

UR E10 “Test Specification for Type Approval”

Summary

Item 8 (inclination test) is revised for the part relevant to Gas Carriers and Chemical Carrier, in alignment with Note 3 to M46.2 which is updated accommodating the reference clause nos. of the IGC Code and the IBC Code that were previously specified in UI SC6 and UI SC290. In parallel, the reference standards are also updated as per the latest and valid version.

Part A. Revision History

Version no.	Approval date	Implementation date when applicable
Rev.10 (August 2024)	26 August 2024	1 January 2026
Rev.9 (August 2023)	07 August 2023	1 July 2024
Corr.1 (Jan 2022)	16 January 2022	-
Rev.8 (Feb 2021)	12 February 2021	1 July 2022
Rev.7 (Oct 2018)	25 October 2018	1 January 2020
Rev.6 (Oct 2014)	31 October 2014	1 January 2016
Rev.5 (Dec 2006)	13 December 2006	1 January 2008
Rev.4 (May 2004)	31 May 2004	-
Corr.1 (July 2003)	16 July 2003	-
Rev.3 (May 2001)	17 May 2001	-
Rev.2.1 (July 1999)	28 July 1999	-
Rev.2 (1997)	12 May 1997	-
Rev.1 (1993)	1993	-
New (1991)	1991	-

• Rev.10 (August 2024)

1 Origin of Change:

- Suggestion by IACS member

2 Main Reason for Change:

Reference clause nos. of the IGC Code and the IBC Code which are the main part of interpretation in UI SC6 and UI SC290 have been transferred to UR M46 (Note 3 to M46.2). As there is similar sentence in item 8 of UR E10, the relevant part of item 8 is to be revisited for update.

Taking the opportunity, the latest edition of the reference standards are also checked and updated accordingly.

3 List of non-IACS Member classification societies contributing or participating in IACS Working Group:

None.

4 History of Decisions Made:

The Panel considered the revision of UI SC6, UI SC290 and UR M46, and after deliberations decided to delete the redundant UIs (i.e. UI SC6 and UI SC290) and add reference clause nos. of the IGC Code and the IBC Code to UR M46 (Note 3 to M46.2).

In the course of discussion, it was found that similar requirements as Note 3 to M46.2 is present in item 8 of UR E10 (inclination test), and the Panel decided to update relevant part of UR E10 as well.

5 Other Resolutions Changes:

- UI SC6
- UI SC290
- UR M46

6 Any hinderance to MASS, including any other new technologies:

None.

7 Dates:

Original Proposal:	19 January 2024	(Ref: PM24002_RIa)
Panel Approval:	02 July 2024	(Ref: PM24002_IMf)
GPG Approval:	26 August 2024	(Ref: 24102bIGe)

• Rev.9 (August 2023)

1 Origin of Change:

- Suggestion by IACS member

2 Main Reason for Change:

The industry standards year of reference is indicated in the UR pursuant to IACS policy. The modification clarifies how to proceed when latest standard is different from the one indicated in the UR, especially when the latest is less demanding or with hardly comparable differences.

3 List of non-IACS Member classification societies contributing or participating in IACS Working Group:

None.

4 History of Decisions Made:

1. Members agree to the proposal, which is reflected in the Note of the table, made in PM20906kIMk that a later revision of the specified standard in the UR may be used if technical specifications are deemed equivalent by the Society.

2. In line 14, additionally to IEC 61000-4-3:2020, the previous version of the standard, IEC 61000-4-3:2006+AMD1:2007+AMD2:2010, was also added as proposed in PM20906kIMj and agreed by qualified majority of member.

3. In PM20906kIMk, implementation date has been chosen to be 1 July 2024, considering the time each member needs to amend their rules and considering clause C5.2.2-4 of IACS Procedures Volume 1.

Additionally, members agreed to avoid retroactively applying UR E10 to existing types of equipment which have already been approved.

5 Other Resolutions Changes:

None.

6 Any hinderance to MASS, including any other new technologies:

None.

7 Dates:

Original Proposal	: 26 November 2021	(Ref: PM20906kIMg)
Panel Approval	: 14 April 2023	(Ref: PM20906kIMl)
GPG Approval	: 07 August 2023	(Ref: 20206iIGc)

• Corr.1 (Jan 2022)

1 Origin of Change:

- Suggestion by IACS member

2 Main Reason for Change:

To correct uniform application statement No.4 in Note of Rev.8 so that it is simply to be applied based on the "application for type approval" date only.

This is to avoid confusions due to three types of implementation concept based on:

1) the date specified in the implementation statement (e.g. application statements No. 1 and 2) not referred to the dates in 2) and/or 3) below;

2) the date of "application for type approval" of the equipment (e.g. application statements No. 3 and 7); and

3) the date of "contract for construction" of the ship (e.g. application statement No.4)."

3 List of non-IACS Member classification societies contributing or participating in IACS Working Group:

None.

4 History of Decisions Made:

During the discussion, a need for flexibility of application of the technical criteria specified in UR E10 was considered, but it was agreed that such a need would not be necessary. This is to say that Rev.8 of this Resolution (including this corrigendum) is to be uniformly applied to equipment for which the date of "application for type approval" is dated on or after 1 July 2022.

5 Other Resolutions Changes:

None.

6 Any hinderance to MASS, including any other new technologies:

None.

