09-420

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 2009 AMENDMENT NO.1
Guidance for the Survey and Construction of Steel Ships
Part H 2009 AMENDMENT NO.1

Rule No.19 / Notice No.18 15th April 2009
Resolved by Technical Committee on 4th February 2009
Approved by Board of Directors on 24th February 2009

ClassNK
NIPPON KAIJI KYOKAI

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part H Electrical Installations

2009 AMENDMENT NO.1

Rule No.19 15th April 2009

Resolved by Technical Committee on 4th February 2009

Approved by Board of Directors on 24th February 2009

Rule No.19 15th April 2009
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

Chapter 1 GENERAL

1.1 General

1.1.5 Definitions

Sub-paragraph (13) has been added as follows.

(13) "Semi-conductor" is a device using semi conducting electronic elements to convert electric energy from one state to another. (*e.g.*, from *a.c.* to *d.c.*, *d.c.* to *a.c.*, *a.c.* to *a.c.* or *d.c.* to *d.c.*)

1.1.6 Drawings and Data

Sub-paragraph (1)(g) has been added as follows.

(1) Drawings :
- (a) Sectional assembly of generators, motors and electromagnetic slipcouplings for electric propulsion equipment including complete rating, main dimensions, main materials used and weights
- (b) Key diagram and explanation of electric propulsion control gears
- (c) Sectional assembly of generators (main, auxiliary and emergency) of 100 *kW* (or *kVA*) and over, including complete rating, main dimensions, main materials used and weights
- (d) Arrangement plan (including specifications of main parts such as circuit breakers, fuses, instruments and cables) and circuit diagrams of main switchboard and emergency switchboard
- (e) Plans of arrangement of electrical equipment and of cable installation
- (f) Diagrams of the wiring system including normal working current, rated current, prospective short-circuit current in the circuits, line drop of voltages, type of cables, cable sizes, rating and setting of circuit breakers, rating of fuses and switches, and breaking capacity of circuit breakers and fuses
- (g) Semi-conductor rectifiers for power for electric propulsion and for electric generators (including dimensions, electric equipment particulars, sectional assembly).

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.1 General

2.1.2 Voltage and Frequency

Sub-paragraph -4 has been added as follows.

4 In cases where *a.c.* generators are driven at rated speeds, giving rated voltages and rated symmetrical loads, the Total Harmonic Distortion (THD) of distribution systems connected such generators is not to exceed values of 5%. However, in cases where specially approved by the Society, the Total Harmonic Distortion (THD) may exceed the requirement values.

Section 2.12 has been amended as follows.

2.12 Semi-conductor Rectifiers for Power

2.12.1 General

1 The requirements given in this **2.12** are to apply to ~~the~~ semi-conductor rectifiers for power (hereinafter referred to as "rectifiers") not less than 5 *kW*. ~~Further, the rectifiers specified in this section are to be taken as a rectifier including thyristor.~~

2 ~~Accessories of the rectifier~~ Rectifiers are to be in accordance with all applicable requirements given in this ~~part~~ Part, and standards are, as far as practicable, to be deemed appropriate by the Society.

2.12.2 Construction and Location

1 Rectifier valve units, rectifier stacks or rectifier cells are to be so arranged that they can be removed from equipment without dismantling the complete unit.

2 ~~Self-cooling and air-cooled rectifiers are to be suitably installed or protected against the effects of salty air and humidity~~ Effective means are to be provided in semiconductor convertors to prevent any accumulation of moisture and condensation unless such semiconductor convertors are located in air-conditioned spaces.

3 ~~Where mercury vapour is liable to be generated, self-cooling and air-cooled semi-conductor rectifiers are not to be used~~ Transformers for rectifiers are to be of two separate windings.

4 Where rectifier elements are connected in series or parallel, they are so arranged that the voltage or current on each element will become equal as far as practicable.

