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CR Classification Society

FOUNDED 1951

RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF HIGH-SPEED CRAFT 2017

AMENDMENT No.2

April 2019

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The following Chapters have been amended and the effective dates are:	
Chapter	**Effective date**
12	April, 2019

The Rules for the Construction and Classification of High-Speed Craft 2017 and amendments thereof are to be read in conjunction with this Amendment.

List of major changes from 2017 edition

C12.0.1 ~ C12.0.2	Revised	C12.1.15	Revised
C12.1.6 ~ C12.1.12	Revised	C12.3.6 & C12.8.2.4	Deleted
C12.1.14	Revised	Table C12.1.1	Deleted

Rules for the construction and classification of high speed craft 2017 have been partly amended as follows:

Paragraph C12.0.1 ~ C12.0.2 have been amended as follows:

Chapter 12
Electrical Installations

Part A - General

C12.0 Drawings and Data

C12.0.1 ~~The shipbuilder or manufacturer is to submit the following drawings and data for approval before the work commences:~~ Drawings and data are to be in accordance with the requirements of 1.2 of Part VII of the Rules for Steel Ships.

~~**.1** For propulsion machineries, generators and essential motors of 375kW and over: – Complete rating, seating arrangements, assembly, shaft, stator and rotor details, electric propulsion coupling details, mass, main dimensions, main materials used, and data for calculation of critical speed.~~

~~**.2** For generators and essential motors below 375kW: Complete rating, seating arrangements, type of enclosure and dimensional outline.~~

~~**.3** For switchboards: – Arrangements and details, front view, installation arrangements and wiring diagram.~~

~~**.4** For wiring: – All wiring plans and circuit diagrams including load distribution, wire size, type of cable, maximum temperature rise of conductor and voltage drop, type of insulation, rating or setting of circuit breaker, rating of fuse and switch, and interrupting capacity of circuit breaker and fuse.~~

~~**.5** For arrangement: – General arrangement of electric equipment including details of the main cable runs.~~

~~**C12.0.2** The shipbuilder is to submit the following specification and data for approval before the work commences:~~

~~**.1** Specifications and list of electrical equipment.~~

~~**.2** Load analysis and protective device coordination study.~~

~~**.3** Calculations of short circuit currents at main, emergency and sub switchboards including those fed from transformers.~~

~~**.4** Explanation of electric propulsion system.~~

C12.0.3~~2~~ In addition to the documentation requested above, the following is also required :

Paragraph C12.1.6 ~ C12.1.12 have been amended as follows:

C12.1.6 Ambient Reference Conditions

Ambient reference conditions are to be in accordance with the requirements of 1.3 of Part VII of the Rules for Steel Ships.

~~**.1** 45°C is to be considered the standard ambient temperature for the inside of the boiler or machinery space and 32°C is to be considered the standard temperature for the inlet of sea water. For other spaces, a temperature of 40°C is to be taken as the standard ambient temperature.~~

~~**.2** The values as specified in the tables of limits of temperature rise in this Chapter are based on 45°C standard ambient temperature. For the ambient temperature of 40°C, these values may be increased by 5°C.~~

~~**.3** Where the ambient temperature of a space is in excess of the values specified in .1 above, the permissible temperature rise of the machine or equipment installed in that space is to be reduced by an amount equivalent to the excess temperature.~~

C12.1.7 Inclination of Ship

Machines and apparatus are to operate satisfactorily under all conditions with the ship inclined up to the angles as specified in 1.4 of Part VII of the Rules for Steel Ships from the normal.

~~**.1** Machines and apparatus should operate inclined up to the following angles from the normal:~~

~~athwartships,~~
~~statie 15°~~
~~dynamic 22.5°~~
~~fore-and-aft,~~
~~statie 5°~~
~~dynamic 10°~~

~~**.2** Emergency machines and apparatus fitted in accordance with statutory requirements should operate satisfactorily when the ship is inclined up to 22.5° and/or when the trim of the ship is 10°.~~

C12.1.8 ~~Voltage and Frequency Variations~~ Quality of Electrical Power Supplies

Quality of electrical power supplies are to be in accordance with the requirements of 1.5 of Part VII of the Rules for Steel Ships.

