

EU RO Mutual Recognition Technical Requirements

LEVEL SWITCHES	Version	0.0
	Adoption Date:	1 January 2019
	Application Date:	1 July 2019
	Tier	7
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1. PRODUCT DESCRIPTION

1.a General description of the product

Level switches are devices composed of an electrical switch operated by a sensor able to detect the presence of a liquid at given levels.

Depending on the type of sensor used for detecting the liquid level, the following level switches are considered:

- a) Level switches based on floating principle;
- b) Reed level switches operated by magnetic float;
- c) Level switches based on capacitive sensor;
- d) Level switches based on conductive sensor;
- e) Level switches based on ultrasonic sensor;
- f) Level switches based on radar sensor;
- g) Level switches based on optical sensor;
- h) Level switches based on vibrating fork sensor;
- i) Level switches based on hydrostatic sensor.

1.b Application limitations[†]

These Technical Requirements are applicable to liquid level switches intended to be used in control and monitoring systems on board ships, with exceptions as per SOLAS Ch. I, Reg. 3.

Rated voltage not to exceed 1000 V a.c. (at a frequency not exceeding 1000 Hz) or 600 V d.c.

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The following types of level switches are not within the scope of these Technical Requirements:

- a) Level switches for installations where 'Ex' certification is required;
- b) Water level detectors subject to MED requirements;
- c) Level switches intended for steam boilers;
- d) Software based level switches.

†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

Switches operated by a sensor able to detect the presence of a liquid at given levels.

1.d System context

See 1.b.

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

- a) Level switch body and wet parts (e.g. sensing elements) shall be made of materials resistant to the marine environment, suitable for the liquids to be detected, the intended design pressure and the design temperatures;
- b) The minimum degree of protection (IP) shall be adequate to the intended installation and in accordance with the requirements set by the EU RO in charge for the classification of the ship;
- c) Materials and dimensions of flange connections shall be in accordance with recognised standards and suitable for the intended application;
- d) Switching element shall be designed in accordance with a recognised standard (e.g. IEC 60947-5-1);
- e) Level switches shall operate reliably under shocks having an acceleration of $\pm 5,0$ g and at a frequency of 40 to 80 shocks per minute;

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- f) Level switches equipped with electronic type level sensors shall be able to provide failure signal;
- g) If intended for use within alarm systems, level switches shall be provided with facility for testing during normal operation;
- h) EU RO MR Technical Requirements for "Sensors" shall be complied with.

2.a.ii. Technical documents to be submitted

- a) Product description including working principle and operation;
- b) Technical specifications and data sheets;
- c) Technical drawings showing dimensions, materials and relevant standards;
- d) Complete list of process liquids which the level switches are intended for;
- e) In case of welded connections, details of the welded joint preparation, WPS and NDT methods to be used;
- f) Installation and operating manuals;
- g) Proposed test program to be agreed with the EU RO;
- h) Details of the production site(s), production facility inspection report, production specifications and a valid QM certificate according to ISO 9001.

2.b Type testing requirements

In general, the type test plan is to be agreed between the Manufacturer and the RO based on the characteristics of the product subject to testing.

The type tests are intended to demonstrate the performance of the prototype according to the requirements of the applicable International Standards and the relevant Manufacturer's specification.

The ability of the product to function as intended under the testing conditions specified in the latest revision of IACS UR E10 shall also be verified. Testing procedures according to the International Standards mentioned in these Technical Requirements may be accepted by the RO, in lieu of those indicated in the IACS UR E10, provided that the test severity conditions set by the IACS UR E10 are fulfilled as a minimum.

The following type tests shall be carried out:

- a) Visual inspection to check conformance to relevant drawings and design data;
- b) Performance type tests according to the Manufacturer's specification and the applicable International Standards;
- c) Hydrostatic pressure test to twice the design pressure of parts in contact with process fluid and subject to pressure. Test pressure should be maintained for 2 minutes;

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- d) Level switches shall be subject to all the tests foreseen in IACS UR E10. Salt mist test shall be applied only for installations on open decks;
- e) It shall be verified that level switches can reliably operate under shocks having an acceleration amplitude of $\pm 5,0$ g and at a frequency of 40 to 80 shocks per minute;
- f) Switching element shall be tested and certified for compliance with the relevant standard (e.g. IEC 60947-5-1) by a Nationally Accredited Laboratory;
- g) Degree of protection (IP Code) shall be tested according to IEC 60529;
- h) EU RO MR Technical Requirements for "Sensors" shall be complied with.

All tests to be performed on agreed test samples. Test specimens shall be selected from production line or at random from stocks*.

Tests shall be carried out in the presence of the EU RO Surveyor. In cases where the tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO surveyor may be omitted*.

*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>)

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); found on <https://www.euomr.org/technical-requirements>

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 No. or symbol;
- c) Serial No. and date of manufacture;
- d) Particulars and ratings, including operating temperature and IP grade.

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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) List of process liquids for which certification is granted;
- b) Application limitations and intended use;
- c) List of EMC/environmental test levels applied, including IP rating.

6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
2018-07-01	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) IEC 60947-5-1 Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices;
- c) IEC 60529 Degrees of protection provided by enclosures (IP Code);
- d) IACS UR E10.

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>

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