

# **RULES FOR HIGH SPEED CRAFT**

GUIDANCE FOR HIGH SPEED CRAFT

**Rules for High Speed Craft**  
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**2011 AMENDMENT NO.1**  
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Rule No.33 / Notice No.46      30th June 2011  
Resolved by Technical Committee on 3rd February 2011  
Approved by Board of Directors on 25th February 2011

**ClassNK**  
NIPPON KAIJI KYOKAI

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# **RULES FOR HIGH SPEED CRAFT**

## **2011 AMENDMENT NO.1**

Rule No.33      30th June 2011

Resolved by Technical Committee on 3rd February 2011

Approved by Board of Directors on 25th February 2011

“Rules for high speed craft” has been partly amended as follows:

## Part 10      ELECTRICAL INSTALLATIONS

### Chapter 2    ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

#### 2.1      General

Paragraph 2.1.2 has been amended as follows.

##### 2.1.2    Voltage and Frequency

**1** System voltage is not, as a rule, to exceed:

- (1) 500 V for generators, power equipment, and heating and cooking equipment connected to fixed wiring
- (2) 250 V for lighting, heaters in cabins and public rooms, equipment other than those specified in (1)
- (3) 15,000 V *a.c.* and 1,500 V *d.c.* installations for electric propulsion
- (4) 15,000 V *a.c.* for *a.c.* generators and *a.c.* power equipment meeting the requirements in **2.17, Part H of the Rules for the Survey and Construction of Steel Ships**

**2** A frequency of 60 Hz is recognized as a standard for all alternating current systems.

**3** Electrical equipment is to be designed and manufactured that it is capable of operating satisfactorily under the normally occurring voltage and frequency fluctuations. Unless otherwise specified, electrical equipment is to operate satisfactorily under the fluctuations in voltage and frequency as given in **Table 10.2.1**. Any special system *e.g.* electronic circuits, whose function cannot operate satisfactorily within the limits given in the table is to be supplied by suitable means, *e.g.* through stabilized supply. **Table 10.2.1** is not to apply to electrical equipment of the battery system.

**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.

**Table 10.2.1      Voltage and Frequency Fluctuations**

Type of fluctuations	Fluctuations	
	Permanent	Transient
Voltage	6%, -10%	± 20% (1.5sec.)
Frequency	± 5%	± 10% (5sec.)

Note:

Numerical values (excluding time) in the table signify percentages for the rated values.

## 2.5 Switchboards, Section Boards and Distribution Boards

Paragraph 2.5.4 has been amended as follows.

### 2.5.4 Busbars

- 1 Busbars are to be of copper having a conductivity of 97% or more.
- 2 Busbar connections are to be so made as to inhibit corrosion and oxidization.
- 3 Busbars and busbar connections are to be so supported as to withstand the electromagnetic force resulted from short-circuiting.
- 4 Temperature rises of busbars, connecting conductors and their connections are not to exceed  $45^{\circ}\text{C}$  at ambient temperatures of  $45^{\circ}\text{C}$  in cases where they are carrying full-load currents. However, in cases where deemed appropriate by the Society, these requirements do not apply.
- 5 Clearance distances between live parts of different polarity or between live parts and earthed metals are not to be less than the values given in **Table 10.2.2**.

**Table 10.2.2 Minimum Clearance Distances for Busbars**

Rated voltage between poles or phases (V)	Minimum clearance (mm)	
	Between phases or poles of live parts	Between live parts and earthed metals
125 or less	13	13
over 125 to 250 inclusive	16	13
over 250 to 500 inclusive	23	23

## 2.7 Cables

Paragraph 2.7.3 has been amended as follows.

### 2.7.3 Terminals, Joints and Branches of Cables

- 1 Cables are to be jointed by terminals. However, in cases where deemed appropriate by the Society, these requirements do not apply. Soldering fluxes containing corrosive substances are not to be used.
- 2 Terminals are to have sufficient contacting surface and pressure.
- 3 The length of soldered parts of copper tube terminals and other terminals is not to be less than 1.5 times the diameter of conductors.
- 4 Cables not having a moisture-resistant insulation (*e.g.*, mineral insulation) are to have their ends effectively sealed against ingress of moisture.
- 5 Terminals and joints (including branches) of all cables are to be so made as to retain the original electrical, mechanical, flame-retardant and, where necessary, fire-resisting properties of the cable.
- 6 Terminals and conductors are to be of dimensions adequate for the cable rating.