5 ~~Rectifiers are to be installed in such a manner that the circulation of cooling air is not impeded and that the temperature of the inlet air to the air-cooled rectifier stacks does not exceed the allowable value.~~ Rectifiers are to be installed with effective cooling devices in order to maintain temperature rises of semiconductor elements or semiconductor stacks below allowable levels. In such cases, such equipment is to be installed in such a manner that coolant circulation is not impeded and that the temperature of the air at inlets to air-cooled rectifier stacks does not exceed allowable values.

6 Rectifiers are to be separated from resistors, steam pipes or other sources of radiant heat as far as practicable.

2.12.3 Protective Devices, etc.

1 ~~Where~~ In cases where forced cooling devices are ~~is~~ provided, ~~the~~ rectifiers ~~is~~ are to be ~~so~~ arranged so that ~~the rectifier~~ they can not remain loaded unless effective cooling is maintained.

2 Where necessary, means are to be provided to guard against transient over-voltage caused by switching and breaking of the circuits and *d.c.* voltage rise due to regenerative power.

3 Protecting fuses for rectifier cells are to be co-ordinated with the character of rectifier cell as far as practicable.

4 ~~The maximum permissible temperature of junction of rectifier cells is to be such a value as will be specified by the manufacturer. Where the information is not available, the maximum permissible temperature of junction of rectifier cells is not to exceed the following values :~~

~~Selenium : 70℃~~

~~Silicon : 150℃ (thyristor : 125℃)~~

Over voltages in those supply systems to which semiconductor convertors are connected are to be limited by suitable devices to prevent any damage.

5 ~~Transformers for rectifier are to be of two separate windings~~ Semiconductor elements and filter circuits are to be protected by fuses, etc.

~~**2.12.4 Thyristor Control**~~

~~**1** Gate control circuits are to comply with the following :~~

~~(1) Gate control circuits of thyristors are to be so arranged that they can generate the gate pulse not exceeding the gate rating and having the pulse width enough to fire all thyristors connected. The gate control circuits are also to be protected from misfire caused by electrostatic induction and/or electromagnetic induction.~~

~~(2) Where thyristors are connected in series or parallel, gate control circuits are to be so arranged that firing timings of each thyristor are not irregular.~~

~~**2** Where *d.c.* motors are controlled by a thyristor, the following requirements **(1)** to **(3)** are to be applied :~~

~~(1) Where communication of *d.c.* motor may be affected by the harmonics of thyristor output waveform, appropriate measures are to be taken to reduce such harmonics.~~

~~(2) Where electrical sources may be affected by lower power factor resulted from the phase control of thyristor, means are to be provided to compensate it.~~

~~(3) In case where motors are operated in either direction of rotation by means of changing-over the field polarity, interlock is to be made so as to reverse the polarity of field after armature current reaching zero, and in addition, suitable means are to be provided to limit electrical non-locked conditions of armature.~~

2.12.~~5~~4 Shop Tests

1 Rectifiers and their accessories are to be tested in accordance with the requirements in this **2.12.~~5~~4**. The test required by **-2**, however, may be omitted subject to the Society's permission for each product which is produced in series having identical type with its first unit.

2 Temperature rise tests of rectifiers and their accessories ~~is~~ are to be carried out under normal working conditions, and the test results are ~~to comply with the requirements in **2.12.3-4**~~ not to exceed~~ing the~~ those values specified in the requirements given in **2.8.3** ~~as well~~. Furthermore, temperature test methods for semiconductor element connections are to be as deemed appropriate by the Society.

3 Instruments, switching devices and protective devices fitted in rectifiers are to be checked for normal operation under operating conditions.

4 Rectifiers are to withstand the high voltage by applying the following *a.c.* voltage for one *minute* between rectifier cells or live parts of accessories charged with main circuit potential and

earth.

Testing voltage (V) = $1.5EP_i$ + 1000 (minimum 2,000 V)

EP_i : ~~Peak reverse voltage~~ Maximum voltage values are to be impressed on the reverse side of convertor circuit arms

Where *d.c.* voltage is less than 100 V, minimum testing voltage may be 1,500 V. Rectifier cell is to be short-circuited before the test.

