

Amendment on 27 June 2024

Resolved by Technical Committee on 30 January 2024

Environmental Tests for Automatic Devices and Equipment

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part D

Rules for the Survey and Construction of Inland Waterway Ships

Guidance for Safety Equipment

Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use

Reason for Amendment

IACS Unified Requirement (UR) E10 specifies requirements related to environmental tests for automatic devices and equipment such as control systems and alarm systems, etc. These requirements have already been incorporated into the NK Rules.

In UR E10, international standards are referenced according to their version (year of issue). Moreover, when such a standard is revised, references to it in UR E10 are also subsequently revised after confirming the details of the revision. In such cases, there is, therefore, a time gap before the latest version of a standard is reflected in UR E10, thus it sometimes is not clear which version of a standard applies. For this reason, IACS adopted UR E10(Rev.9) in August 2023 to clarify that a version more recent than the version of a standard referenced in UR E10 may be applied if it is deemed to be equivalent to the requirements of the UR.

Accordingly, relevant requirements are amended in accordance with UR E10 (Rev.9).

In addition, the consistency between Chapter 1, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use and other requirements related to the approval of automatic devices and equipment was reviewed, and amended as needed.

Outline of Amendment

The main contents of this amendment are as follows:

- (1) Specifies the handling of versions of international standards more recent than that referenced with respect to environmental tests of automatic devices and equipment.
- (2) Deletes requirements related to quality control for software in environmental tests of automatic devices and equipment.
- (3) Clarifies requirements related to documents submitted when applying for approval of automatic devices and equipment, loading computers, level indicators, etc.
- (4) Clarifies requirements related to testing conditions, testing methods and criteria in environmental tests for automatic devices and equipment.

Effective Date and Application

- (1) 1.3.1 and Table 7.1-1, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.

This amendment applies to automatic devices and equipment for which the application for approval for use is submitted to the Society on or after 1 July 2024.

- (2) Amendments other than (1)

Effective date of this amendment is 1 July 2024.

Notwithstanding the above, retroactive application may be made up on request.

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

ID: DD23-26

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part D MACHINERY INSTALLATIONS</p> <p align="center">Chapter 18 AUTOMATIC AND REMOTE CONTROL</p> <p>18.7 Tests</p> <p>18.7.1 Shop Tests*</p> <p>After being constructed, automatic or remote control systems of machinery and equipment, considered necessary by the Society, are to be subjected to the following tests:</p> <p>(1) (Omitted)</p> <p>(2) Completion tests of automatic equipment</p> <p>All automatic devices which have passed the environmental tests specified in (1) are to be subjected to the following tests after completion of their assembly as automatic equipment. The procedures of these tests are to comply with the requirements deemed appropriate by the Society.</p> <p>((a) to (d) are omitted.)</p> <p>(Deleted)</p> <p><u>(e)</u> Other tests deemed necessary by the Society.</p>	<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS</p> <p align="center">Part D MACHINERY INSTALLATIONS</p> <p align="center">Chapter 18 AUTOMATIC AND REMOTE CONTROL</p> <p>18.7 Tests</p> <p>18.7.1 Shop Tests*</p> <p>After being constructed, automatic or remote control systems of machinery and equipment, considered necessary by the Society, are to be subjected to the following tests:</p> <p>(1) (Omitted)</p> <p>(2) Completion tests of automatic equipment</p> <p>All automatic devices which have passed the environmental tests specified in (1) are to be subjected to the following tests after completion of their assembly as automatic equipment. The procedures of these tests are to comply with the requirements deemed appropriate by the Society.</p> <p>((a) to (d) are omitted.)</p> <p><u>(e) Confirmation of the effective implementation of quality control of software and documentation of software modification history.</u></p> <p><u>(f)</u> Other tests deemed necessary by the Society.</p>	<p>Requirement related to quality control for software is specified in Part X of the Rules for the Survey and Construction of Steel Ships. Therefore, this requirement is deleted from 18.7.1, Part D of the Rules.</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p align="center">Part 7 MACHINERY INSTALLATIONS</p> <p align="center">Chapter 14 AUTOMATIC AND REMOTE CONTROL</p> <p>14.7 Tests</p> <p>14.7.1 Shop Tests*</p> <p>After being constructed, automatic or remote control systems of machinery and equipment, considered necessary by the Society, are to be subjected to the following tests:</p> <p>(1) (Omitted)</p> <p>(2) Completion tests of automatic equipment</p> <p>All automatic devices which have passed the environmental tests specified in (1) are to be subjected to the following tests after completion of their assembly as automatic equipment. The procedures of these tests are to comply with the requirements deemed appropriate by the Society.</p> <p>((a) to (d) are omitted.)</p> <p>(Deleted)</p> <p><u>(e)</u> Other tests deemed necessary by the Society.</p>	<p align="center">RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS</p> <p align="center">Part 7 MACHINERY INSTALLATIONS</p> <p align="center">Chapter 14 AUTOMATIC AND REMOTE CONTROL</p> <p>14.7 Tests</p> <p>14.7.1 Shop Tests*</p> <p>After being constructed, automatic or remote control systems of machinery and equipment, considered necessary by the Society, are to be subjected to the following tests:</p> <p>(1) (Omitted)</p> <p>(2) Completion tests of automatic equipment</p> <p>All automatic devices which have passed the environmental tests specified in (1) are to be subjected to the following tests after completion of their assembly as automatic equipment. The procedures of these tests are to comply with the requirements deemed appropriate by the Society.</p> <p>((a) to (d) are omitted.)</p> <p><u>(e) Confirmation of the effective implementation of quality control of software and documentation of software modification history.</u></p> <p><u>(f)</u> Other tests deemed necessary by the Society.</p>	<p>Requirement related to quality control for software is specified in Part X of the Rules for the Survey and Construction of Steel Ships. Therefore, this requirement is deleted from 14.7.1, Part 7 of the Rules for the survey and construction of inland</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">EFFECTIVE DATE AND APPLICATION</p> <ol style="list-style-type: none"> 1. The effective date of the amendments is 1 July 2024. 2. Notwithstanding the amendments to the Rules, the current requirements apply before the effective date. 3. Notwithstanding the provision of preceding 2, the amendments to the Rules may apply to equipment for marine use before the effective date upon request of the owner. 		waterway ships.