## 2.11 Tests after installation on Board

Paragraph 2.11.1 has been amended as follows.

### 2.11.1 Insulation Resistance Test

1 Each circuit of power and lighting is to have insulation resistances not less than the values in **Table 10.2.5** between conductors and between each conductor and earth.

2 Insulation resistances of internal communication circuits are to comply with the following requirements (1) to (3) :

- (1) Each circuit of 100 V and above is to have an insulation resistance not less than  $1M\Omega$  between conductors and between each conductor and earth.
- (2) For circuits below 100 V, the insulation resistance is to be at least  $1/3M\Omega$ .
- (3) During the test for (1) and (2), any or all appliances connected thereto may be disconnected from the circuit.

**Table 10.2.5 Minimum Insulation Resistance**

<u>Load</u>	<u>Insulation resistance</u>
<del>Up to 5A</del>	<del><math>2M\Omega</math></del>
<del>Up to 10A</del>	<del><math>1M\Omega</math></del>
<del>Up to 25A</del>	<del><math>400,000\Omega</math></del>
<del>Up to 50A</del>	<del><math>250,000\Omega</math></del>
<del>Up to 100A</del>	<del><math>100,000\Omega</math></del>
<del>Up to 200A</del>	<del><math>50,000\Omega</math></del>
<del>Over 200A</del>	<del><math>25,000\Omega</math></del>

<u>Rated voltage</u> <u><math>U_n</math> (V)</u>	<u>Minimum test voltage</u> <u>(V)</u>	<u>Minimum insulation</u> <u>resistance</u> <u>(<math>M\Omega</math>)</u>
<u><math>U_n \leq 250</math></u>	<u><math>2 \times U_n</math></u>	<u><math>\frac{1}{3}</math></u>
<u><math>250 &lt; U_n \leq 1,000</math></u>	<u>500</u>	<u><math>\frac{1}{3}</math></u>
<u><math>1,000 &lt; U_n \leq 7,200</math></u>	<u>1,000</u>	<u><math>\frac{U_n}{1,000} + 1</math></u>
<u><math>7,200 &lt; U_n</math></u>	<u>5,000</u>	<u><math>\frac{U_n}{1,000} + 1</math></u>

Note:

During the above test, any or all electric heaters, small appliances and the like connected thereto may be disconnected from the circuit.

## Chapter 3 DESIGN OF INSTALLATIONS

### 3.3 Navigation Lights, Other Lights, Internal Signals, etc.

Paragraph 3.3.1 has been amended as follows.

#### 3.3.1 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 and the reserve source of electrical power or the lighting distribution panel provided on the navigation bridge (limited to the case where two or more generating sets are provided). However, in craft 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.
- 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 the event of the failure of navigation lights due to blown bulbs, short-circuits, etc., visual and audible alarms are to activate on navigation light indicator panels. Such alarm devices are to be fed from the main sources and reserve sources of power and their feeder circuits are to be independent of the feeder circuits from navigation light indicator panels to navigation lights.

#### EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 30 June 2011.

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# **GUIDANCE FOR HIGH SPEED CRAFT**

**GUIDANCE**

## **2011 AMENDMENT NO.1**

Notice No.46      30th June 2011

Resolved by Technical Committee on 3rd February 2011

“Guidance for high speed craft” has been partly amended as follows:

Amendment 1-1

## **Part 10 ELECTRICAL INSTALLATIONS**

### **Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN**

#### **2.1 General**

Paragraph 2.1.2 has been amended as follows.

##### **2.1.2 Voltage and Frequency**

**1** In 2.1.2-3, **Part 10 of the Rules**, voltage fluctuation in the main switchboard busbars are to be designed by taking into account the voltage drop in the power cables so that the electrical equipment supplied from those switchboards are capable of operating satisfactorily without trouble.

**2** In 2.1.2-3, **Part 10 of the Rules**, the steady state voltage and frequency of *A.C.* motors is to be considered to change simultaneously, and the fluctuations in such an event in terms of the sum of absolute value of respective ratio of fluctuation are to be within 10%. Further, the limit of fluctuation of voltage and frequency is to be the maximum amplitude of each.