5 High voltage test between live parts and earth for accessories charged with auxiliary circuit potential is to be in accordance with the requirements in **2.8.4-4**.

6 After the high voltage test, insulation resistance between live parts of rectifiers and their accessories and earth is not to be less than $1M\Omega$ when tested with *d.c.* voltage of at least 500 V.

Chapter 3 DESIGN OF INSTALLATIONS

3.6 Navigation Lights, Other Lights, Internal Signals, etc.

Paragraph 3.6.1 has been amended as follows.

3.6.1 Navigation Lights

1 Navigation lights are to be connected separately to the navigation light indicator panel.

2 Each navigation light is to be controlled and protected in each insulated pole by a switch with fuses or a circuit breaker fitted on the navigation light indicator panel.

3 The navigation light indicator panel is to be power supplied by a separate circuit from the main switchboard or the secondary busbar of transformers connected to it and from the emergency switchboard or the secondary busbar of transformers connected to it respectively. The circuits are to be separated throughout their length as widely as practicable.

4 Switches and fuses are not to be provided on the feeder circuits of navigation lights, except the switchboards and indicator panel.

5 The navigation light indicator panel is to be placed in an accessible position on the navigation bridge.

6 In cases where the event of failure of navigation lights due to bulb blown and short-circuit, etc., visual and audible alarms are to activate on navigation light indicator panels. That alarm devices are to be fed from the main sources or emergency sources (or standby sources) of power and that their feeder circuits are to be independent of the feeder circuits from navigation light indicator panels to navigation lights.

Chapter 5 ADDITIONAL REQUIREMENTS FOR ELECTRIC PROPULSION PLANTS

Section 5.2 has been amended as follows.

5.2 Propulsion Electrical Equipment ~~and Cables~~

5.2.1 General

1 Excessive electromagnetic interference of propulsion electrical equipment (*e.g.*, sources of electrical power devices for propulsion, propulsion transformers, propulsion semiconductor convertors, propulsion motors) ~~are~~ is not to occur ~~observed at any~~ under normal manoeuvring conditions.

2 Propulsion electrical equipment connected to circuits with propulsion semiconductor convertors is to be designed considering the harmonic content effects occurring on such circuits.

5.2.2 General Requirements for Propulsion Motors

1 Propulsion motors are to have performance specified in the following **(1)** to ~~**(3)**~~**(5)**.

(1) Torque available for manoeuvring a ship is to be capable of stopping or reversing of the ship in a reasonable time when the ship is running at maximum service speed

(2) Adequate torque margin is to be provided in *a.c.* propulsion systems to guard against the motor to be pulled out of synchronism during rough weather and at the time of turning operation in a multiple-screw ship

(3) Motors are not to produce any harmful torsional vibration within a normal range of rotational speeds

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

(5) Permanent exited motors and their current carrying components are to be capable of withstanding any steady state short circuit currents.

~~**2** Lubrication of the bearings of propulsion motors is to be effective at all operational speed including creep speed. When a forced lubrication system is used, the system is to be provided with alarm devices which give visible and audible alarming in the event of failure of lublicating oil supply or appreciable reduction in lubricating oil pressure, and also with devices to stop the operation of the motors automatically by lower pressure after the function of the alarm.~~

~~**3**~~**2** For *d.c*. motors liable to over the speed specified in **2.4.7** due to propeller missing or propeller racing, overspeed protection devices are to be provided, and the rotors are to be suitably constructed to prevent damage due to excessive overspeed.

~~**4**~~**3** Where arrangements permit a propulsion motor to be connected to the generating plant having a continuous rating greater than the motor rating, means are to be provided to prevent continuous operation at the overload or overtorque conditions not permitted to the motors and shaftings.

~~**5**~~**4** The propulsion motor shaft is to conform to the requirements in **2.4.11**. In this case, the diameter of the rotor shaft in the length from the section where rotor is fixed to the shaft end of propeller side is to conform to the requirements in **2.4.11-3(1)**. The value of F_1 is to comply with the value specified either in **(1)** or **(2)** below.