7 Dates:

Original Proposal	: 27 April 2021	(Ref: PM20906kIMa)
Panel Approval	: 01 November 2021	(Ref: PM20906kIMe)
GPG Approval	: 16 January 2022	(Ref: 20206cIGf)

• Rev.8 (Feb 2021)

1 Origin of Change:

- Other (Update to comply with the required format when industry standards are referred to)

2 Main Reason for Change:

There was a need to update this UR to comply with the following format when industry standards are referred to:

[Standard Designation], [version/revision, if applicable], [year of publication] (examples: API Spec 2F, 6th Edition, 1997; ISO 4624, 2002), where [version/revision, if applicable] and/or [year of publication] are decided by IACS and are not necessarily to be the current/latest version.

3 List of non-IACS Member classification societies contributing or participating in IACS Working Group:

None.

4 History of Decisions Made:

None.

5 Other Resolutions Changes:

None.

6 Any hinderance to MASS, including any other new technologies:

None.

7 Dates:

Original Proposal	: 28 October 2019	(Ref: PM18939_IMd)
Panel Approval	: 09 November 2020	(Ref: PM20906_IMf)
GPG Approval	: 12 February 2021	(Ref: 20206cIGb)

• Rev.7 (Sep 2018)

.1 Origin for Change:

- Suggestion by IACS member

.2 Main Reason for Change:

The main reason for revising the document was related to wireless applications, and what requirements that should apply to such equipment. Technology advancements and the use of wireless data communication links have increased electromagnetic frequencies, from 2 GHz to 6 GHz.

The electromagnetic compatibility (EMC) of these emissions at these higher frequencies on nearby equipment needs evaluation. UR E10 lists test requirements for electromagnetic and radiated emissions at frequencies up to 2 GHz depending on the maximum working frequency of the equipment under test in accordance with IEC 61000-4-3 and CISPR 16-2-1 and 16-2-3 respectively. Refer to test items nos. 14, 19 and 20 of UR E10 Rev.6. Accordingly, tests nos. 14 and 19 have been revised to address the increased electromagnetic frequencies. Moreover, test item 5 (dry heat) and the referenced Note 1 have been revised to align with Table 1/Item 7 and Note "d" of IEC60092-504:2016, respectively.

A change in the Notes of the Application statement was considered necessary following a query submitted by a member society after discussion at the 26th Panel meeting.

.3 List of non-IACS Member Classification Societies contributing through the TC Forum and/or participating in IACS Working Group:

None.

.4 History of Decisions Made:

The IACS Machinery Panel agreed to carry out the task by a Project Team. Forms A and 1 were agreed in the Panel on 23 April 2014. Forms A and 1 were approved by GPG on 9 May 2014.

PM17601 outcome (16 Jan. 2018) on the Notes of the implementation statement updated to address equipment type approval and installation on new constructed ships.

.5 Other Resolutions Changes

UR E22

.6 Dates:

Original Proposal: March 2014 Made by: Machinery Panel
Panel Approval: September 2018 by Machinery Panel (Ref. 28th Panel meeting)
GPG Approval: 25 October 2018 (Ref: 14062_IGg)

• Rev.6 (Oct 2014)

.1 Origin for Change:

Suggestion by IACS member

.2 Main Reason for Change:

The main reason for revising the document was related to wireless applications, and what requirements that should apply to such equipment. During the panels work, it was decided to isolate this as a separate task. The documents would also undergo a general review to decide possible needs for general improvements / clarifications.

.3 List of non-IACS Member Classification Societies contributing through the TC Forum and/or participating in IACS Working Group:

None

.4 History of Decisions Made:

The IACS Machinery Panel agreed to carry out the task by a Project Team.
Form A & 1 were agreed in the Panel in Aug 2008.
Forms were approved by GPG in September 2008.

.5 Other Resolutions Changes

UR E22

.6 Dates:

Original Proposal: August 2008 Made by: Machinery Panel
Panel Approval: September 2014 by Machinery Panel (20th Panel meeting)
GPG Approval: 31 October 2014 (Ref: 6206_IGI)

• Rev.5 (Dec 2006)

Refer to the TB document in Part B. No history file available.

- **Rev.4 (May 2004)**

Refer to the TB document in Part B. No history file available.

- **Corr.1 (July 2003)**

Refer to the UL History Section in the Blue Book. No history file or TB document available.

- **Rev.3 (May 2001)**

Refer to the TB document in Part B. No history file available.

- **Rev.2.1 (July 1999)**

Refer to the TB document in Part B. No history file available.

- **Rev.2 (1997)**

Editorial improvements including change of title. The rest requirements 4, 7, 9, 10, 11, 13, 14 & 15 are changed. New test requirements 16, 17, 18, 19, 20 & 21 are added.

No history file or TB document available.

- **Rev.1 (1993)**

No history file or TB document available.

- **New (1991)**

No history file or TB document available.

