Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk

Object of Amendment

Rules for the Survey and Construction of Steel Ships Parts D and H
Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use

Reason for Amendment

IACS Unified Interpretations (UI) SC6 and SC290 each specify inclination requirements related to emergency power sources for ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk. The only difference, however, between the two UIs is the year (version) of the IGC Code being referenced.

IACS has, therefore, decided to delete the redundant UIs, and transfer their contents to UR M46, which summarises the requirements for inclination of equipment, and UR E10, which summarises the requirements for environmental tests.

Accordingly, relevant requirements are amended in accordance with UR M46(Rev.4) and E10(Rev.10) following their incorporation of UI SC6 and UI SC290.

Outline of Amendment

The main details of this amendment are as follows:

(1) Specifies requirements related to the inclination requirements for emergency power sources for ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk in reference to the IGC Code and IBC Code.
(2) Updates references to standards for environmental tests to reflect their latest editions.

Effective Date and Application

(1) Rules for the Survey and Construction of Steel Ships Parts D and H
This amendment applies to ships for which the date of contract for construction is on or after 1 January 2026.
(2) 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 January 2026.

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

ID: DD24-26

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D MACHINERY INSTALLATIONS

Chapter 1 GENERAL

1.3 General Requirements for Machinery Installations

1.3.1 General*

Table D1.1 Angle of Inclination

Type of machinery installation	Athwartships[2]		Fore-and-aft[2]	
	Static inclination (List)	Dynamic inclination (Rolling)	Static inclination (Trim)	Dynamic inclination (Pitching)
Main propulsion machinery Main boilers and essential auxiliary boilers Prime movers driving generators (excluding those for emergency) Auxiliary machinery (excluding auxiliary machinery for specific use, etc.) and their driving units	15°	22.5°	5°[4]	7.5°
Emergency installation (emergency generators, emergency fire pumps and prime movers to drive them) Switchgears[1](Circuit breakers, etc.) Automatic or remote operated equipment	22.5°[3]	22.5°[3]	10°	10°

Notes:

(1) No undesired switching operations or operational changes are to occur.

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks
(2) Athwartships and fore-and-aft inclinations may occur simultaneously. (3) In ships intended for the carriage of liquefied gases and of dangerous chemicals the emergency power supply is to also remain operable with the ship flooded to a final athwartships inclination up to maximum of 30°. **(*See* 2.7.1-3(2), Part N, 2.9.3(2), Part S)** (4) Where the length of the ship exceeds 100 *m*, the fore-and-aft static angle of inclination may be taken as follows: $\theta = 500/L$ θ : The static angle of inclination (°) L : Length of the ship specified in **2.1.2, Part A** (*m*)		UR M46 Rev.4 M46.2 Note 3 There is no change in the handling.

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part H ELECTRICAL INSTALLATIONS** **Chapter 1 GENERAL** **1.1 General** **1.1.7 Ambient Conditions***	**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part H ELECTRICAL INSTALLATIONS** **Chapter 1 GENERAL** **1.1 General** **1.1.7 Ambient Conditions***	

Table H1.2 Angle of Inclination

Installation Components	Athwartships[2]		Fore-and-aft[2]	
	Static inclination (List)	Dynamic inclination (Rolling)	Static inclination (Trim)	Dynamic inclination (Pitching)
Electrical installations excluding those items started below	15°	22.5°	5°[4]	7.5°
Emergency electrical installations, switch gears (circuit breakers, etc.), electric appliances and electronic appliances[1]	22.5°[3]	22.5°[3]	10°	10°

Notes:

1. No undesired switching operations or operational changes are to occur.
2. Athwartships and fore-and-aft inclinations may occur simultaneously.
3. In ships intended for the carriage of liquefied gases and of dangerous chemicals the emergency power supply is to also remain operable with the ship flooded to a final athwartships inclination up to a maximum of 30°. **(*See* 2.7.1-3(2), Part N, 2.9.3(2), Part S)**
4. Where the length of the ship exceeds 100 *m*, the fore-and-aft static angle of inclination may be taken as follows:

   $\theta = 500/L$

   θ : The static angle of inclination (°)

UR M46 Rev.4
M46.2 Note 3
There is no change in the handling.