(1) When the motor has bearings at both ends: 110

(2) When the motor has no bearings at its propeller side: 20

5 In cases where the coolers of propulsion motors fail, but restricted service is to be possible.

6 Breaking or blocking systems or decupling systems which can fix the shafts of propulsion

motors are to be provided in preparation for those cases where such propulsion motors failure.

7 In cases where the temperature rise for the windings of propulsion motors mentioned above in **5.2.3-3.** exceed design allowance values, means of decreasing nominal propulsion power are to be provided.

5.2.3 Construction and Arrangement of Propulsion Rotating Machines

1 Means are to be provided to prevent the accumulation of bilgewater under the propulsion motors, the generators, the exciters or the electromagnetic slip-couplings(hereinafter referred to as the propulsion rotating machines in this chapter).

2 Slip rings and commutators of propulsion rotating machines are to be suitably arranged to be maintained easily. For purpose of inspection and repair is to be made for easy access to each kind of coils and bearing. When the Society considers necessary, the propulsion rotating machines are to have construction that permits removal and replacement of their field windings.

3 Temperature sensors for monitoring and alarming are to be provided for ~~a~~ the stator windings of *a.c*. machines or ~~a~~ the interpoles, mainpoles and compensation windings of *d.c*. machines ~~with~~ which exceed ~~500 *kW*~~ ratings of 500 *kW* (or *kVA*).

~~**4** Propulsion rotating machines provided with forced ventilation systems, air ducts or air filters are to have thermometers for measuring cooling air temperatures.~~

4 Propulsion rotating machines provided with forced ventilation systems, air ducts or air filters 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 coolers are adopted, additional leakage monitoring systems are to be provided and located so that any leakage water is kept away from the windings.

5 Effective means are to be provided in rotating machines to prevent accumulation of moisture and condensation.

6 The lubrication of bearings is to be effective at all operational speeds including creep speeds. In cases where forced lubrication systems for bearings are used, such systems are to be provided with alarm devices which give visible and audible alarms in the event of any failure of lubricating oil supplies or any appreciable reduction in lubricating oil pressure. In addition, devices to automatically stop the operation of motors after such alarms have sounded are to be provided as well.

7 Bearings are to be provided with monitoring systems for bearing temperatures and with alarm systems responsible for detecting excessive bearing temperatures.

8 In order to protect generator circuits from electrical failures located on the generator side of generator breakers, differential current protection devices are to be provided for propulsion generators with ratings exceed 1500 *kW* (or *kVA*).

5.2.4 Temperature Rise of Rotating Machines

~~When~~ In cases where variable speed propulsion rotating machines are fitted with ~~an~~ integral fans and have to be operated at speeds below ~~the~~ rated speeds ~~with~~ at full-load torque, full-load current, full-load excitation or the like, temperature limits according to **Table H2.2** of **2.4.3** are not to be exceeded.

5.2.5 Propulsion Semiconductor Convertors

~~**1** The semiconductor convertor is to be designed to withstand an overcurrent which may be generated during the turning motion of a ship and under the manoeuvring conditions specified in **1.3.2, Part D**.~~

~~**2** When semiconductor elements are connected in series or in parallel, an equal voltage or current distribution are to be ensured.~~

~~**3** An effective cooling device is to be provided for maintaining the temperature rise of~~

~~semiconductor elements or semiconductor stacks below an allowable level.~~

~~**4** Forced ventilated semiconductor elements are to be arranged in such a way that the semiconductor convertors may reduce its output in the event of failure of the ventilating fan, or when a plurality of semiconductor elements are connected in parallel and ventilating fans are provided for individual groups, the elements of the group concerned can be separated from others.~~

~~**5** Forced ventilated semiconductor convertor are to be provided with thermometers for measuring cooling air temperatures.~~

~~**6** Effective means are to be provided in semiconductor convertor to prevent accumulation of moisture and condensation unless the semiconductor converters are situated in an air-conditioned space.~~

~~**7** Over voltages in a supply system to which semiconductor convertors are connected are to be limited by suitable devices to prevent damage.~~

~~**8** Semiconductor elements and filter circuits are to be protected by fuses, etc. as deemed appropriate by the Society.~~

1 Propulsion semiconductor convertors are to be designed to withstand any overcurrents which may be generated during turning and astern motions of ships (under conditions specified in **1.3.2, Part D**).