Part B. Technical Background

List of Technical Background (TB) documents for UR E10:

- Annex 1. **TB for Rev.2.1 (July 1999)**
See separate TB document in Annex 1.
- Annex 2. **TB for Rev.3 (May 2001)**
See separate TB document in Annex 2.
- Annex 3. **TB for Rev.4 (May 2004)**
See separate TB document in Annex 3.
- Annex 4. **TB for Rev.5 (Dec 2006)**
See separate TB document in Annex 4.
- Annex 5. **TB for Rev.6 (Oct 2014)**
See separate TB document in Annex 5.
- Annex 6. **TB for Rev.7 (Sep 2018)**
See separate TB document in Annex 6.
- Annex 7. **TB for Rev.8 (Feb 2021)**
See separate TB document in Annex 7
- Annex 8. **TB for Corr.1 (Jan 2022)**
See separate TB document in Annex 8
- Annex 9. **TB for Rev.9 (Aug 2023)**
See separate TB document in Annex 9
- Annex 10. **TB for Rev.10 (August 2024)**
See separate TB document in Annex 10

Note: *There are no technical background (TB) documents exist for Original version (1991), Rev.1 (1993), Rev.2 (1997) and Corr.1 (July 2003).*

Technical Background Document
WP/EL Task 38 "To Review UR E10, Rev.2.1"

1. Objective and Scope:

Correct an editorial nature error to test item 14 : "Radiated Radio Frequency" , i.e. replacing "80 kHz to 1 GHz" with "80 MHz to 1 GHz".

2. Source of Proposed Requirements:

The proposed correction was submitted by GPG correspondence (Mr.Kaji of NK message of 29 July 1998). IEC 1000-4-3 (1995) Standard.

3. Points of Discussion:

WP/EL unanimously agreed to correct test item 14 : "Radiated Radio Frequency" , i.e. replacing "80 kHz to 1 GHz" with "80 MHz to 1 GHz".

E 10 (Rev.3)

Technical Background Document

WP/EL Task 39 "Revision of IACS UR E10 Testing procedure for electrical, control and instrumentation equipment, computers and peripherals covered by classification"

Objective and Scope:

To revise UR E10 in order to investigate the difference between IEC 60945, IEC60533 and to align with IEC Standards.

Source of Proposed Requirements:

IACS WP/EL 28th Progress Report
IEC 60945, IEC 60533, IEC 60092-504 Standards

Points of Discussion:

The existing UR E10 had undergone an extensive review during the meeting. Test requirements are harmonized with IEC 60092-504 „Electrical Installations in Ships“ Part 504: Special features – Control and instrumentation“, IEC 60533 “Electrical and electronic installations in ships – Electromagnetic compatibility“ and IEC 60945 “Maritime navigation and radiocommunication equipment and systems. General requirements- Methods of testing and required test results“.

DNV proposed to add a new test concerning influence of mobile phones on electrical equipment. With some other changes the corrected draft of the UR agreed by WG was forwarded to GPG for consideration attached to the 30th WP/EL Progress Report

Submitted by WP/EL Chairman in January 2001

Technical Background

UR E10 (Rev.4)

IACS WP/EL Task No.49 "To clarify the equipment to be covered by UR E10 "Type Test Specification" and to investigate the adequacy of the DC power supply tests in item 4 "Power supply variations" of the table in UR E10."

Objective and Scope:

1. To redefine more closely the equipment to which E10 is required to be applied.
2. To investigate if the test procedure for DC power supply voltage variation in item 4 a) of the Table "Type testing condition for equipment covered by E10.1" is adequate.

Source of Proposed Requirements:

IACS UR E10 (Rev. 3, May 2001)

Draft of AHG/COMP "Onboard Use and Application of Computers".

IEC Pub. 60092-504

Points of Discussion:

There appears to exist different interpretations among IACS member societies for the scope of applications of E10 for onboard equipment and systems, especially for onboard computer based systems and peripherals. At least, further breakdown of the listed equipment in E10.1 is necessary for uniform implementation of E10 among IACS member societies.

The existing UR E10 had undergone an extensive review during the meeting. ABS proposed to postpone this objective due to several reasons taking into account of the currently undergoing Tasks in IACS, e.g., L[5], AHG/COMP, AHG/EMC, etc.

However, during the discussion, it was decided that the scope of application in E10.1 was slimmed and the application of E10 was limited for "Type Approval".

NK submitted the investigation of the test procedure for DC power supply voltage variation in item 4 of the Table of E10. It appears that the duration time and the cycle period for "voltage cyclic variation" and "voltage ripple" are not specified for the test conditions of DC supply variation.

However having considered all *pro et contra* after discussion it was decided to stay tests without change as it is. Additionally it was proposed to investigate some suppositions in EMC/AHG.

It was decided to approve new Draft of UR E10 on following conditions:

- To change Type Test Specification in title and para.E10.1 of UR E10 to 'Test Specification for Type Approval'.
- To retain "monitoring, control protection and safety" and "interior communication" services and to delete all other services in the current E10.1.
- To stay 'voltage cycling variation' and 'voltage ripple' (para.4 of E10 Table) without change as it is.

With some other changes the corrected draft of the UR agreed by WG was forwarded to GPG for consideration attached to the 33rd WP/EL Progress Report.

**Technical Background Document
UR E10 (Rev.5, Dec. 2006)**

IACS Machinery Panel Task No. PM5603

Objective and Scope:

The aim of this Task was to:

- 1) To align UR E10 with test requirements found in IEC 60068-2-6 test Fc
- 2) To examine UR E10 requirements on RMC/RFI in the light of the new edition of IEC 60945 and amend as found necessary
- 3) To unify low temperature test conditions between UR E10, UR M40 and other relevant industry standards (e.g. IEC 60945).

In addition minor alterations was introduced to enhance the quality of the test standard and to make it more up-to-date.

