

# EU RO Mutual Recognition Technical Requirements

<b>FUSES</b>	Version	0.3
	Adoption Date	1 April 2016
	Application Date	1 October 2016
	Tier	1
This document is subject to controlled issue and can be found here: <a href="http://www.euromr.org/technical-requirements">http://www.euromr.org/technical-requirements</a> <b>*** Uncontrolled if downloaded or printed ***</b>		

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## 1. PRODUCT DESCRIPTION

### 1.a General description of the product

- a) Fuses are over current protective devices that contain a calibrated current carrying element which melts and opens under specified over current conditions;
- b) Fuses are individual devices and can have different shapes. Connection to a circuit is normally carried out through the use of single or multi fuse bases or fuse holders, as required;
- c) Fuses are to be classified according to applicable parts of IEC standards 60269-1, IEC 60269-2, IEC 60068-2 and IEC 60721-3, as applicable.

### 1.b Application limitations

- a) Fuses shall be used in low voltage (<1000V for AC systems and <1500V for DC systems) electrical installations of ships classed for unrestricted navigation and, designed, constructed and tested to operate satisfactorily under the worst environmental conditions, found on board, for each application case;
- b) This technical requirement shall not apply to fuses used for the protection of internal circuitry, normally located inside of cabinets or enclosures such as semiconductor power converters, specific motor controllers, battery chargers and similar equipment;
- c) This technical requirement shall not apply to -fuse bases and fuse-holders.

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## **1.c Intended use**

Fuses used on protection of overload and short circuits in LV electrical installations, on power and lighting distribution systems, motor and transformer circuits or, as a backup, to increase the short circuit breaking capacity of electrical devices. Fuses may be used for overload protection only up to a rating of 315A.

## **1.d System context**

See 1.c above.

## **2. DESIGN EVALUATION**

### **2.a Engineering evaluation requirements**

#### **2.a i. Technical Requirements**

- a) The terms and definitions, related to fuses, according to IEC 60269-1 shall apply;
- b) Fuse elements shall be of a totally enclosed type and allow no arc ejection to the outside, sparking, or any other harmful effect upon the adjacent parts in the case the fuse blows;
- c) Fuse elements shall be made of incombustible and non-hygroscopic insulating material;
- d) Type testing conditions, namely those concerned with ambient air temperature, humidity, salt mist and vibration level, shall comply with the requirements of IEC 60269-2, IEC 60068-2 and IEC 60721-3 as applicable. These environmental operating conditions aim at reflecting the higher ambient air temperature, higher humidity and the presence of salt mist, all degrading factors with influence in the behaviour of a fuse link;
- e) The system voltage, the currents to be carried and to be broken, the rated frequency and the power factor for AC systems, or the time constant for DC systems shall comply with IEC-60269-1 as applicable.

#### **2.a.ii. Technical documents to be submitted**

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

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The manufacturer shall submit detailed information concerning:

- a) Technical data and characteristics;
- b) Construction drawings concerning all parts of each of the fuse link types;
- c) Dimensions and tolerances;
- d) Instructions on fitting, assembly and operation;
- e) Materials specification;
- f) Type of applied anticorrosive treatments;
- g) Contact plating materials;
- h) Application, working area.

Prior to tests the manufacturer is to submit:

- i) Proposed test program and test schedule;
- j) Description of the test specimens and explanation of the selected test sample(s);
- k) Complete accreditation certificate of the Test laboratory (prior the first test only; changes in the scope of accreditation must be informed);

After completion of tests the manufacturer is to submit:

- l) The test report with an identification number containing all relevant data and test results including place and date of the tests;
- m) Type references and serial numbers of the products tested;
- n) Test reports and test records must be signed by the personnel members in charge of the test and are to be confirmed by the EU RO by signing and marking the test report;
- o) The test laboratory shall be accredited according to ISO 17025 for relevant IEC standards, issued by one of the certification bodies under the LOVAG or IECCE Mutual Recognition Agreement.
- p) Complete report of the tests carried out according to applicable procedures as per IEC 60269-1, Chapter 8, taking into account the particular shipboard conditions;
- q) The manufacturer shall also submit tables with conventional time for non-fusing ( $I_{nf}$ ) and fusing current ( $I_f$ ) as well as time-current characteristics and gates, with due corrections for shipboard conditions.