~~All electrical equipment supplied from the main and emergency source of electrical power is to be so designed and manufactured that it is capable of operating satisfactorily under normally occurring variations of voltage and frequency. Unless specified otherwise electrical equipment, other than that supplied by battery systems, is to operate satisfactorily with the following simultaneous variations, from their nominal value, when measured at the consumer input terminals.~~

~~voltage:~~

~~permanent variations +6%, -10%~~

~~transient variations +20%, -20%~~

~~recovery time 1.5 seconds~~

~~frequency:~~

~~permanent variations ±5%~~

~~transient variations ±10%~~

~~recovery time 5 seconds~~

~~**C12.1.9 Harmonics**~~

~~Unless specified otherwise, the total harmonic distortion (THD) of the voltage waveform at any switchboard or section board is not to exceed 8% for all frequencies up to 50 times the supply frequency and no voltage at a frequency above 25 times supply frequency is to exceed 1.5% of the supply voltage.~~

C12.1.~~10~~9 Location and Construction

Location and construction of electrical equipment are to be in accordance with the requirements of 1.6 of Part VII of the Rules for Steel Ships.

~~.1 Electrical equipment is to be accessibly placed in well ventilated and adequately lighted spaces where it is not exposed to risk of mechanical injury or damage arising from water, steam or oil. Where it is unavoidable to be exposed to such risks, the equipment is to be so constructed as to meet the conditions of the locations.~~

~~.2 Bolts, nuts, pins, screws, terminals, studs, springs and such other small parts are to be made of corrosion resistant materials or steel suitably protected against corrosion.~~

~~.3 Insulating materials and insulated windings are to be resistant to moisture, sea air and oil vapour unless special precautions are taken to protect them.~~

~~.4 The operation of all electrical equipment and the lubrication arrangements are to be efficient under such conditions of vibration and shock as arise in normal practice.~~

~~.5 All nuts and screws used in connection with current-carrying parts and working parts are to be effectively locked to prevent loosening due to vibration.~~

~~.6 Generators and motors are preferably to be placed with their axis of rotation in the fore and aft direction of the ship. Where a machine is installed athwartship, it shall be ensured that the design of the bearings and the arrangements for lubrication are satisfactory to withstand the ship's inclination specified in C12.1.7.~~

~~.7 The electrical equipment exposed to the weather or located in spaces exposed to sea splashing or other severe moisture condition is to be of the waterproof type or protected by means of waterproof enclosure.~~

C12.1.~~11~~10 Clearances and Creepage Distances

Clearances and creepage distances are to be in accordance with the requirements of 1.9 of Part VII of the Rules for Steel Ships.

~~.1 Clearances and creepage distances between live parts and between live parts and earthed metal, whether across surfaces or in air, are to be adequate for the working voltage having regard to the nature of the insulating material and the transient over-voltages developed by switch and fault conditions.~~

~~.2 Bare main bus bars in main and emergency switchboards, but not including the conductors between the main bus bars and the supply side of out-going units, are to have minimum clearances (in air) and creepage distances (across surfaces) as given in Table C12.1.1.~~

C12.1.~~12~~11 Electrical Equipment for Use in Explosive Gas Atmospheres

Electrical equipment for use in explosive gas atmospheres is to be in accordance with the requirements of 1.10 of Part VII of the Rules for Steel Ships.

~~.1 Where electrical equipment is installed in areas where explosive gas atmospheres may be present, it is to be of a 'safe type', certified for the gases/ vapors involved. The construction and type testing is to be in accordance with IEC Publication 60079, Electrical Apparatus for Explosive Gas Atmospheres, or an equivalent national standard.~~

~~.2 Certified safe type equipment includes the following types of protection:~~

~~Intrinsically safe – Ex 'i'~~

~~Increased safety – Ex 'e'~~

~~Flameproof – Ex 'd'~~

~~Pressurized enclosure - Ex 'p'~~

~~**.3** In addition, lighting fittings of the air driven type with pressurized enclosure are considered to be a 'safe type' of lighting fitting.~~

~~**.4** When 'safe type' equipment is permitted in hazardous zones or spaces all switches and protective devices are to interrupt all lines or phases and, where practicable, are to be located in a non-hazardous zone or space unless specifically permitted otherwise. Such equipment, switches and protective devices are to be suitably labelled for identification purposes.~~

C12.1.12 Protection of Electrical Enclosures

Protection of electrical enclosures is to be in accordance with the requirements of 1.11 of Part VII of the Rules for Steel Ships.

