

EU RO Mutual Recognition Technical Requirements

DISPLAY MONITORS, VIDEO SCREENS, TERMINALS	Version	0.5
	Adoption Date	1 January 2022
	Application Date	1 July 2022
	Tier	1
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1. PRODUCT DESCRIPTION

1.a General description of the product

Display monitors and video screens for monitoring the conditions of systems, machinery and equipment. In case where display monitors and video screens are integrated with touch screens or terminals with keys and buttons, TR for "TOUCH SCREEN I.E. A DISPLAY MONITOR OR A VIDEO SCREEN THAT IS ALSO AN INPUT DEVICE" is applied.

1.b Application limitations†

Onboard ships with exceptions as per SOLAS Ch. I, Reg. 3. (naval, offshore and industrial applications).

†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

Alarm and monitoring systems subject to classification.

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1.d System context

N/A

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

Ambient Conditions

- a) The ambient condition given in **Table 2.1** shall be applied to the design, selection and arrangement of electrical installations in order to ensure their proper operation;
- b) Electrical equipment shall be suitable for operations up to 55°C;
- c) Electrical equipment shall be designed sufficiently enough to withstand any vibrations that occur under normal conditions.

Voltage and Frequency

- a) Electrical equipment supplied from main and emergency switchboards shall be designed and manufactured so that it is capable of operating satisfactorily under the normally occurring voltage and frequency fluctuations. Such electrical equipment shall operate satisfactorily under those fluctuations in voltage and frequency that are given in **Table 2.2**. Any special systems, e.g. electronic circuits, whose functions cannot operate satisfactorily, within the limits given in this table, shall be supplied by some suitable means, i.e. through some stabilized supply.

Construction, Materials, Installations, etc.

- b) All electrical equipment shall be constructed and installed so as not to cause injury when handled and touched in a normal manner;
- c) Insulating materials and insulated windings shall be resistant to moisture, sea air and oil vapors;

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- d) Bolts, nuts, pins, screws, terminals, studs, springs and other such small parts shall be made of corrosion resistant material or shall be suitably protected against corrosion.

2.a.ii. Technical documents to be submitted

- a) Specifications (description of the product name, type, principal particulars, use, construction, performance, etc.);
- b) Product name, principal particulars, general dimensions and sectional assembly plan, material, quantity, applicable rules and standards, etc.);
- c) Wiring diagram (electrical systems) including PCB layouts and parts list
- d) Instruction manual (including operating procedure);
- e) Inspection and test specification for quality control (including test data);
- f) Environmental test procedures including appropriate measure of technical performance;
- g) Certificate and test result certificate issued by bodies recognized by the EU RO (if any);
- h) Quality control for software:
 - Quality standards;
 - A quality plan for software lifecycle;
 - Quality assurance procedures in production.
- i) Documentation of software modification;
- j) Work procedures for modifying program contents and data including upgrades.

2.b Type testing requirements

- a) After the drawings and documents submitted in accordance with 2.a.ii have been examined, tests shall be carried out in accordance with the latest IACS UR E10 with modifications given in **Table 2.3** in the presence of the EU RO's surveyor, and they shall be proven to satisfy the criteria of the latest IACS UR E10 and **Table 2.3**;
In cases where the tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO surveyor may be omitted†.
- b) Test specimens shall be taken from the production line or from stocks†.
- c) In case the documents in 2.a.ii (g) are deemed appropriate, a part of tests may be exempted;
- d) Tests shall be carried out under normal temperatures (25°C - 1°C), normal humidity (60% - 30%), normal atmospheric pressures (96 kPa - 10 kPa), rated

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electrical source voltage and rated electrical source frequency unless otherwise specified. The number of test sample is, as a rule, to be one for each type. However, additional test sample may be required when deemed necessary by the EU RO.

- e) 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 paragraph 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>).

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) The Software history to be provided for review.

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

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 or ratings.

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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) Software name and version [major version. minor version].

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.
July 2019	0.4	CRF043 – Revision of para 1.a Generic sentence to 1b added
28 December 2021	0.5	TG Software update (ref 18042g)

7. BACKGROUND INFORMATION / REFERENCES

- a) IACS UR E10 “Test specification for type approval”;
- b) IEC 60092-504 “Electrical installations in ships – Special features, Control and instrumentation”;

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- c) IEC 60945 “Maritime Navigation and Radio communication Equipment and Systems – General Requirements”;
- d) IEC 60533 “Electrical and electronic installations in ships – Electromagnetic compatibility”;
- 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@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>.

Table 2.1 – Angles of Inclination

Static inclination	Dynamic inclination
22.5° ⁽¹⁾	22.5° ⁽¹⁾

Note:

In ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk, emergency power supplies are to remain operable with the ship flooded to a final athwart ships inclination up to a maximum of 30°. In this case the test level has to be named on the certificate.

Table 2.2 - Voltage and Frequency Fluctuation

(a) Voltage and frequency fluctuations for a.c. distribution systems ^(Note 1)

Type of fluctuation	Fluctuation ^(Note 4)	
	Permanent	Transient
Voltage	+10% , -10%	± 20% (within 1.5 sec)
Frequency	± 5%	± 10% (within 5 sec)

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(b) Voltage fluctuations for d.c. distribution systems ^(Note 2)

Type of fluctuation	Fluctuation ^(Note 4)	
Voltage fluctuation (Permanent)	±	10%
Voltage cyclic fluctuation deviation		5%
Voltage ripple		10%

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(c) Voltage fluctuations for battery systems

Systems	Fluctuation ^(Note 4)
Components connected to the battery during charging ^(Note 3)	+30%, -25%
Components not connected to the battery during charging	+20%, -25%

Note 1: A.C. distribution systems mean *a.c.* generator circuits and *a.c.* power circuits produced by inverters.