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">GUIDANCE FOR SAFETY EQUIPMENT</p> <p align="center">Chapter 3 ARRANGEMENTS AND PERFORMANCE</p> <p>3.1 General</p> <p>3.1.1 General</p> <p>6 All electrical and electronic appliances installed on the bridge and vicinity of the bridge other than the ones specified in 3.1.1-2(1) and (3) of the Rules, are to be tested on board for electromagnetic compatibility under their working conditions in accordance with the requirements in Regulation 17, Chapter V of the Annex to the Convention. In this case, the following manners are to be applied.</p> <p>(1) (Omitted)</p> <p>(2) The wording “all electrical and electronic equipment” in Regulation 17.1, Chapter V of the Annex to the Convention generally means the equipment other than mobile equipment supplied by ship builders or ship owners, specified in the Appendix <u>B.2.2</u> of the standard <i>IEC 60533:2015</i>.</p> <p>(3) (Omitted)</p>	<p align="center">GUIDANCE FOR SAFETY EQUIPMENT</p> <p align="center">Chapter 3 ARRANGEMENTS AND PERFORMANCE</p> <p>3.1 General</p> <p>3.1.1 General</p> <p>6 All electrical and electronic appliances installed on the bridge and vicinity of the bridge other than the ones specified in 3.1.1-2(1) and (3) of the Rules, are to be tested on board for electromagnetic compatibility under their working conditions in accordance with the requirements in Regulation 17, Chapter V of the Annex to the Convention. In this case, the following manners are to be applied.</p> <p>(1) (Omitted)</p> <p>(2) The wording “all electrical and electronic equipment” in Regulation 17.1, Chapter V of the Annex to the Convention generally means the equipment other than mobile equipment supplied by ship builders or ship owners, specified in the Appendix <u>C.2.1</u> of the standard <i>IEC 60533:2015</i>.</p> <p>(3) (Omitted)</p>	<p>Review of references.</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">EFFECTIVE DATE AND APPLICATION</p> <ol style="list-style-type: none"> 1. The effective date of the amendments is 1 July 2024. 2. Notwithstanding the amendments to the Guidance, the current requirements apply before the effective date. 3. Notwithstanding the provision of preceding 2, the amendments to the Guidance may apply to equipment for marine use before the effective date upon request of the owner. 		