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## 2.b Type testing requirements

- a) Fuse links shall be subject to a complete testing program carried out under the responsibility of the fuse manufacturer, in the presence of the EU RO's surveyor.
- b) In cases where the tests are conducted at laboratories accredited by an Accreditation Body under the MLA regime of ILAC or by laboratories recognised either by LOVAG or IECCE, the presence of the EU RO's surveyor may be omitted†.
- c) The test laboratory shall be authorized to conduct type tests according to the relevant IEC standards;
- d) Test specimens shall be taken from the production line or from stocks†.
- e) The complete tests as well as type tests shall be carried out, considering the recommended number of samples and following the applicable test program for the "g" or "a" fuse link types according to IEC 60269-1, Chapter 8, Table 7A, 7B or 7C;
- f) The following environmental tests according to IACS UR E10 are to be carried out:
  - I. #5 (dry heat);
  - II. #6 (damp heat);
  - III. #7 (vibration) (20mm/s velocity amplitude in frequency range 5-50Hz is accepted);
  - IV. #11 (cold);
  - V. #12 (salt mist).

Verification shall be according to IEC 60269-1 chapter 8.

† 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>.)

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## 3. PRODUCTION REQUIREMENTS

- a) EU RO Production Quality Assurance is to be applied. The manufacturer and its individual works are to be recognised by the EU RO for the type of product(s) fabricated. Plants, production and treatment procedures, testing equipment, laboratories, internal control systems and personnel qualification are to be suitable in the opinion of the EU RO. Production of the equipment is limited to those facilities listed in the certificate;
- b) Manufacturing procedures and techniques are to be such as to reasonably ensure constant compliance of the product with the requirements. If tests and/or analyses are performed by external laboratories or third parties, these have to be recognized by the EU RO. Manufacturing process may be required to be approved and approval tests may have to be performed for the purpose. The EU RO shall be granted access to all manufacturing and testing facilities, and is to be provided with all the information necessary to perform its duties. Changes to the product will void the certification. General terms and conditions of the EU RO are to be observed;
- c) 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

- a) The marking shall be durable and easily legible. Compliance is to be checked by inspection and by testing according to IEC 60269-1 chapter 6;
- b) Markings on fuse links are to be in accordance with the IEC 60269-1 standard;
- c) Additionally a code or mark, to be designated shall be marked on all type approved fuse links identifying the type approval and the EU RO.

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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 relevant EU RO MR Type Approval Certificate:

- Manufacturer's documentation\* identification number for the product or series with date;

\* Manufacturer's documentation is to include particular information for the product or series:

- Manufacturer type designation;
- Application category (breaking range and utilization category by code letters);
- Rated current (or range of current ratings in case of a series of fuses);
- Voltage rating;
- Type of current (ac; dc; both);
- Rated frequency (if applicable);
- Rated breaking capacity;
- Rated power dissipation;
- Time current characteristics curves;
- Cut-off current characteristics;
- Others.

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## 6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
8 July 2012	0.0	Accepted by Advisory Board
31 January 2014	0.1	Added reference to the EU RO Framework Document for the Mutual Recognition of Type Approval.
31 January 2015	0.2	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	0.3	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) IEC (2006), "IEC 60269(2006) "Low-voltage fuses";
- b) IEC (2002), "IEC 60721(2002) "Classification of environmental conditions";
- c) IEC (2007), "IEC 60068(2007) "Environmental Testing";
- d) IACS UR E10 (2011), "Unified Requirements concerning Electrical Installations "Test Specification for Type Approval - E10";
- e) EU RO Framework Document for the Mutual Recognition of Type Approval.

## 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](mailto: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: <http://www.euomr.org/Guidance%20for%20Mutual%20Recognition>

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