2

In cases where semiconductor elements are cooled by forced ventilation, etc., the following preventive measures are to be provided to respond to any failure of such cooling systems:

(1) Output reduction or decupling measures for propulsion semiconductor convertors, and.

(2) In cases where semiconductor elements are connected in parallel, divided into groups, and provided with independent group cooling systems, measures to separate the concerned group from others.

3 Forced cooled propulsion semiconductor convertors are to be provided with means for monitoring effective forced cooling, and alarming in the event of any cooling system failure.

4 In cases where propulsion convertors are cooled by the forced ventilation of coolant, alarms are to be given in the event of any coolant leakage.

5 In cases where the sensors which detects speeds and rotor positions of propulsion motors are provided, alarms are to be connected to such sensors and respond in cases of the sensors failure.

6 Semiconductor elements and protective fuses for filter circuits installed in propulsion convertors are to be monitored at all times.

~~**5.2.6 Cables**~~

~~Conductors of cables for controlgear and instrumentation, which are connected directly with a main circuit are to have 7 or more strands, with a cross-sectional area of 1.5 mm^2 or more.~~

5.2.6 Propulsion transformers

1 Propulsion transformers are to be provided with means for monitoring winding temperatures.

2 In cases where the temperature rise for the windings of propulsion transformers exceed design allowance values, means of decreasing propulsion power are to be provided.

3 In cases where liquid cooled transformers are used as propulsion transformers, the following requirements **(1)** to **(3)** are to apply:

(1) Means of monitoring liquid temperatures are to be provided. In addition, prealarms are to be actuated before maximum permissible temperature is attained. In cases where the maximum permissible temperature limit is reached, transformers are to be switched off.

(2) Means of monitoring liquid filling levels by two separate sensors are to be provided. In addition, prealarms are to be actuated before liquid levels below permissible levels. In cases where liquid levels fall below permissible levels, supplies for transformers are to be switched off.

(3) Gas-actuated protection devices are to be provided.

4 Forced ventilated propulsion transformers are to be provided with means of monitoring the operation condition of ventilation devices and cooling air temperatures.

5 Propulsion transformers with closed circuit cooling methods for heat exchangers are to be provided with thermometers for monitoring cooling air temperatures. Especially, in cases where water cooling methods are adopted, additional leakage monitoring systems are to be provided and located so that any leakage water is kept away from the windings.

6 Propulsion transformers are to be protected from short circuit at their secondary also.

5.2.7 Measuring Instruments

~~Measuring instruments specified **(1)** to **(4)** below are to be installed on the control panel of propulsion motors or in other appropriate places in addition to those specified in **Table H2.7** of **2.5.6** or **Table H2.8** of **2.5.7 :**~~

~~(1) Temperature indicator for interpole windings or stator windings of rotating machines for propulsion.(only where output exceeds 500 *kW*)~~

~~(2) Voltmeters for motors~~

~~(3) Ammeters for field currents and armature in the case of *d.c.* motors~~

~~(4) Ammeters for main circuits in the case of *a.c.* motors~~

Measuring instruments specified below are to be installed on the control panels of propulsion motors or local control positions:

(1) Voltmeters for propulsion motors (only in the case of variable speed control)

(2) Ammeters for propulsion motors (Ammeters for field currents and armatures in the case of *d.c.* motors, Ammeters for main circuits in the case of *a.c.* motors)

Section 5.3 has been amended as follows.