**3** The wording “specially approved by Society” given in 2.1.2-4, Part 10 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. 2.1.2-1 Application example of 2.1.2-3.(1)

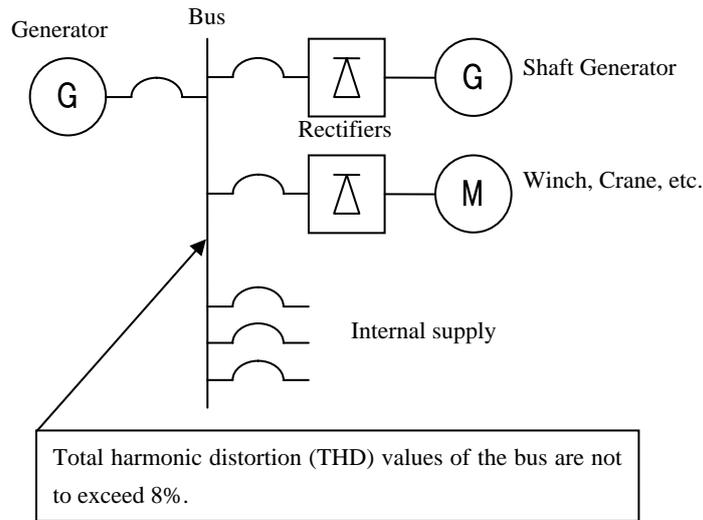
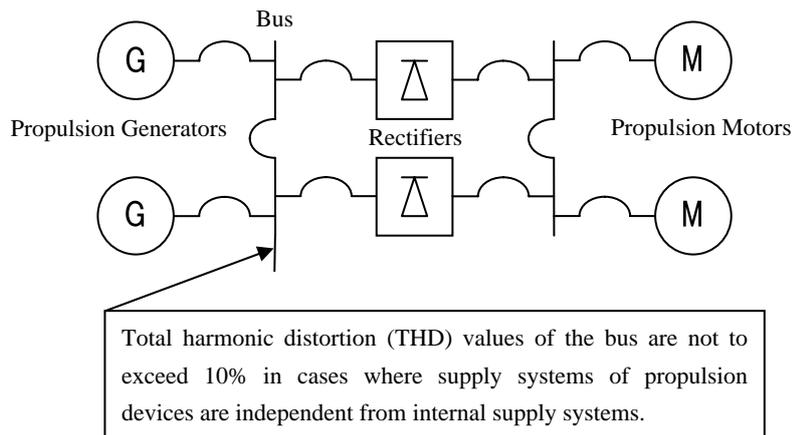


Fig. 2.1.2-2 Application example of 2.1.2-3.(2)



## 2.5 Switchboards, Section Boards and Distribution Boards

Paragraph 2.5.4 has been amended as follows.

### 2.5.4 Busbars

1 Busbars and the contact faces of busbars and linking conductors are to be protected against corrosion or oxidization by means of silver plating, tin plating or dipping in a solder bath, etc.

2 Current rating of busbars may generally be determined by **Table 10.2.5.4-1**.

3 The wording “in cases where deemed appropriate by the Society” in 2.5.4-4, Part 10 of the Rules refers to cases where documents which show that there are no adverse effects on any of the following (1) to (5) are submitted to and approved by the Society in cases where the temperature rises of any busbars, connecting conductors and their connections that are carrying full-load currents exceed 45K at an ambient temperature of 45°C.

(1) Mechanical strength of the conducting material

(2) Possible effect on adjacent equipment

(3) Permissible temperature limits of the insulating materials in contact with the conductor

- (4) Effect of the temperature of the conductor on the apparatus connected to busbars
- (5) For plug-in contacts, the nature and surface treatment of the contact material

## **2.7 Cables**

Paragraph 2.7.3 has been added as follows.

### **2.7.3 Terminals, Joints and Branches of Cables**

**1** The wording “in cases where deemed appropriate by the Society” in **2.7.3-1, Part 10 of the Rules** refers to cases where a cable connection is installed by splicing which consists of a conductor connector, replacement insulation, replacement cable sheath, and, where applicable, replacement armour and shielding, and establishes electrical continuity in conductors, armour, or screens, under the following conditions:

- (1) In cases where cables are installed in structural sub-assemblies
- (2) In cases where circuits are extended or shortened in a ship which will undergo remodeling
- (3) In cases where a damaged section of cables is replaced
- (4) Splicing is not to be used for propulsion cables and cables in hazardous locations. However, with respect to cables in hazardous locations, cases where Society approval is obtained are excluded
- (5) Other cases deemed appropriate by the Society