Background for the Proposed Revision:

Test number 3,

External power supply failure, special conditions for the test has been added if the equipment under test needs a longer time for start up, e.g. booting sequence and for equipment which requires booting.

Points of Discussion:

This has been added in order to ensure a uniform implementation of the test requirement.

Test number 7,

Vibration, last bullet in the comment field does not specify the limitations given in the IEC standard. A request from Siemens revealed the flaw in E10.

The limitations are of importance to ensure adequate stress level of the equipment under endurance test.

Points of Discussion:

When a resonance frequency is detected during vibration test, we have to ensure that no damage to the equipment is likely to occur at this frequency. This is done by performing an endurance test. In case several frequencies are detected the endurance test may be carried out as swipe test, but only within frequency limits specified.

This is agreed to be technically correct and introduced in E10.

Test number 15,

Conducted low Frequency, IEC 60945 has deleted the test Immunity to conducted low frequency interference.

Points of Discussion:

The test referred to in E10 was on the basis of IEC 60533, but the origin for IEC 60533 was IEC 60945.

We have therefore investigated whether this test is of relevance to ship installations. We have had confirmation from test laboratories performing the testing of equipment that it is, but that the test standard referred to is incorrect. We have therefore added a drawing to show an adequate test set-up which is suitable for performing this test.

This is agreed to be technically correct and introduced in E10.

Test number 21, flame retardant test where an alternative has been added.

Points of Discussion:

The test piece required for the test specified in IEC 60092-101 is very large and in many cases it is not available such large pieces for testing. IEC 60695-11-5 being a newer

standard does fulfil the intention of the IEC 60092-101 and may be used as an alternative. The evidence of flame retardation for cables is described sufficiently in IEC 60092-101.

Task number 3 was to unify low temperature test conditions between UR E10, UR M40 and other relevant industry standards (e.g. IEC 60945). This did not have any effect on the standard and is only enclosed as a reminder of the work being carried out.

Points of Discussion:

In order to examine low temperature test standard an investigation of environmental conditions has been conducted.

Environmental conditions – elaboration of requirements in different standards:

M40

(1981)

Ambient conditions – Temperatures

M40.1 The ambient conditions specified under M40.2 are to be applied to the layout, selection and arrangement of all shipboard machinery, equipment and appliances as to ensure proper operation.

M40.2 Temperatures

Air

Installations, components	Location, arrangement	Temperature range (°C)
Machinery and electrical installations ¹	In enclosed spaces	0 to +45
	On machinery components, boilers In spaces subject to higher and lower temperatures	According to specific local conditions
	On the open deck	-25 to +45

Water

Coolant	Temperature (°C)
Seawater	32
Charge air coolant inlet to charge air cooler	see UR M28

NOTES

1. Electronic appliances are to be suitable for proper operation even with an air temperature of +55°C.
2. The Classification Society may approve other temperatures in the case of ships not intended for unrestricted service.

Conclusion:

Lower temperature in enclosed spaces is 0°C

Low temperature test IEC 60945 (protected equipment)

-15 °C ± 3 °C

IEC 60945 states

(Equipment protected from the weather should not experience such low temperatures, and IEC 60721-3-6 gives +5 °C as the minimum temperature. However, since this standard deals with vital navigation and radiocommunication equipment which will be required to start operating in a dead ship, clause 8 calls for – 15 °C for protected equipment and –20 °C for portable (life saving) equipment.) IEC 60721-3-6 states: (IEC 60721-3-6 Classification of environmental conditions. Part 3: Classification of groups of environmental parameters and their severities. Ship environment, abstract: Classifies groups of environmental parameters and their severities to which a product is subjected when installed aboard a ship. Ships where products may be permanently or temporarily installed include ships propelled by mechanical means and ships not propelled by mechanical means.)

As we read IEC 60721-3-6 +5°C covers products installed in totally weather protected, heated and ventilated locations after warm-up, otherwise -25°C applies. This has been adopted by IEC 60945, but modified.

E10

IEC Publication 60068-2-1
+5°C ± 3°C

Overall conclusion:

+5°C ± 3°C is correct for products installed in totally weather protected, heated and ventilated locations after warm-up. There may be equipment required to start operating in a dead ship condition which may need a lower temperature.

Effect on E10.

To keep the 5°C for the moment, but to return to the task when doing a total upgrade of the URs with respect to temperature limitations.

**Submitted by Machinery Panel Chair
23 November 2006**

Permanent Secretariat Note (December 2006):

- Rev. 5 of UR E10 approved by GPG and Council, 13 December 2006 (6206_IGc).
- Machinery Panel proposed implementation date of 1 January 2008 and this was agreed by GPG/Council.

Technical Background (TB) document for Rev.6 (Oct 2014)

1 Scope and objectives

- Adoption of tests for wireless applications used on board ships in response to queries from the industry.
- Proposal for a broad-band random vibration test according to IEC 60068-2-64 which is less dependent on the test-setup of the EUT than the test method according to IEC 60068-2-6 Test Fc.
- Proposal for a change of test parameters down to a temperature -5°C for the cold test. A temperature of +5 °C has absolutely no influence to the EUT.
- Adoption of revised international testing standards e.g. IEC 61000-4-4 (Burst).

2 Engineering background for technical basis and rationale

Clarification of content necessary for test 2 (Performance test), test 5 (Dry heat), test 6 (Damp heat) alternative test for 7 (Vibration), test 12 salt mist , test 15 (Conducted low Frequency), test 17 (Burst), test 18 (Surge voltage) and test 19 (Radiated emission) .