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks
L : Length of the ship specified in **2.1.2, Part A** (*m*)		
The effective date of the amendment is according to EFFECTIVE DATE AND APPLICATION (A)		

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks
Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS	**Part 7 CONTROL AND INSTRUMENTATION EQUIPMENT AND ELECTRICAL INSTALLATIONS**	
Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT	**Chapter 1 APPROVAL OF USE OF AUTOMATIC DEVICES AND EQUIPMENT**	
1.7 Markings	**1.7 Markings**	
1.7.1 Markings	**1.7.1 Markings**	

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">
Table 7.1-1 Environmental Test Items, Testing Conditions, Methods, and Criteria
<table>
<tr><th>Test Item</th><th>Testing condition and method</th><th>Criteria</th></tr>
<tr><td colspan="3">(Omitted)</td></tr>
<tr><td>Inclination test</td><td>- The equipment is at an operating condition and check the operation of the equipment with 22.5° static inclination.
- The equipment is at an operating condition and check the operation of the equipment with rolling of 22.5° at period of about 10 seconds for not less than 15 minutes.
- The test is carried out at athwartships and bow-and-stern inclinations.
- On ships for the carriage of liquefied gases and chemicals, the emergency power supply is to remain operational with the ship flooded up to a maximum final athwartships inclination of 30° . <u>(See 2.7.1-3(2), Part N, 2.9.3(2), Part S)</u></td><td>- No abnormality is observed.
- The equipment operates satisfactory.</td></tr>
<tr><td colspan="3">(Omitted)</td></tr>
<tr><td>Conducted high frequency immunity test</td><td>- Check the operation of the equipment when the conducted high frequency immunity test is carried out according to the following condition.
Frequency range: 150 kHz - 80 MHz
Modulation: 80% AM at 1 kHz
Amplitude: 3 V rms
Frequency sweep range: ≤1.5×10⁻³decades/sec. (or 1% / 3sec.)
- This test is to be applied to AC, DC, I/O ports and signal/control lines.
- 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.
- For equipment installed in the bridge and deck zone, the following test levels are to be added.
Spot frequencies: 2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 MHz
Amplitude: 10 V rms
- Detailed test methods are referred to Level 2 of IEC 61000-4-6:<s>2013</s><u>2023</u>.</td><td>- Performance Criterion A^(*1)</td></tr>
<tr><td>Surge immunity test</td><td>- Check the operation of the equipment when the surge immunity test is carried out according to the following condition.
- The test applies to AC and DC power ports.
Open | Pulse rise time | 1.2 μS(front time)</td><td>- Performance Criterion B^(*2)</td></tr>
</table>
</td><td>UR E10 Rev.10, No.8
There is no change in the handling.

UR E10(Rev.10), No.16
Change the measurement method</td></tr>
</table>

<table>
<tr><th colspan="4">Amended</th><th colspan="2">Original</th><th>Remarks</th></tr>
<tr><td></td><td></td><td colspan="2">
<table>
<tr><td rowspan="3">circuit voltage</td><td>Single pulse width</td><td>50 μS(time to half value)</td></tr>
<tr><td rowspan="2">Amplitude (peak)</td><td>line/earth: 1 kV</td></tr>
<tr><td>line/line: 0.5 kV</td></tr>
<tr><td rowspan="2">Short circuit current</td><td>Pulse rise time</td><td>8 μS (front time)</td></tr>
<tr><td>Single pulse width</td><td>20 μS (time to half value)</td></tr>
<tr><td colspan="2">Reputation rate</td><td>at least 1 pulse/min.</td></tr>
<tr><td colspan="2">No. of pulses</td><td>5 per polarity</td></tr>
<tr><td colspan="3">- Test circuit is shown in Fig. 7.1-2 where power and signal lines are identical.
- Detailed test methods are referred to Level 2 of IEC 61000-4-5:2014+AMD1:2017.</td></tr>
</table>
</td><td></td><td></td><td rowspan="3">UR E10(Rev.10), No.18
There is no change in the handling.</td></tr>
<tr><td>Radiated emission test</td><td colspan="2">- Radiated emission test is to be carried out according to the following.</td><td>- Radiated emission is to be within limits in the table.</td><td></td></tr>
<tr><td></td><td colspan="2">
Frequency range:
Up to 1 GHz
<table>
<tr><td colspan="2">- For equipment installed in the bridge and deck zone.</td></tr>
<tr><td>Frequency range</td><td>Quasi peak limits (dBμV/m)</td></tr>
<tr><td>150 kHz - 300 kHz</td><td>80 – 52</td></tr>
<tr><td>300 kHz - 30 MHz</td><td>52 – 34</td></tr>
<tr><td>30 MHz - 156 MHz</td><td>54</td></tr>
<tr><td>156 MHz - 165 MHz</td><td>24</td></tr>
<tr><td>165 MHz - 1 GHz</td><td>54</td></tr>
<tr><td colspan="2">- For equipment other than the above.</td></tr>
<tr><td>Frequency range</td><td>Quasi peak limits (dBμV/m)</td></tr>
<tr><td>150 kHz - 30 MHz</td><td>80 - 50</td></tr>
<tr><td>30 MHz - 100 MHz</td><td>60 - 54</td></tr>
<tr><td>100 MHz - 156 MHz</td><td>54</td></tr>
<tr><td>156 MHz - 165 MHz</td><td>24</td></tr>
<tr><td>165 MHz - 1 GHz</td><td>54</td></tr>
<tr><td colspan="2">- Distance between equipment and antenna is to be 3 m.
- For the frequency band 156 MHz to 165 MHz, the measurement is to be repeated with a receiver bandwidth of 9 kHz (as per IEC 60945:2002).</td></tr>
</table>
</td><td></td><td></td></tr>
</table>