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE</p> <p align="center">Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT</p> <p>1.3 Environmental Test</p> <p>1.3.1 Approval Test</p> <p>(1) After the drawings and documents submitted in accordance with 1.2.1 have been examined, tests are to be carried out in accordance with the testing condition and method of Table 7.1-1 in the presence of the Society's surveyor, and they are to be proven to satisfy the criteria of Table 7.1-1.</p> <p>(2) Where tests which do not fully comply with the testing condition and methods, and the criteria of Table 7.1-1, they may comply with a standard deemed appropriate by the Society such as <i>IEC 60092-504:2016 (Electrical installations in ships - Special features, Control and instrumentation, Section 3: Environmental and supply conditions and testing)</i>, <i>IEC 60945:2002 (Maritime Navigation and Radiocommunication Equipment and Systems - General Requirements - Methods of Testing and</i></p>	<p align="center">GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE</p> <p align="center">Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS</p> <p align="center">Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT</p> <p>1.3 Environmental Test</p> <p>1.3.1 Approval Test</p> <p>(1) After the drawings and documents submitted in accordance with 1.2.1 have been examined, tests are to be carried out in accordance with the testing condition and method of Table 7.1-1 in the presence of the Society's surveyor, and they are to be proven to satisfy the criteria of Table 7.1-1.</p> <p>(2) Where tests which do not fully comply with the testing condition and methods, and the criteria of Table 7.1-1, they may comply with a standard deemed appropriate by the Society such as <i>IEC 60092-504:2016 (Electrical installations in ships - Special features, Control and instrumentation, Section 3: Environmental and supply conditions and testing)</i>, <i>IEC 60945:2002 (Maritime Navigation and Radiocommunication Equipment and Systems - General Requirements - Methods of Testing and</i></p>	

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p><i>Required Test Results</i>), IEC 60533:2015 (<i>Electrical and electronic installations in ships - Electromagnetic compatibility</i>), JIS F 8076 (<i>Electrical installations in ship - Part 504: Automation, control and instrumentation</i>).</p> <p>(3) In case the documents in 1.2.1(11) are deemed appropriate, a part of tests may be exempted.</p> <p>(4) Tests are to be carried out under normal temperature ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$), normal humidity ($60\% \pm 30\%$), normal atmospheric pressure ($96\text{ kPa} \pm 10\text{ kPa}$), rated 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 Society.</p> <p>(5) <u>Recent versions of the international standards specified in Table 7.1-1 may be acceptable for use, provided the Society determines them to be equivalent to the technical specifications of Table 7.1-1.</u></p>	<p><i>Required Test Results</i>), IEC 60533:2015 (<i>Electrical and electronic installations in ships - Electromagnetic compatibility</i>), JIS F 8076 (<i>Electrical installations in ship - Part 504: Automation, control and instrumentation</i>).</p> <p>(3) In case the documents in 1.2.1(11) are deemed appropriate, a part of tests may be exempted.</p> <p>(4) Tests are to be carried out under normal temperature ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$), normal humidity ($60\% \pm 30\%$), normal atmospheric pressure ($96\text{ kPa} \pm 10\text{ kPa}$), rated 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 Society.</p> <p>(Newly added)</p>	<p>Specifies the handling of versions of international standards more recent than that referenced with respect to environmental tests of automatic devices and equipment. (IACS UR E10 (Rev.9))</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended			Remarks
Table 7.1-1 Environmental Test Items, Testing Conditions, Methods, and Criteria			
Test Item	Testing condition and method		Criteria
(Omitted)			
Inclination test	(Omitted)		(Omitted)
(Omitted)			
Salt mist test	(Omitted)		(Omitted)
(Omitted)			
Radiated radio frequency immunity test	- Check the operation of the equipment when the radiated radio frequency immunity test is carried out according to the following condition.		- Performance Criterion A ^(*)
	Frequency range	80 MHz - 6 GHz	
	Modulation	80% AM at 1 kHz	
	Field strength	10 V/m	
	Frequency sweep rate	≤1.5×10 ⁻³ decades/sec. (or 1% / 3sec.)	
	- If for tests of equipment an input signal with a modulation frequency of 1 kHz is necessary a modulation frequency of 400 Hz may be chosen.		
	- If 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 3.7.2-2, Part X of the Rules for the Survey and Construction of Steel Ships .		
- Detailed test methods are according to Level 3 of IEC 61000-4-3:2020 or Level 3 of IEC 61000-4-3:2006+AMD1:2007+AMD2:2010.			
(Omitted)			
Flame retardant test	- Flame generator: a) Outer diameter of burner: 0.9 mm or below b) Length of flame: 12 mm±1 mm c) Gas: Butane or Propane 95 % - A flame is to be applied to flammable enclosures of equipment being tested for 30 sec., and then the flame is removed, or for 15 sec. and repeat 5 times at 15 sec. intervals. - A wrapping tissue is laid under the equipment keeping the 200 mm ±5 mm distance to catch any material that drips down. - Detailed test methods are referred to IEC 60695-11-5:2016 or IEC 60092-101:2018.		- No flame, no incandescence or - In the event of a flame or incandescence being present, it extinguishes itself within 30 sec. after removal of the flame without full combustion of the equipment. - Any dripping material extinguishes itself in such a way as to not ignite the wrapping tissue. - The burnt out or damaged part of the specimen by not more than 60 mm long.