3 Source/derivation of the proposed IACS Resolution

Following queries from the industry and also changes, clarifications and updates of IEC test standards.

4 Summary of Changes intended for the revised Resolution

General comment:

The term performance test used throughout the UR was clarified in note b) and distinguished from the performance test required in test 2.

Addition of procedure for Test No. 2 Performance Test Added for clarification that depending on the equipment under test (EUT) specific testing is necessary. E.g. IEC 60255 for protection relays Change of test parameter and addition under "other information" for Test No. 5 Dry Heat

Depending on the size of the EUT and climatic conditions 2 hours are often not sufficient to achieve stable conditions. It is therefore agreed that the next severity level specified in the source standard IEC 60068-2-2 is required. Under "Other information" a clause has been added for equipment which is to be proven to be suitable to be installed where higher ambient temperature is expected, e.g. exhaust manifolds which will require a higher test temperature.

Addition of other information for Test No. 6 Damp heat The stabilizing period before the start of the first cycle was added for clarification in "other information" column. This is in line with the requirement found in the source standard IEC 60068-2-30.

Addition of other information for Test No. 7 Vibration Practical experience shows that electronic fuel oil injection systems may be exposed to higher vibration levels. Such system was consequently included as example for equipment that may require test at increased vibration levels and frequency range. A general note has been added that the increased frequency range has to be agreed in each case. The example of increased values has been kept.

Remark to Test No.11 Cold

The international standard IEC 60945, 60092-504, 101 are not consistent and harmonized.

IACS UR M40 is also not harmonized with the UR E10. It is highly recommended to harmonize the standards. Therefore the requirements were not changed by the PT.

Other information to Test No. 12 Salt Mist Added for clarification to ensure that any deterioration or corrosion is superficial in nature.

Change of test parameters in test No. 14 Electromagnetic Field The frequency range was increased up to 6GHz to ensure that equipment which uses frequency band higher than 2 GHz is also tested.

The panel is of the opinion that the requirements to EMC at 6GHz as proposed by the PT would prohibit the use of wireless equipment onboard as they would radiate a signal with strength that is beyond the limit set.

The panel is therefore of the opinion that the technical solution proposed by the PT is not technically sound and have deleted this in the test specification.

Remark to Test No.15 Conducted low Frequency It is not required to exceed the power limit of 2W and hence it is acceptable to decrease the voltage applied during the test to keep within the power limit.

Clarification for Test 18, Surge Voltage:

The test description was inaccurate and contained incorrect symbols. This has been corrected according to the source standard. For practical purpose no change in the testing scope.

Change of Test No. 19 Radiated emissions

Quasi peak detection was defined only for frequencies up to 1 GHz and makes no sense for the protection of receiver / transmitter technology above 1 GHz (no AM or FM). Therefore the PT decreases the frequency range to 1GHz and added test no. 20.

Open point: The limits for 156-165MHz 24 dBuV/m to be checked for the general power distribution zone.

An editorial correction is being made to the table for equipment installed in the bridge and deck zone. For the frequency range 0.3 – 30 MHz, the limits are being editorially corrected from "50 – 34 dBmicroV/m" to "52 – 34 dBmicroV/m". It was determined the value indicated in Rev. 5 of UR E10 was incorrect. The corrected value is in agreement with IEC 60092-504 and IEC 60945.

The panel has deleted test 20 in lieu of not agreeing to 6 GHz. It has therefore been agreed to re-instate 2 GHz in test 19 in line with IEC 60945.

Addition of Test No. 20

With reference to CISPR 22 only the peak or average peak value shall be used for frequencies above 1GHz. Quasi peak detection was defined only for frequencies up to 1 GHz and makes no sense for the protection of receiver / transmitter technology above 1 GHz (no AM or FM). Category B of CISPR-22, to be used for living areas (PC, radio, television, communication) was chosen because the source and the sink of disturbances are close together similar as on ships. It should be taken into consideration that according to CISPR-22 the limits for radiated emissions above 1GHz depend on the maximum used frequency of the EUT.

The Machinery Panel has agreed to delete the proposed test.

5 Points of discussions or possible discussions

Test E10.1 General

There was a comment of a member stated that E10 is not applied to all internal communication equipment as listed in 10.1. When this question was circulated a number of the societies quoted as applying the E10 to mandatory and/or essential internal communication. Based on this a society was tasked to provide their interpretation of "internal communication", i.e. to agree what is "mandatory/essential". A society states that UR E10 is a test specification for TA and not a source or reference document for defining "internal communication". It was proposed to expand the expression to "communication" thereby including data communication and wireless communication links as applicable areas of utilisation of the test requirements; however, there was not sufficient agreement. It was finally concluded that each society may choose to apply E10 to type approval of any communication systems in accordance to their own interpretation of the term.

Result in this draft version of E10: application changed to remove "internal communication".