Paragraph C12.1.14 has been amended as follows:

C12.1.14 Testing and Inspection of Electrical Equipment

Testing and inspection of electrical equipment are to be in accordance with the requirements of 1.12 of Part VII of the Rules for Steel Ships.

~~**.1** All generators, including emergency generators, motors, and other rotating machines for essential auxiliary services are to be tested in the presence of the Surveyor, preferably at the plant of the manufacturer. For electrical machines of less than 750 kW consideration will be given on application to the acceptance of standardized, batch and line produced machinery without tests and inspections of individual units subject to approval of the proposed designs and the manufacturer's quality control program.~~

~~**.2** Shop tests of generators and motors are to be carried out as follows:~~

~~**.2.1** For generators:~~

~~Temperature rise test.~~
~~Load characteristics.~~
~~Overload test.~~
~~Overspeed test.~~
~~High voltage test.~~
~~Insulation resistance measurement.~~

~~Mechanical check of end play setting, running balance, vibration and bearing temperature.~~

~~**.2.2** For motors:~~

~~Temperature rise test.~~
~~Speed range if variable speed.~~
~~Excess torque test.~~
~~Overspeed test.~~
~~High voltage test.~~
~~Insulation resistance measurement.~~

~~Mechanical check of end play setting, running balance, vibration and bearing temperature.~~

~~**.3** The switchboard and controller are to be inspected and dielectric tested in the presence of the Surveyor. Satisfactory operation of tripping safety devices are also to be demonstrated.~~

~~**.4** The shaft material of generators and motors of 375 kW and over is to be tested in accordance with the requirements in Part XI of the Rules for the construction and classification of steel ships. For the shaft material of machines below 375 kW the manufacturer's certificate of material test is to be acceptable in each case provided the test record submitted by the manufacturer is satisfactory.~~

~~**.5** Transformers are to be inspected in the presence of the Surveyor at the plant of the manufacturer and subject to the tests of momentary short circuit, voltage regulation, voltage ratio, temperature rise, high voltage and induced overvoltage.~~

~~**.6** Cables are to be tested and inspected in the presence of the Surveyor at the plant of the manufacturer for conductor resistance, high voltage, insulation resistance, and flammability tests. The dimensions and construction of the cables are also to be inspected.~~

~~**.7** Semicondu~~

~~ctor equipments are to be inspected in the presence of the Surveyor at the plant of the manufacturer for function, temperature rise, high voltage and insulation resistance test.~~

~~**.8** The electrical equipment for use in explosive gas atmospheres is to be approved and tested in the presence of the Surveyor.~~

[Chapter 12]

Paragraph C12.1.15 has been amended as follows:

C12.1.15 Tests after Installation on Board

Tests after installation on board are to be in accordance with the requirements of Chapter 16 of Part VII of ~~the Rules for the construction and classification of steel ships~~ the Rules for Steel Ships.

Paragraph C12.3.6 & C12.8.2.4 have been deleted as follows:

~~**C12.3.6** With reference to 12.3.6.1.2, for the purpose of classification, the time for generator start-up and loading is not to exceed 15 seconds.~~

~~**C12.8.2.4** For the purpose of classification, the time for generator start-up and loading is not to exceed 15 seconds.~~

Table C12.1.1 has been deleted as follows:

~~**Table C12.1.1**~~
~~**Minimum Clearance and Creepage Distances**~~

~~Rated insulation voltage (V)~~	~~Minimum clearances (mm)~~	~~Minimum creepage distances (mm)~~
~~Up to 250~~	~~15~~	~~20~~
~~Over 250 to 660~~	~~20~~	~~30~~
~~Over 660 to 1,000~~	~~25~~	~~35~~

~~Notes:~~

~~1. The values in this table apply to clearances and creepage distances between live parts as well as between live parts and exposed conductive parts, including grounding.~~
~~2. System with nominal voltage exceeding 1kV (phase to phase) is to comply with the requirements of high voltage system .~~

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