	0 to 45
In spaces subject to temperatures exceeding 55°C and below 0°C	According to design conditions
On open decks	-25 to 45

Note: Most of the batteries used onboard are installed in Battery room or in enclosed spaces. When installed in other spaces, due consideration should be given.

Table 2.2 Angles of Inclination

Athwartships		Bow-and-stern	
Static inclination (List)	Dynamic inclination (Rolling)	Static inclination (Trim)	Dynamic inclination (Pitching)
22.5°	22.5°	10°	10°

Note:

1. In ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk, emergency power supplies shall remain operable with the ship flooded to a final athwartships inclination up to a maximum of 30°. In this case the test level has to be named on the certificate.
2. Athwartships and bow-and-stern inclinations may simultaneously occur.

Table 2.3 Vibration conditions

Frequency(Hz)	Amplitude(mm)	Acceleration(m/s ²)
to 13.2	±1	N.A.
13.2 to 100	N.A.	6.9

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Appendix 2 Type Test Requirements

Table 2.4 Testing condition and methods

(Any changes made to IACS UR E10 in Revision 6.0 needs to be implemented in this test plan.)

NO.	TEST	PROCEDURE ACC. TO:*	TEST PARAMETERS	OTHER INFORMATION
* indicates the testing procedure which is normally to be applied. However, equivalent testing procedure may be accepted by the RO provided that the requirements stated in the other columns are fulfilled.				
1.	Visual inspection	-	-	conformance to drawings, design data, product markings
2.	Performance test	<p>Tests shall be carried out in accordance with approved test program.</p> <p>For starter battery: All type tests described in IEC 60095-1 shall be conducted except sub-clause 9.8.</p> <p>For stationary batter: (1) vented type: All type tests described in IEC 60896-11 shall be conducted. (2) valve regulated type: All type tests described in IEC 60896-21, IEC60896-22 shall be conducted</p>	<p>standard atmosphere conditions</p> <p>-temperature: 25°C ± 10°C</p> <p>-relative humidity: 60% ± 30%</p> <p>-air pressure: 96kPa ± 10kPa</p>	<p>a) The product standards may specified testing condition different from the standard atmosphere conditions.</p> <p>b) For valve regulated battery, the valve operation test specified in sub-clause 6.8 of IEC60896-21 shall be conducted.</p>

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3	Vibration	IEC Publication 60068-2-6 Test Fc	-2_0^{+3} Hz to 13.2 Hz – amplitude ± 1 mm -13.2 Hz to 100 Hz – acceleration \pm 0.7 g.	a) duration in case of no resonance condition 90 minutes at 30 Hz; b) duration at each resonance frequency at which Qinutes at 30 Hz; in sub-clause c) during the vibration test, functional tests shall be carried out; d) tests to be carried out in three mutually perpendicular planes; e) Q should not exceed 5; f) where sweep test shall be carried out instead of the discrete frequency test and a number of resonant frequencies is detected close to each other duration of the test shall be 120 min. Sweep over a restricted frequency range between 0.8 and 1.2 times the critical frequencies can be used where appropriate. Note: Critical frequency is a frequency at which the equipment being tested may exhibit mechanical resonances with amplification greater than 10 will not be accepted g) confirm that storage battery has stable discharge current and normal voltage, and electrolyte shall not leak or splash.
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NO.	TEST	PROCEDURE ACC. TO:*	TEST PARAMETERS	OTHER INFORMATION
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4	swing endurance test	Publication IEC 60092-504	Static 22.5°	<p>a) inclined to the vertical at an angle of at least 22.5°</p> <p>b) inclined to at least 22.5° on the other side of the vertical and in the same plane as in (a),</p> <p>c) inclined to the vertical at an angle of at least 22.5° in plane at right angles to that used in (a),</p> <p>d) inclined to at least 22.5° on the other side of the vertical and in the same plane as in (c).</p> <p>Note: The period of testing in each position should be sufficient to fully evaluate the behaviour of the equipment.</p>
			Dynamic 22.5°	<p>e) Using the directions defined in a) to d) above, the equipment shall be rolled to an angle of 22.5° each side of the vertical with a period of 10 seconds. The test in each direction shall be carried out for not less than 15 minutes</p> <p>f) On ships for the carriage of liquefied gases and chemicals, the emergency power supply shall remain operational with the ship flooded up to a maximum final athwart ship inclination of 30°.</p> <p>g) confirm that storage battery has stable discharge current and normal voltage, and electrolyte shall not leak or splash.</p>

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5	Inclination endurance	Publication IEC 60092-305	Static 40°	a) inclined to the vertical at an angle of 40° and kept in this position for 15min. b) restore to vertical and then inclined to 40° on the other side of the vertical and in the same plane as in (a) and kept in this position for 15min. c) inclined to the vertical at an angle of 40° in plane at right angles to that used in (a),

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				<p>d) restore to vertical and then inclined to 40° on the other side of the vertical and in the same plane as in (c) and kept in this position for 15min.</p> <p>e) confirm that electrolyte shall not leak or splash.</p>
6	Flame retardant	IEC 60092-101 or IEC 60695-11-5	Flame application: 5 times 15 s each. Interval between each application: 15s or 1 time 30s. Test criteria based upon application. The test is performed with the EUT or housing of the EUT applying needle-flame test method.	<p>a) the burnt out or damaged part of the specimen by not more than 60 mm long.</p> <p>b) no flame, no incandescence or;</p> <p>c) in the event of a flame or incandescence being present, it shall extinguish itself within 30 s of the removal of the needle flame without full combustion of the test specimen.</p> <p>d) any dripping material shall extinguish itself in such a way as not to ignite a wrapping tissue. The drip height is 200 mm ± 5 mm.</p>
7	Insulation resistance	Test voltage: 2Un min.24V Min. insulation resistance: 10MΩ		After filled with electrolyte, the surface of the storage battery shall be cleaned and dried. Put the battery on a metal plate and measure the insulation resistance between any battery terminal and the metal plate. The insulation resistance of the battery to earth shall not be less than 10MΩ.

End of Document