Previous versions of the IEC standard is added as reference.

Clarifies requirements related to testing conditions, testing methods and criteria in environmental tests for automatic devices and equipment.

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Remarks
<p>Remarks:</p> <ul style="list-style-type: none"> (1) A simplified test may be used instead of a performance test to verify equipment operation if such testing is sufficient to show the equipment has not suffered any deterioration and no abnormalities were caused by the individual environmental tests. (2) (*1) Performance Criterion A: The Equipment Under Test (EUT) is to continue to operate as intended during and after the tests. No degradation of performance or loss of function is allowed as defined in relevant equipment standard and the technical specification published by the manufacturer. (*2) Performance Criterion B: The EUT is to continue to operate as intended after the test. No degradation of performance or loss of function is allowed as defined in the technical specification published by the manufacturer. During the test, degradation or less of function or performance which is self recoverable is however allowed but no change of actual operating state or stored data is allowed. (3) <u>Inclination test is to be applied to equipment with moving parts.</u> (4) <u>Salt mist test is to be applied to devices installed in unenclosed spaces such as open decks.</u> <p style="text-align: center;">EFFECTIVE DATE AND APPLICATION</p> <ul style="list-style-type: none"> 1. The effective date of the amendment is 1 July 2024. 2. Notwithstanding the amendments to the Guidance, the current requirements apply to automatic devices and equipment other than those for which the application for approval is submitted to the Society on and after the effective date. 	<p>Clarifies requirements related to testing conditions, testing methods and criteria in environmental tests for automatic devices and equipment.</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p>Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS</p> <p>Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT</p> <p>1.2 Application Procedures</p> <p>1.2.1 Application Procedures The manufacturer (applicant) of the equipment intended to be applied the requirements in this chapter is to submit the appropriate application form (Form 7-1) accompanied with three copies each of the following drawings and documents to the Society. ((1) to (8) are omitted.) (9) <u>Past records of products (if any)</u> (10) Environmental test procedures prepared according to 1.3. (11) Certificate and test result certificate issued by bodies recognized by the Society (if any) (Deleted)</p> <p>(Deleted)</p>	<p>Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS</p> <p>Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT</p> <p>1.2 Application Procedures</p> <p>1.2.1 Application Procedures The manufacturer (applicant) of the equipment intended to be applied the requirements in this chapter is to submit the appropriate application form (Form 7-1) accompanied with three copies each of the following drawings and documents to the Society. ((1) to (8) are omitted.) (9) <u>Past records of products</u> (10) Environmental test procedures prepared according to 1.3. (11) Certificate and test result certificate issued by bodies recognized by the Society (if any) (12) <u>Quality control for software</u> <u>(a) Quality standards</u> <u>(b) A quality plan for software lifecycle</u> <u>(c) Quality assurance procedures in production</u> (13) <u>Documentation of software modification</u> <u>Work procedures for modifying program contents and data</u> <u>including upgrades</u></p>	<p>Clarifies requirements related to documents submitted when applying for approval of automatic devices and equipment, loading computers, level indicators, etc.</p> <p>Requirement related to quality control for software is specified in Part X of the Rules for the Survey and Construction of Steel Ships. Therefore, this requirement is deleted.</p>