5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits

5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion

1 Means are to be provided to ensure that the installation or equipment mentioned in the following **(1)** to ~~**(6)**~~**(5)** are to be capable of starting the propulsion motors and obtaining a navigable speed for the ship even though one of those becomes inoperative.

(1) The source of electrical power for propulsion

(2) Transformers for propulsion

(3) Semiconductor convertors (~~including exciters of propulsion motors~~ or propulsion motor control devices)

~~(4) Cooling system of propulsion motors~~

~~(5) Lubricating system of propulsion motors~~

(4) Propulsion motors (including cooling systems and lubricating systems)

(~~6~~5) Other installations and equipment which the Society deems necessary

2 Where the source of electrical power for propulsion correspond to **(1)** and **(2)** below, they may be used for the main source of electrical power specified in **3.2.1**.

(1) When one set of the source of electrical power for propulsion is out of operation, the capacity specified in **3.2.1-2** is secured by the remaining the source of electrical power for propulsion, which at the same time has a capacity sufficient to give a navigable speed for the ship.

(2) At ~~the~~ times of load fluctuations and braking of the propeller~~ or at the time of changing the rotational speed of the propulsion generator in order to control the propulsion motors~~, ~~the~~ variations of ~~the~~ voltage and frequency are to comply with the requirements given in **2.1.2-3**.

5.3.2 Electrical Power Supply Circuits

1 Electrical equipment or installations, in duplicate, in accordance with the requirements in **5.3.1-1** are to be supplied with electrical power by mutually independent circuits. In such cases, wiring cables are to be separated as far apart as practicable through out their length.

2 Propulsion system having two or more generators or motors respectively on one propeller shaft, is to be so arranged that any unit of them can be taken out of service and isolated electrically.

3 The safety ~~Safety~~ measures specified in the following **(1)** to ~~**(6)**~~**(5)** are to be implemented ~~taken~~ for ~~the~~ electrical power supply circuits.

~~(1) Overcurrent protective devices, if any, in the main circuits are to be sufficiently high so that there is no possibility of their operating due to overcurrent caused by manoeuvring condition in rough weather, turning operation or the operation specified in **1.3.2, Part D**.~~

(1) Overcurrent protective devices, if any, in main circuits are to be sufficiently high so that there is no possibility of their operating due to overcurrent caused by manoeuvring in rough weather conditions, turning operations or astern operations (under the conditions specified in **1.3.2, Part D**).

(2) Means for earth leakage detection are to be installed on the electrical power supply circuit to the propulsion motor.

(3) Excluding a brushless exciting circuit and an exciting circuit of a rotating machine of less than 500 *kW*(or *kVA*), an earth leakage detection is to be installed at an insulated exciting circuit.

~~(4) For propulsion motors or propulsion generators, means are to be provided to enable them to have selective tripping or quick reduction in their field magnetic flux to safeguard against the occurrence of overload current on the main circuits.~~

(~~5~~4) ~~Field circuits are~~ It is to be provided with means of suppressing voltage rise ~~when~~ in cases where ~~the field switch is~~ switches in excitation circuits are opened.

(~~6~~5) In excitation circuits, there is to be no overload protection ~~causing the openning of the~~ that causes the opening of any circuits.

4 In cases where generators are running in parallel and one of them is tripping, power supply systems are to be provided with suitable means of load reductions to protect the remaining generators against unacceptable load steps.

Chapter 6 SPECIAL REQUIREMENTS FOR SHIPS WITH RESTRICTED SERVICE, SMALL SHIPS AND FISHING VESSELS

6.2 Electrical Installations of Ships Specified in 6.1.1(1)

Paragraph 6.2.17 has been amended as follows.

6.2.17 Power Supply to Navigation Lights

Notwithstanding the requirements of **3.6.1-3** and **-6**, power feeding to a navigation light indicator panel (including alarm circuits) is to be supplied by a separate circuit from a main switchboard and a reserve source of electrical power or a lighting distribution panel provided on the navigation bridge (limited to the case where two or more generating sets are provided). However, for ships with a gross tonnage less than 500 *tons*, only one circuit from the main switchboard supplied from the main source of electrical power and the reserve source of electrical power may be accepted.