Note 2: D.C. distribution systems mean *d.c.* generator circuits and *d.c.* power circuits produced by converters.

Note 3: Different voltage fluctuations as determined by charging and discharging characteristics, including voltage ripples from the charging devices, may be considered.

Note 4: The numerical values given in the table, excluding those values for time, mean percentages of rated values.

Table 2.3 – Modified testing condition and method of IACS UR E10

NO.	TEST	PROCEDURE ACC. TO:*	TEST PARAMETERS	OTHER INFORMATION																														
1.	Power supply variations a) electric	-	<p style="text-align: center;">AC SUPPLY</p> <table border="1"> <thead> <tr> <th>Combination</th> <th>Voltage variation permanent</th> <th>Frequency variation permanent</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+10</td> <td>+5</td> </tr> <tr> <td>2</td> <td>+10</td> <td>-5</td> </tr> <tr> <td>3</td> <td>-10</td> <td>-5</td> </tr> <tr> <td>4</td> <td>-10</td> <td>+5</td> </tr> <tr> <td></td> <td>voltage transient 1,5 s %</td> <td>frequency transient 5s %</td> </tr> <tr> <td>5</td> <td>+20</td> <td>+10</td> </tr> <tr> <td>6</td> <td>-20</td> <td>-10</td> </tr> </tbody> </table> <p style="text-align: center;">DC SUPPLY</p> <table border="1"> <tbody> <tr> <td>Voltage tolerance Continuous</td> <td>± 10%</td> </tr> <tr> <td>Voltage cyclic Variation</td> <td>5%</td> </tr> <tr> <td>Voltage ripple</td> <td>10%</td> </tr> </tbody> </table>	Combination	Voltage variation permanent	Frequency variation permanent	1	+10	+5	2	+10	-5	3	-10	-5	4	-10	+5		voltage transient 1,5 s %	frequency transient 5s %	5	+20	+10	6	-20	-10	Voltage tolerance Continuous	± 10%	Voltage cyclic Variation	5%	Voltage ripple	10%	
Combination	Voltage variation permanent	Frequency variation permanent																																
1	+10	+5																																
2	+10	-5																																
3	-10	-5																																
4	-10	+5																																
	voltage transient 1,5 s %	frequency transient 5s %																																
5	+20	+10																																
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			<p>Electric battery supply:</p> <ul style="list-style-type: none"> • +30% to –25% for equipment connected to charging battery or as determined by the charging/discharging characteristics, including ripple voltage from the charging device; • +20% to –25% for equipment not connected to the battery during charging. 	
2.	Vibration	IEC Publication 60068-2-6 Test Fc	<ul style="list-style-type: none"> • 2(+3,-0)Hz to 13.2 Hz – amplitude $\pm 1\text{mm}$ • 13.2 Hz to 100 Hz – acceleration $\pm 0.7\text{ g}$. • For severe vibration conditions such as, e.g. on diesel engines, air compressors, etc. • 2.0 Hz to 25 Hz – amplitude $\pm 1.6\text{ mm}$ • 25.0 Hz to 100 Hz – acceleration $\pm 4.0\text{ g}$. 	<ul style="list-style-type: none"> • duration in case of no resonance condition 90 minutes at 30 Hz; • duration at each resonance frequency at which $Q \geq 2$ is recorded - 90 minutes; • during the vibration test, functional tests are to be carried out; • tests to be carried out in three mutually perpendicular planes; • Q should not exceed 5. • where sweep test is to 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 is to be 120 min. Sweep over a restricted frequency range between 0.8 and 1.2 times the critical frequencies can be used where appropriate. <p>Note: Critical frequency</p>

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				<p>is a frequency at which the equipment being tested may exhibit:</p> <ul style="list-style-type: none"> malfunction and/or performance deterioration mechanical resonances and/or other response effects occur, e.g. chatter mechanical resonances with amplification greater than 10 will not be accepted 								
3.	Compass safe distance measurement	IEC 60945		<ul style="list-style-type: none"> the test is applied to equipment intended for installation on the navigation bridge 								
4.	Acoustic noise and signals measurement	IEC 60945		<ul style="list-style-type: none"> the test is applied to equipment intended for installation on the navigation bridge 								
5.	Shock	IEC 60068-2-27	<table border="1"> <tr> <td>Acceleration (g)</td> <td>±5.0</td> </tr> <tr> <td>Shock duration (ms)</td> <td>10 - 15</td> </tr> <tr> <td>Number of shocks in each position</td> <td>20</td> </tr> <tr> <td>Shock succession frequency (mm)</td> <td>40 - 80</td> </tr> </table>	Acceleration (g)	±5.0	Shock duration (ms)	10 - 15	Number of shocks in each position	20	Shock succession frequency (mm)	40 - 80	<ul style="list-style-type: none"> The tests shall be earned out in operating condition under effect of shock load in each of the three mutually perpendicular directions in relation to the item, in turn. The form of the shock pulse is recommended to be close to sine one. The method of fastening the items for testing shall be indicated in the technical documentation with due account of the possible positions of the items in service. If the technical
Acceleration (g)	±5.0											
Shock duration (ms)	10 - 15											
Number of shocks in each position	20											
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				<p>documentation on the items specifies different methods of fastening in service, the item shall be tested using the most dangerous method of fastening stated in the technical documentation.</p> <ul style="list-style-type: none"> • The equipment shall be considered to have passed the tests if during and after the tests it meets the requirements set forth in the technical documentation for the test type concerned.
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