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p>Chapter 2 APPROVAL OF USE OF LOADING COMPUTER</p> <p>2.2 Application Procedure</p> <p>Any manufacturer (applicant) of the loading computers and stability computers, intended to be applied the requirements in this chapter, is to submit the appropriate application form (Form7-2) accompanied with three copies each of the following drawings and documents to the Society:</p> <p>((1) to (3) are omitted.)</p> <p>(4) <u>Records of manufacture and delivery (if any)</u></p> <p>((5) and (6) are omitted.)</p> <p>Chapter 4 APPROVAL OF USE OF LEVEL INDICATORS</p> <p>4.2 Application</p> <p>4.2.3 Documents</p> <p>Three copies each of the drawings and data in the following (1) through (9) are to be submitted together with the application form specified in 4.2.1.</p> <p>((1) to (6) are omitted.)</p> <p>(7) <u>Manufacturing and delivery records of said devices (if any)</u></p> <p>((8) and (9) are omitted.)</p>	<p>Chapter 2 APPROVAL OF USE OF LOADING COMPUTER</p> <p>2.2 Application Procedure</p> <p>Any manufacturer (applicant) of the loading computers and stability computers, intended to be applied the requirements in this chapter, is to submit the appropriate application form (Form7-2) accompanied with three copies each of the following drawings and documents to the Society:</p> <p>((1) to (3) are omitted.)</p> <p>(4) <u>Records of manufacture and delivery</u></p> <p>((5) and (6) are omitted.)</p> <p>Chapter 4 APPROVAL OF USE OF LEVEL INDICATORS</p> <p>4.2 Application</p> <p>4.2.3 Documents</p> <p>Three copies each of the drawings and data in the following (1) through (9) are to be submitted together with the application form specified in 4.2.1.</p> <p>((1) to (6) are omitted.)</p> <p>(7) <u>Manufacturing and delivery records of said devices</u></p> <p>((8) and (9) are omitted.)</p>	

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p>Chapter 5 APPROVAL OF USE OF WATER LEVEL DETECTION AND ALARM SYSTEMS</p> <p>5.2 Application</p> <p>5.2.3 Documents Three copies each of the drawings and data in the following (1) through (9) are to be submitted together with the application form specified in 5.2.1. ((1) to (6) are omitted.) (7) <u>Manufacturing and delivery records of the said systems (if any)</u> ((8) and (9) are omitted.)</p> <p>Chapter 6 APPROVAL OF USE OF CRANKCASE OIL MIST DETECTION ARRANGEMENTS</p> <p>6.2 Application</p> <p>6.2.2 Documents The documents listed (1) through (10) below, each in triplicate, are to be submitted together with the application form specified in 6.2.1. ((1) to (8) are omitted.) (9) <u>Records of manufacture and delivery (if any)</u> (10) Others which are considered necessary by the Society</p>	<p>Chapter 5 APPROVAL OF USE OF WATER LEVEL DETECTION AND ALARM SYSTEMS</p> <p>5.2 Application</p> <p>5.2.3 Documents Three copies each of the drawings and data in the following (1) through (9) are to be submitted together with the application form specified in 5.2.1. ((1) to (6) are omitted.) (7) <u>Manufacturing and delivery records of the said systems</u> ((8) and (9) are omitted.)</p> <p>Chapter 6 APPROVAL OF USE OF CRANKCASE OIL MIST DETECTION ARRANGEMENTS</p> <p>6.2 Application</p> <p>6.2.2 Documents The documents listed (1) through (10) below, each in triplicate, are to be submitted together with the application form specified in 6.2.1. ((1) to (8) are omitted.) (9) <u>Records of manufacture and delivery</u> (10) Others which are considered necessary by the Society</p>	

Amended-Original Requirements Comparison Table (Environmental Tests for Automatic Devices and Equipment)

Amended	Original	Remarks
<p align="center">EFFECTIVE DATE AND APPLICATION</p> <ol style="list-style-type: none"> 1. The effective date of the amendments is 1 July 2024. 2. Notwithstanding the amendments to the Guidance, the current requirements apply before the effective date. 3. Notwithstanding the provision of preceding 2, the amendments to the Guidance may apply to equipment for marine use for which the application for approval is submitted to the Society before the effective date upon request of the manufacturer. 		