6.3 Electrical Installations of Ships Specified in 6.1.1(2)

Paragraph 6.3.5 has been amended as follows.

6.3.5 Power Supply to Navigation Lights

Notwithstanding the requirements of **3.6.1-3** and **-6**, power feeding to a navigation light indicator panel (including alarm circuits) may be supplied by one circuit from a main switchboard supplied from a main source of electrical power and a reserve source of electrical power.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 15 October 2009.

2. Notwithstanding the amendments to the Rules, the current requirements may 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

GUIDANCE

Part H Electrical Installations

2009 AMENDMENT NO.1

Notice No.18 15th April 2009

Resolved by Technical Committee on 4th February 2009

Notice No.18 15th April 2009
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

H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.1 General

2.1.2 Voltage and Frequency

Paragraph H2.1.2-3 has been added 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 systems connected with rectifiers where the safe operation of other electric devices connected to such supply systems is maintained by the adoption of suitable methods for decreasing harmonic content effects, and Total Harmonic Distortion (THD) values do not exceed 8%.

(2) In electric propulsion ships, where the supply systems connected with rectifiers are closed circuits independent from other internal supply systems, and Total Harmonic Distortion (THD) values do not exceed 10%.

Fig. H2.1.2-1. Application example of H2.1.2-3.(1)

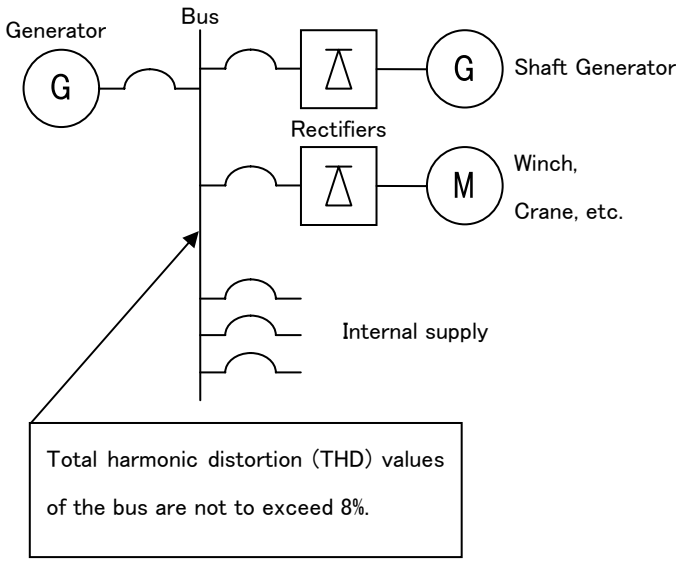
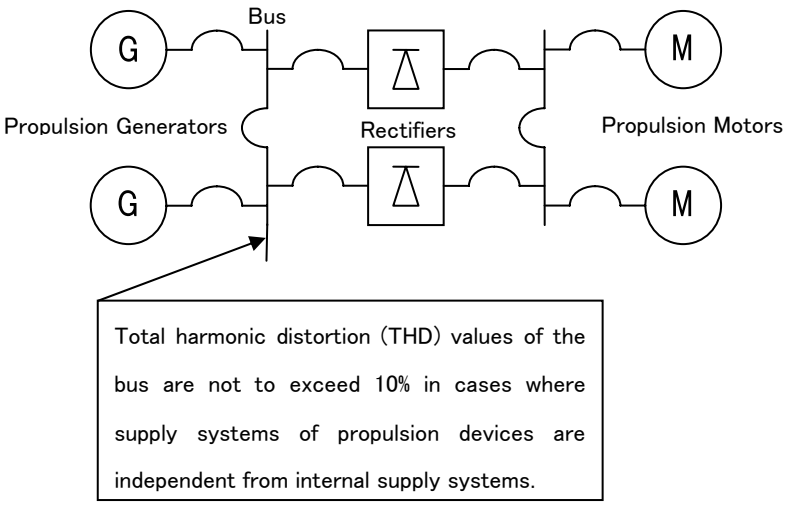


Fig. H2.1.2-2. Application example of H2.1.2-3.(2)



Section H2.12 has been added as follows.

