

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part H

Electrical Installations

Rules for the Survey and Construction of Steel Ships
Part H **2017 AMENDMENT NO.1**
Guidance for the Survey and Construction of Steel Ships
Part H **2017 AMENDMENT NO.1**

Rule No.29 / Notice No.27 1st June 2017
Resolved by Technical Committee on 30th January 2017
Approved by Board of Directors on 20th February 2017

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

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part H

Electrical Installations

RULES

2017 AMENDMENT NO.1

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Rule No.29 1st June 2017

AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

“Rules for the survey and construction of steel ships” has been partly amended as follows:

Part H ELECTRICAL INSTALLATIONS

Amendment 1-1

Chapter 1 GENERAL

1.1 General

1.1.6 Drawings and Data*

Sub-paragraph (2) has been amended as follows.

The drawings and data to be submitted are as follows. In cases where the Society deems it to be necessary, the submission of drawings and data other than those specified below may be requested.

(2) Data:

((a) to (e) are omitted.)

(f) The following data in cases where the electrical distribution system on board a ship includes harmonic filters, except in cases where the filters are installed for single application frequency devices such as pump motors.

i) Total Harmonic Distortion (THD) calculation report

ii) Harmonic filter operation guide

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.12 Semiconductor Converters for Power

2.12.1 General*

Sub-paragraph -1 has been amended as follows.

1 The requirements given in this **2.12** are to apply to semiconductor converters for power (hereinafter referred to as “converters”) not less than $5kW$. However, the requirement given in **2.12.4** is to apply to converters less than $5kW$, too.

Paragraph 2.12.4 has been renumbered to Paragraph 2.12.5, and Paragraph 2.12.4 has been added as follows.

2.12.4 Harmonic Filters

1 Where the electrical distribution system on board a ship includes harmonic filters, except when the filters are installed for single application frequency drives such as pump motors, the ship is to be fitted with facilities to continuously monitor the Total Harmonic Distortion (THD) value experienced on the main busbar as well as to alert the crew in cases where the value exceeds the upper limits given in **2.1.2-4**. The Total harmonic distortion (THD) value is to be recorded in the engine log book, but this reading may be logged electronically in cases where the engine room is provided with systems which automatically log such values.

2 The protection arrangements for harmonic filters specified in -1 are to comply with the following requirements:

- (1) Arrangements are to be provided to alert in the event of activation of the protection of a harmonic filter circuit.
- (2) The protection of a harmonic filter circuit is to be arranged in conformity with the following requirements:
 - (a) A harmonic filter is to be arranged as a three-phase unit with individual protection provided for each phase. The activation of the protection arrangement for a single phase is to result in automatic disconnection of the entire filter.
 - (b) A current unbalance detection system independent of the overcurrent protection is to be provided to alert the crew in the case of current unbalance.
- (3) Consideration is to be given to additional protection for individual capacitor elements, such as relief valves or overpressure disconnectors, in order to protect against damage from rupturing. This consideration is to take into account the type of capacitors used.

2.12.45 Shop Tests*

Sub-paragraph -1 has been amended as follows.

1 Converters and their accessories are to be tested in accordance with the requirements in this **2.12.45**. However, those tests required by -2 below may be omitted, subject to Society approval, for those products which are produced in a series of identical types from the second unit onward.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 1 July 2017.
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 and that are not newly fitted with harmonic filters on or after 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.

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.9 Cables

Paragraph 2.9.1 has been amended as follows.

2.9.1 General*

Cables are to comply with *IEC Publication 60092* or any equivalent thereto. However, cables such as flexible cables, fibre-optic cables, etc. used for special purposes may be accepted provided they comply with relevant standards deemed appropriate by the Society or any equivalent thereto. Installation of cables is to comply with the requirements given in this **2.9**.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 July 2017.

Chapter 5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS

5.2 Propulsion Electrical Equipment and Cables

5.2.1 General*

Sub-paragraph -3 has been added as follows.

3 Propulsion electrical equipment and cables connected to circuits with propulsion semiconductor convertors are to be designed in consideration of the additional heating contribution caused by the harmonics generated by such circuits.

5.2.2 General Requirements for Propulsion Motors*

Sub-paragraph -1(4) has been amended as follows.

1 Propulsion motors are to perform as specified in the following (1) to (5):

((1) to (3) are omitted.)

(4) Propulsion motors are to be capable of withstanding a sudden short circuit at their terminals under ~~rated~~ all conditions without suffering damage.

((5) is omitted.)

Sub-paragraph -6 has been amended as follows.

6 Breaking or blocking systems or decoupling systems which can fix the shafts of propulsion motors are to be provided in preparation for those cases where such propulsion motors failure. In this case, the power output of the remaining shafts may be limited as long as manoeuvrability is maintained under all weather conditions.

5.2.3 Construction and Arrangement of Propulsion Rotating Machines*

Sub-paragraph -4 has been amended as follows.

4 Propulsion rotating machines provided with forced ventilation systems, air ducts, ~~or~~ air filters, water-cooled heat exchangers, etc., are to have thermometers for measuring cooling air temperatures and visible and audible alarm systems responsible for detecting excessive bearing temperatures. Especially, in cases where ~~water-cooled~~ heat exchangers are adopted, additional leakage monitoring systems are to be provided ~~and located so that any leakage water is kept away from the windings.~~

Sub-paragraph -9 has been added as follows.