**2** In -1 above, splicing is to comply with the following (1) to (7):

- (1) The conductors are to be connected using a compression type butt connector. In such cases, a one-cycle compression tool and proper dies are to be used. Long barrel butt connectors with conductor stops are to be used for conductor sizes of  $6mm^2$  or larger.
- (2) The splices for multi conductor cables are to be staggered in such away that the connectors for each conductor are not contiguous to the connector of an adjacent conductor. In addition, no more than is necessary to ensure a proper connection of the cable insulation is to be removed.
- (3) Replacement insulation that has the same or a greater thickness than that of the cable insulation and the same or better thermal and electrical properties of the cables.
- (4) For screened cables, replacement screenings are to be provided and such screenings are to be secured by a method that does not exert more pressure than necessary to establish adequate electrical contact. Screened cables are to have at least a  $13mm$  overlap between any replacement shielding material and the original screening material.
- (5) Replacement cable sheath materials are to have physical properties that are the same as, or equivalent to, the cable sheath. Replacement cable sheaths are to be centered over the splices and to overlap the existing cable sheaths by at least  $51mm$ . Replacement cable sheaths are to be installed so that a watertight seal with the existing cable sheaths is created.
- (6) The electrical continuity of any cable armour is to be re-established by a jumper of wire or braid, or replacement armour of the same metal.
- (7) For cables with a sheath over the armour, a replacement covering is to be used.

**3** The wording “to retain the original electrical, mechanical, flame-retardant and, in cases where necessary, fire-resisting properties of the cable” in **2.7.3-5, Part 10 of the Rules** means that connections and branching of cables are to be made within enclosures with no possibility of any outward spreading of fire by internal short-circuits or other causes. In addition, the type of enclosure is to be selected from those meeting the requirement given in **2.1.3-4** according to installation location.

## Chapter 4 ADDITIONAL REQUIREMENTS FOR CRAFT CARRYING SPECIAL CARGOES

### 4.1 Enclosed Cargo Holds for Carrying Motor Vehicles with Fuel in Their Tanks for Their Own Propulsion and Enclosed Compartments adjoining the Cargo Holds, etc.

Paragraph 4.1.1 has been amended as follows.

#### 4.1.1 Electrical Installations in Enclosed Cargo Holds, etc.

**1** A wording “electrical equipment of a type suitable for use in explosive gas atmosphere concerned” in **4.1.1-2, Part 10 of the Rules** means those generally meeting the requirements in **2.9, Part 10 of the Rules** having an intrinsically safe, flameproof ~~or~~, pressurized increased safety, encapsulation, powder filling or oil immersion construction grouped into Apparatus Group *IIA* and Temperature Class *T3* as specified *IEC 60079* or Explosion Class *d1* and Ignition Group *G3* as specified in Technical Recommendation issued by Independent Administrative Institution National Institute of Industrial Safety or equivalent thereto. Further, a wording “cables of a type suitable for use in explosive gas atmosphere concerned” means general cables which comply with the requirements in **4.2.4-8, Part H of Rules for the Survey and Construction of Steel Ships**.

**2** The electrical equipment so enclosed and protected as to prevent the escape of sparks specified in **4.1.1-3, Part 10** is to be of the following (1) or (2).

(1) The electrical equipment with a protection degree of at least IP55 as defined in **H2.1.3-4, Part H of the Guidance for the Survey and Construction of Steel Ships**.

(2) The electrical equipment suitable for use in zone 2 (*e.g.* type of protection “n”) and with a temperature class of at least *T3* as defined in *IEC 60079*.

**3** The platforms with openings of sufficient size permitting penetration of petrol gases downwards means, for example, grating deck.

**4** A wording “a type approved by the Society” in **4.1.1-4, Part 10 of the Rules** means that specified in -1.

#### EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 30 June 2011.

## Part 2 CLASS SURVEYS

### Chapter 1 GENERAL

#### 1.2 Preparation for Surveys and Others

##### 1.2.2 Preparation for Surveys

Sub-paragraph -2 has been amended as follows.

**2** Any applicant for survey is to make necessary preparations for survey fittings, cleaning of compartments, freeing from water, scale, dirt, oil residues and gas, sufficient lighting, non-destructive testing equipment and other items of preparation required for tests and inspections according to the purpose of survey. Furthermore, casings, ceilings or linings, and loose insulation, where fitted, are to be removed as required by the Surveyor.

#### EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 July 2011.
2. Notwithstanding the amendments to the Guidance, the current requirements may apply to the surveys for which the application is submitted to the Society before the effective date.