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td></td><td>
- The radiation limit at a distance of 3m from the enclosure port at the frequency range of 156 MHz to 165 MHz may be 30 dBμV/m (peak value) (as per IEC 60945:2002).
- Detailed test methods are referred to CISPR 16-2-3:2016+ AMD1:2019+AMD2:2023. For the frequency band 156 MHz to 165 MHz, Detailed test methods are according to IEC 60945:2002.
</td><td></td><td>UR E10(Rev.10), No.19
Change the measurement method</td></tr>
<tr><td></td><td>
Frequency range: Above 1 GHz
<table>
<tr><th>Frequency range</th><th>Average limit (dB μ V/m)</th></tr>
<tr><td>1 GHz - 6 GHz</td><td>54</td></tr>
</table>
- Distance between equipment and antenna is to be 3 m.
- Equipment intended to transmit radio signals for the purpose of radio communication (e.g. wifi router, remote radio controller) may be exempted from limits, within its communication frequency range, 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 CISPR 16-2-3:2016+ AMD1:2019+AMD2:2023.
</td><td></td><td>UR E10(Rev.10), No.19
Change the measurement method</td></tr>
<tr><td>Conducted emission test</td><td>
- Conducted emission test is to be carried out according to the following.
- The test applies to AC and DC power ports.
- For equipment installed in the bridge and deck zone.
<table>
<tr><th>Frequency range</th><th>Limits (dB μ V)</th></tr>
<tr><td>10 kHz - 150 kHz</td><td>96 – 50</td></tr>
<tr><td>150 kHz - 350 kHz</td><td>60 - 50</td></tr>
<tr><td>350 kHz - 30 MHz</td><td>50</td></tr>
</table>
- For equipment other than the above.
<table>
<tr><th>Frequency range</th><th>Limits (dBμV)</th></tr>
<tr><td>10 kHz - 150 kHz</td><td>120 - 69</td></tr>
<tr><td>150 kHz - 500 kHz</td><td>79</td></tr>
<tr><td>500 kHz - 30 MHz</td><td>73</td></tr>
</table>
- Detailed test methods are referred to CISPR 16-2-1:2014+AMD1:2017.
</td><td>- Conducted emission is to be within limits in the table.</td><td>UR E10(Rev.10), No.20
There is no change in the handling.</td></tr>
<tr><td>Flame retardant test</td><td>- Flame generator:
a) Outer diameter of burner: 0.9 mm or below</td><td>- No flame, no incandescence or
- In the event of a flame or</td><td></td></tr>
</table>

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">
<table>
<tr><td></td><td>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.</td><td>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.</td></tr>
</table>
Remarks:
(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) Inclination test is to be applied to equipment with moving parts.
(4) Salt mist test is to be applied to devices installed in unenclosed spaces such as open decks.
</td><td></td></tr>
<tr><td colspan="2">The effective date of the amendment is according to EFFECTIVE DATE AND APPLICATION (B)</td><td></td></tr>
</table>

Amended-Original Requirements Comparison Table
(Inclination Requirements for Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk)

Amended	Original	Remarks
EFFECTIVE DATE AND APPLICATION (A) **1.** The effective date of the amendments is 1 January 2026. **2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction* is before the effective date. * "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29. IACS PR No.29 (Rev.0, July 2009) **1.** The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding. **2.** The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided: (1) such alterations do not affect matters related to classification, or (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed. **3.** If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply. **4.** If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Note: This Procedural Requirement applies from 1 July 2009. EFFECTIVE DATE AND APPLICATION (B) **1.** This draft amendment applies to automatic equipment for which the application for approval is submitted to the Society on or after 1 January 2026.		