9 Regenerated power which may occur when reversing operation of ship from full ahead to full astern or from full astern to full ahead is carried out is to be limited by the control system in order to protect generators from overspeed or reverse power. However, the requirement does not apply in cases where external means such as a braking resistor is provided to absorb excess amounts of

regenerated energy and to reduce the speed of the propulsion motor.

5.2.5 Propulsion Semiconductor Convertors*

Sub-paragraph -6 has been amended as follows.

6 Failures of ~~S~~semiconductor elements and ~~protective fuses for~~ harmonic filter circuits installed in propulsion semiconductor convertors are to be monitored at all times. Harmonic filter protection circuits are to be fail-safe.

5.2.6 Propulsion Transformers*

Sub-paragraph -6 has been amended as follows.

6 Propulsion transformers are to be protected from short circuit at their primary and secondary sides ~~also~~. However, it is acceptable to only protect the primary side provided that overcurrent protection is arranged on the secondary side.

Sub-paragraph -7 has been added as follows.

7 High voltage propulsion transformers are to be provided with differential protection relays to protect the primary side (high voltage busbar side), except in cases where other means deemed equivalent to such relays are provided instead.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

- 1.** The effective date of the amendments is 1 December 2017.
- 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.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part H

Electrical Installations

GUIDANCE

2017 AMENDMENT NO.1

Notice No.27 1st June 2017

Resolved by Technical Committee on 30th January 2017

AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

“Guidance for the survey and construction of steel ships” has been partly amended as follows:

Part H ELECTRICAL INSTALLATIONS

Amendment 1-1

H1 GENERAL

H1.1 General

Paragraph H1.1.6 has been amended as follows.

H1.1.6 Drawings and Data

1 The wording “lists of any electrical equipment installed in such hazardous areas” specified in **1.1.6(2)(d) and (e), Part H of the Rules** means such lists are to include the following information:
(1) and (2) are omitted.)

2 “Total Harmonic Distortion (THD) calculation report” specified in 1.1.6(2)(f)i, Part H of the Rules is to include the following information:

(1) Results of the calculation of the Total Harmonic Distortion (THD) value experienced when a failure of a harmonic filter occurs.

(2) With respect to 2.1.2-4, Part H of the Rules, the acceptable limit of the Total Harmonic Distortion (THD) value.

3 The “harmonic filter operation guide” specified in 1.1.6(2)(f)ii, Part H of the Rules is to include the following information:

(1) The permitted operating mode of the electrical distribution system while maintaining the Total Harmonic Distortion (THD) values within acceptable limits during normal operation.

(2) The permitted operating mode of the electrical distribution system in the case of failure of any combination of harmonic filters.

4 Data specified in -2 and -3 are to be submitted by the system integrator of the distribution system.

H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

H2.1 General

H2.1.2 Voltage and Frequency

Sub-paragraph -3 has been amended as follows.

3 The wording “specially approved by Society” given in **2.1.2-4, Part H of the Rules** means to satisfy any of the following:

- (1) In ~~supply~~ distribution systems connected with semiconductor converters where the safe operation of other electric devices connected to such ~~supply~~ distribution systems is maintained by the adoption of suitable methods for decreasing harmonic content effects such as harmonic filters, and the Total Harmonic Distortion (THD) values do not exceed 8%.
- (2) In electric propulsion ships, where the ~~supply~~ distribution systems connected with propulsion semiconductor converters are closed circuits independent from other internal ~~supply~~ distribution systems, and the Total Harmonic Distortion (THD) values do not exceed 10%.

H2.12 Semiconductor Converters for Power

Paragraph H2.12.4 has been amended as follows.

H2.12.45 Shop Tests

1 Regarding the temperature rise tests for semiconductor element connections mentioned in **2.12.45-2, Part H of the Rules**, measurements of the temperature rise of individual element parts such as cooling fins, cases and coolant parts, etc. may be accepted. However, such temperature rise tests may be performed on the aforementioned element parts only in cases where manufactures specify in advance that the temperature rise of semiconductor element connections will not exceed their maximum allowable temperature if the temperature rise of their parts is within allowable limits.

2 With respect to **2.12.45-3, Part H of the Rules**, tests which may inadvertently inflict serious damage on the protective devices of semiconductor elements may be omitted in cases where the proper operation of semiconductor element protective fuses, etc. can be confirmed.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 1 July 2017.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction* is before the effective date and that are not newly fitted with harmonic filters on or after the effective date.
 - * “contract for construction” is defined in the latest version of IACS Procedural Requirement (PR) No.29.

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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.

H5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS

H5.2 Propulsion Electrical Equipment

Paragraph H5.2.6 has been amended as follows.

H5.2.6 Propulsion Transformers

In cases where specified in **5.2.6-6, Part H of the Rules**, the use of protection devices fitted in propulsion convertors may be acceptable as short-circuit protection for the secondary side.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

- 1.** The effective date of the amendments is 1 December 2017.
- 2.** Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction is before the effective date.