Test No. 7 Vibration

There was a discussion within the PT regarding vibration tests for equipment mounted on Diesel engines. Additional testing on increased vibration levels and frequencies seems to be necessary for equipment mounted on electronic controlled Diesel engines. (Example: Pressure variations in the injection system for common rail engines appr. 230Hz, Turbocharger: 15000rpm angular frequency appr. 250Hz, medium or high speed engines e.g. MTU 20cyl. 1800rpm) Increasing the vibration test level up to 300Hz was not accepted by the PT in order to be harmonized with IEC 60092-504. A proposal by CIMAC for testing equipment mounted in close proximity to hydraulic valves, fuel boosters and exhaust valves in accordance with IEC 60068-2-64 (1993), Test Fh: Vibration, broadband random (digital control) was withdrawn and also not accepted by the majority of the PT.

Result in this draft version of E10: No changes

Proposal by the PT:

For future revisions of UR E10 it is recommended to observe the outcome of ISO/NP 20283-4 "Mechanical vibration — Measurement of vibration on ships — Part 4: Measurement and evaluation of vibration of the ship propulsion machinery".

In addition to it is recommended to make a note to ISO / IEC for further examination.

Test No. 11 Cold

The international standard IEC 60945, 60092-504, 101 are not consistent and harmonized.

IACS UR M40 is also not harmonized with the UR E10. A test with 5 deg. C has no influence on any equipment to be tested. Dead ship / cold iron condition were not taken into consideration.

Result in this draft version of E10: No changes

Proposal by the PT:

It is recommended by the PT to make a note to ISO / IEC to harmonize the testing standards.

Test No. 17 Burst

IEC recommends repetition rates of 100 kHz which are closer to reality. 5 kHz repetition rates are traditional; however. The test was not changed to be consistent with e.g. IEC 60945. The recommendation from IEC should be observed for further revisions.

Test No. 14,16, 19 and 20 Electromagnetic field, conducted and radiated Emission.

The upper test frequency in test no. 19 was in the PT agreed to be 6 GHz. When the PT's result was circulated in the panel it was agreed that no equipment communicating within the specified increased frequency range would be able to comply with the requirements to radiated emission. It was hence agreed to maintain the existing frequency limits (2GHz), and to solve this matter in a separate task.

After Machinery Panel discussion:

The panel is of the opinion that the requirements to EMC at 6GHz as proposed by the PT would prohibit the use of wireless equipment onboard as they would radiate a signal with strength that is beyond the limit set.

The panel is therefore of the opinion that the technical solution proposed by the PT is not technically sound and have deleted this in the standard.

Further study on developing criteria for EMC test up to 6 GHz is recommended.

10.1 The panel did agree to limit the test specification application scope.

6 Attachments if any

None

Technical Background (TB) document for UR E10 (Rev.7 Oct 2018)

1 Scope and objectives

Adoption of tests for wireless applications for use on board ships relating to queries from the industry. The revision considers the increase of the frequency range for electromagnetic emissions up to 6 GHz and the application a quasi-peak detection and average detection to test radiated emissions for below and above 1 GHz, respectively.

2 Engineering background for technical basis and rationale

An evaluation of the effects of the higher frequency emissions (2 to 6 GHz) and the use of wireless data communication links on the function of nearby equipment and systems was considered necessary. The evaluation considered also testing radiated emissions within the limits of the maritime mobile VHF radio band for the general power distribution zone and the correctness of the testing method for radiated emissions within the limits of the maritime mobile VHF radio band (156 MHz to 165 MHz).

The wording of IEC 60092-504:2016 for dry heat test was used for alignment of test item 5 and the referenced Note 1.

A comparison between UR E10 test 14 and pertinent standards CISPR24, IEC61000-6-1, IEC 61000-6-2, 61000-4-3, IEC 60945, 60092-504, IEC 60533, ETSI EN 301 843-1 as well as between UR E10 test 19 and CISPR 22, CISPR 16-1-1, CISPR 16-1-4, CISPR 16-2-3, IEC 61000-6-3, IEC 61000-6-4, IEC 60945, IEC 60092-504, IEC 60533, ETSI EN 301 843-1 and ECMA-358 was undertaken by the Project Team.

3 Source/derivation of the proposed IACS Resolution

Following queries from the industry and also changes, clarifications and updates of IEC test standards.

4 Summary of Changes intended for the revised Resolution

- a. Change of Test No. 5 Dry Heat
Following a proposal by a member society, the test has been aligned with Test no. 7 of Table 1 of IEC 60092-504:2016 to consider non-heat and heat dissipating equipment. The reference to Note 1 has been moved from Column "Test Parameters" to "Test".
- b. Change of test parameters in Test No. 14 Electromagnetic Field
The frequency range was increased up to 6 GHz to ensure that equipment which uses frequency band higher than 2 GHz is also tested in accordance with test No.14 of the IEC Publication 60092-504:2016.

The test parameters other than "Frequency Range" have not been modified. A clarification for receivers/transmitters exclusion band from immunity tests has been added to "Other Information".

- c. Change of Test No. 19 Radiated Emissions

Quasi peak detection is defined for limits up to 1 GHz and average detection above 1 GHz. In this regard for limits below 1 GHz the previous 2000 MHz has been decreased to 1000 MHz.

It should be taken into consideration that according to CISPR 22 the limits for radiated emissions above 1GHz depend on the maximum used frequency of the EUT and such is addressed in the "other information" adding the wording "procedure in accordance with the standard". CISPR 22 has not been included as referenced standard, however the instruction that the procedure should be in accordance with the standard has been retained as the 3 m distance is the normal recommendation of standards such as IEC 60945:2002 and 60092-504:2016. The limits of 24 dB μ V/m for 156-165MHz has been maintained specifying that such a limit is applicable for the repeated measure with a receiver bandwidth of 9 kHz as per IEC Publication 60945.