2.12 Semi-conductor Rectifiers for Power

2.12.1 General

The wording "standards are to be deemed appropriate by the Society" given in **2.12.1-2**, **Part H of the Rules** means the current standards of *IEC* 60146.

2.12.4 Shop Tests

(1) Regarding the temperature rise tests for semiconductor element connections mentioned in **2.12.4-2**, **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 preformed 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 **2.12.4-3**, **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.

Chapter H5 has been added as follows.

H5 ADDITIONAL REQUIREMENTS FOR ECTRICAL PROPULSION PLANTS

5.1 General

5.1.1 Scope

In **5.1.1-1**, **Part H of the Rules**, the exclusion of thrusters intended as auxiliary steering devices, booster and take-home devices may be acceptable.

5.2 Propulsion Electrical Equipment

5.2.1 General

The wording "designed considering the harmonic content effects" specified in **5.2.1-2**, **Part H of the Rules** means that designs in which the Total Harmonic Distortion (THD) on circuits connected to propulsion electric equipment satisfies the requirement given in **2.1.2-4**, **Part H of the Rules**.

5.2.2 General Requirements for Propulsion Motors

1 The wording "current carrying components" specified in **5.2.2-1(5)**, **Part H of the Rules** means, for example, cables, feeder circuits, and slip-rings.

2 The wording "restricted service" specified in **5.2.2-5**, **Part H of the Rules** means, for example, the opening of emergency air inlets fitted in the body of propulsion motors by the crew, etc. in order to maintain minimum cooling performance as well as the manoeuvring condition of operating such motors under low output.

5.2.3 Construction and Arrangement of Propulsion Rotating Machines

The wording "thermometers for measuring cooling air temperatures" specified in **5.2.3-4**, **Part H of the Rules** means that it is measure exhaust side temperatures. Furthermore, the Society may accept the use of thermo-sensors fitted in the stator windings of propulsion rotators as a substitute means.

5.2.5 Propulsion Semiconductor Convertors

1 The wording "means for monitoring effective forced cooling" specified in **5.2.5-3**, **Part H of the Rules** means, for example, those thermometers measuring cooling air temperatures.

2 The wording "sensors failure" specified in **5.2.5-5**, **Part H of the Rules** means line open faults, short-circuit, etc.

5.2.6 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.

5.3 Composition of Electrical Equipment for Propulsion and Electrical Power Supply Circuits

5.3.1 Composition of Electrical Equipment for Propulsion and Auxiliary Machinery for Propulsion

1 The wording "obtaining a navigable speed for the ship" specified in the main sentence of **5.3.1-1**, **Part H of the Rules** means the speed given in **D1.3.1-1**, **Part D of the Guidance for the Survey and Construction of Steel Ships**.

2 The wording "lubricating systems" specified in **5.3.1-1(4)**, **Part H of the Rules** means lubricating oil pumps.

3 In cases where specified in **5.3.1-1(4)**, **Part H of the Rules**, the installation of only one propulsion motor onboard ship may be acceptable on the condition that the following requirements are satisfied:

(1) Synchronous motors and induction motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor. Furthermore, such convertors are to be designed for at least 50% nominal power of the propulsion drive system

(2) Permanent-magnet excited motors are to be provided with two stator winding systems which can be disconnected from their respective propulsion convertor.

(3) Propulsion motors are to be provided with means for substitution (emergency opening air flap etc.) in addition to those temperature monitoring systems required in **5.2.3-3** and **-4**, **Part H of the Rules**, However, in cases where two cooling systems are installed, this requirement does not apply.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 15 October 2009.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships for which the date of contract for construction is before the effective date.