Following a proposal by a member society, a note for exemption of radio equipment using wireless systems has been added.

- d. Change of Note 1 in the Table "Type testing condition for equipment covered by E10.1".

Following a proposal by a member society, the wording has been aligned with Table 1/Note d of IEC 60092-504:2016.

- e. Change of Notes in Implementation Statement

Following a query submitted by a member society during the 26th Panel meeting, the Panel agreed to review Footnote 2 of UR E10 Rev.6 to address the case of equipment, for which the manufacturers request a renewal of the type approval certificates without further testing to the new standards of Rev. 7, based on equipment satisfactory service history. The Panel reviewed the request under a separate task and decided to reflect its conclusion by updating the Notes in the application statement of UR E10 Rev.7.

5 Points of discussions or possible discussions

- a. Test 19 Radiated Emission of IEC 60092-504:2016 was revised to cover frequency range up to 6 GHz, which was 2 GHz in IEC 60092-504:2001, but retained the same limit value of 54 dB μ V/m with no change. It was also noted that the limit value of 54 dB μ V/m for frequency range between 30 to 6000 MHz is different from the limit values for frequency range above 1 GHz stipulated in CISPR 22.

IACS contacted IEC TC18 regarding the technical background of the increment of frequency range up to 6 GHz while keeping the limit value at 54 dB μ V/m.

IEC TC 18 Chair's reply was as follows: *"...The frequency range has been increased to 6GHz to accommodate the increased use on ships of emerging W-LAN and Bluetooth technologies.*

The proposal to splitting the frequency range further and using two limits (similar to EN 55022:2011) was also considered, but rejected because that would put the arrangements in conflict with IEC 60945 for Bridge mounted equipment.

The above rationale being driven by the fact that the bridge of a ship is a

particularly sensitive location due to its dense concentration of radionavigation, radiocommunication and marine control system equipment. Leading to the conclusion: that the requirement in Table 1 of the new IEC 60092-504:2016, should be maintained.

This conclusion is based on discussion within IEC TC 18/MT 2 who are responsible for IEC 60092-504. A recent meeting of the German EMC committee (16 February 2017), where this subject was raised, also agreed the current TC 18 conclusion.

Therefore, it would not be the intention of Chair or Secretary of TC 18 to recommend amendment of the standard at this time. However, a potential future revision of this standard can be conducted in cooperation with TC 80, where alignment to other applicable standards can be considered, as maybe applicable”.

Following IEC TC 18 reply, the Panel agreed to proceed with alignment with the revised IEC 60092-504:2016 (the other proposals were to adopt an approach for test 19 based on CISPR22 and then bring the matter to the attention of TC18 or to deviate from IEC requirements and introduce new limits).

- b. IEC 60092-504:2016 does not distinguish between average and peak limits and leaves it open to which of these criteria the limit of 54 dB μ V/m applies. The agreed test 19 specifies the quasi-peak measuring receiver up to 1 GHz and the measuring receiver with average detector above 1 GHz.
- c. For Test n. 19, a member society proposed to add a clarification in the column “Other information” for the radio equipment used for wireless systems exclusion from the test which was agreed as follow:

“Equipment intended to transmit radio signals for the purpose of radio communication (e.g. wifi router, remote radio controller) may be exempted from limit, within its communication frequency range, subject to the provisions in UR E22.5.2.”

- d. A proposal by a member society to revise the recommendation for Q in test no. 7 (Vibration) to read that Q should not be higher than 5 without exceeding 10 has not been agreed.
- e. A proposal by a member society to replace 2 GHz by 6 GHz in test no. 14 and 2000 MHz by 6000 MHz in tests no. 19 of UR E10 Rev.6 has not been agreed.
- f. Regarding Test no. 14 a member society proposed to add a clarification in the column “Other information” for the receivers/transmitters exclusion from the immunity test which was agreed as follow:

“if an equipment is intended to receive radio signals for the purpose of radio communication (e.g. wifi router, remote radio controller), then the immunity limits at its communication frequency do not apply, subject to the provisions in UR E22.5.2.”

6 Attachments if any

None

Technical Background (TB) document for UR E10 (Rev.8 Feb 2021)

1. Scope and objectives

UR E10(Rev.7) does not reflect the agreed format for referencing the IEC and CISPR standards. Rev.8 has been developed to comply with the agreed format.

2. Engineering background for technical basis and rationale

Format for references to Industry standards

Format:

[Standard Designation], [version/revision, if applicable], [year of publication]
(examples: API Spec 2F, 6th Edition, 1997; ISO 4624, 2002), where [version/revision, if applicable] and/or [year of publication] are decided by IACS and are not necessarily to be the current/latest version.

3. Source/derivation of the proposed IACS Resolution

None

4. Summary of Changes intended for the revised Resolution

UR E10 has been updated to specify the revision/version of the IEC and CISPR standards as follows:

Publications in E10	Replaced by
IEC 60092-504	IEC 60092-504:2016
IEC 60533	IEC 60533:2015
IEC 60068-2-2	IEC 60068-2-2:2007
IEC 60068-2-30	IEC 60068-2-30:2005
IEC 60068-2-6	IEC 60068-2-6:2007
IEC 60068-2-1	IEC 60068-2-1:2007
IEC 60068-2-52	IEC 60068-2-52:2017
IEC 61000-4-2	IEC 61000-4-2:2008
IEC 61000-4-3	IEC 61000-4-3:2020
IEC 61000-4-6	IEC 61000-4-6:2013
IEC 61000-4-4	IEC 61000-4-4:2012
IEC 61000-4-5	IEC 61000-4-5:2017
CISPR 16-2-3	CISPR 16-2-3:2016
IEC 60945	IEC 60945:2002
CISPR 16-2-1	CISPR 16-2-1:2017
IEC 60092-101	IEC 60092-101:2018
IEC 60695-11-5	IEC 60695-11-5:2016

5. Points of discussions or possible discussions

The year of publication indicates the year when the standard as consolidated edition or its latest amendment has been published. For CISPR 16-2-3:2016, for which Amendment 1 has been issued in 2019, the 2016 edition has been stated as 2020 is the review year of the standard.

6. Attachments if any

None

Technical Background (TB) document for UR E10 (Corr.1 Jan 2022)

1. Scope and objectives

To correct uniform application statement No. 4 in Note of Rev.8 so that it is simply to be applied based on the "application for type approval" date.

2. Engineering background for technical basis and rationale

None

3. Source/derivation of the proposed IACS Resolution

None

4. Summary of Changes intended for the revised Resolution:

The change made to uniform application statement No. 4 in Note of Rev.8 is as follows:

"4. Equipment intended to be installed on ships contracted for construction on or after 1 January 2022 is to comply with Rev.7 and ~~Rev.8~~ of this UR."

5. Points of discussions or possible discussions

None

6. Attachments if any

None

Technical Background (TB) document for UR E10 (Rev.9 August 2023)

1. Scope and objectives

Rev. 9 of UR E10 has been developed to precise the way to proceed when latest standard is different from the one indicated in the UR.

2. Engineering background for technical basis and rationale

None.

2a. Specification of the data utilised in the development/revision of the proposed IACS Resolution, if any

N/A.

3. Source/derivation of the proposed IACS Resolution

None.

4. Summary of Changes intended for the revised Resolution:

Note of the table concerning the column "Procedure" has been modified by replacing indication to apply the latest edition of the normative reference by the possibility to use later versions or revisions of the standards specified if they are deemed equivalent to the technical specification of the UR.

In the specific case of line 14 for which IEC 61000-4-3:2020 and previous version IEC 61000-4-3:2006+AMD1:2007+AMD2:2010 are mentioned, it was noted that the test laboratories typically confirm compliance with the version of the standard that are covered by their accreditation and that many test laboratories are still accredited according to the previous version of the standard as the latest version of IEC 61000-4-3 introduces requirements for testing using multiple test signal, etc. that may require new expensive test equipment. Therefore, in this case, they cannot confirm compliance with the latest version under their current accreditation. It is acceptable considering test 14 in IACS UR E10 will be performed identically, no matter which version of the standard is applied.

5. Points of discussions or possible discussions

None.

6. Attachments if any

None.

Technical Background (TB) document for UR E10 (Rev.10 August 2024)

1. Scope and objectives

In the course of revision of Note 3 to M46.2, it was proposed to update item 8 (inclination) of UR E10 where similar requirements as Note 3 to M46.2 is present.

2. Engineering background for technical basis and rationale

The inclination requirement for emergency source of electrical power on gas carriers and chemical tankers is addressed in UI SC6 and UI SC290. The two UIs are dealing with the same issue and the same contents, with the only difference of the reference clause nos. for IGC Code between old and new IGC Code, i.e. UI SC6 refers to 1983 IGC Code and UI SC290 mentions 2014 IGC Code.

The duplication of the UIs is thought to be originated from GPG instruction (ref. 18902_IGe and PM5901fIMI: "creating UIs that will be published as "new" and also revising the old UIs by adding the references to the old IGC Code that will be published as Revisions").

This panel is of the view that the instruction would be applicable when specific requirement of old IGC Code has been revised or replaced by new IGC Code. However in this case, the requirement is same and the two UIs are just indicating the re-adjusted clause number of old & new IGC Code, thus not advisable.

In the meantime, it is observed that the same inclination requirement is already covered by UR M46 (Note 3 of M46.2).

Still, it was found that similar requirements as Note 3 to M46.2 is present in item 8 of UR E10 (inclination test).

2a. Specification of the data utilised in the development/revision of the proposed IACS Resolution, if any

None.

3. Source/derivation of the proposed IACS Resolution

UI SC6, UI SC 290
SOLAS II-1/Reg.43.6
1983 IGC Code, clause 2.9.2.2
2014 IGC Code, clause 2.7.2.2
IBC Code, clause 2.9.3.2

4. Summary of Changes intended for the revised IACS Resolution:

Note 3 to M46.2 has been updated, adding reference clause nos. of the IGC Code (both 1983 IGC Code and 2014 IGC Code) and the IBC Code. By the transfer of the reference clauses, UI SC6 and UI SC290 have been deleted. Likewise, UR E10 item 8 has been updated as per Note 3 to M46.2, adding reference clause nos. of the IGC Code (both 1983 IGC Code and 2014 IGC Code) and the IBC Code.

Taking the opportunity, the latest edition of the reference standards are also checked and updated accordingly.

5. Points of discussions or possible discussions

One member opined that the update of UR E10 could be addressed at a later stage.

6. Attachments if any

None.