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 2008 AMENDMENT NO.1
Guidance for the Survey and Construction of Steel Ships
Part H 2008 AMENDMENT NO.1

Rule No.36 / Notice No.37 29th May 2008
Resolved by Technical Committee on 1st February 2008
Approved by Board of Directors on 26th February 2008

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RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part H Electrical Installations

2008 AMENDMENT NO.1

Rule No.36 29th May 2008

Resolved by Technical Committee on 1st February 2008

Approved by Board of Directors on 26th February 2008

Rule No.36 29th May 2008
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 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.1 General

2.1.3 Construction, Materials, Installations, etc.

Sub-paragraph -10 has been added.

10 Motors are to be provided with a terminal box.

2.10 Transformers for Power and Lighting

2.10.2 Construction

Sub-paragraph -5 has been added.

5 Transformers are to have current limiting devices as needed in order to prevent excessive voltage drop on the system caused by current inrush when the transformers are switched on.

2.17 High Voltage Electrical Installations

2.17.2 Distribution

Sub-paragraph -1 has been amended as follows.

1 The following distribution systems are considered as a standard.
(1) Three-phase, three-wire, insulated system.
(2) Three-phase, three-wire, neutral earthed system.
(a) High-impedance earthing
(b) Low-impedance earthing
(c) Direct earthing

Paragraphs 2.17.3 through 2.17.6 have been amended as follows.

2.17.3 Construction and Location

1 High voltage electrical equipment is to be manufactured in accordance with ~~a standard~~ standards deemed appropriate by the Society, whose ambient temperature may be subject to consideration by the Table **H1.1** when necessary, and to comply with the requirements in this **2.17.3**.

2 High voltage electrical equipment is to be ~~so~~ protected so that the operators are not accidentally ~~in touch~~ able to come in contact with the live parts of the equipment.

3 High voltage electrical equipment or entrances to key-locked spaces in which the equipment are installed ~~of the spaces allocated for high voltage electrical equipment specified in **13**, and high voltage cables~~ are to be marked ~~at~~ in an easily visible place so as to identify them as high voltage electrical installations.

4 High voltage electrical equipment is to be of a construction to facilitate leading of cables, preparation of cable ends, and connection of cables, and also to ~~be prevented from~~ prevent any accidental contact between high and low voltage circuits.

5 For rotating machines, transformers and reactors, effective means is to be provided to prevent the accumulation of moisture and condensation within the machines especially when they are idle for appreciable periods.

6 When generators are run with neutrals interconnected, such generators are to be suitably designed to avoid excessive circulating currents.

7 For generators used in three-wire neutral earthed system, means of disconnection is to be fitted in the neutral earthing connection of each generator so that the generator may be disconnected for maintenance and for insulation resistance measurement.

~~**8** Generator stator windings are to have all phase ends brought out in the terminal box if a differential protection relay is provided.~~

8 To ensure safety of operation, a passageway that has a width of at least 1*m* is to be arranged in front of each high voltage switchboard. Where access to the rear of a switchboard is needed for purposes of operation or maintenance, a passageway of sufficient width allowing such access is to be provided.

~~**9** Motors are to be provided with a terminal box.~~

9 For generators with cooling systems that use auxiliary power, interlocks are to be provided. These interlocks are to disconnect the generator for all other systems in either of the following cases:

(1) In cases where the auxiliary power fails.

(2) In cases where temperature detectors, which sound an alarm when the generator stator windings reach their maximum rated temperature, indicate a temperature of 110% of the maximum rated temperature.

10 Rotating machines are to be provided with temperature detectors in their stator windings to actuate a visual and audible alarm in a normally attended position whenever the temperature exceeds the permissible limit.

11 Where rotating machines are provided with water-air heat exchangers, they are to be of the double tube type. A visual and audible alarm in a normally attended position is to be given to monitor cooling water leakage.

12 Higher voltage terminals are never to be combined with lower voltage terminals in the same box, unless measures are taken to ensure that access to lower voltage terminals can be obtained without danger.

13 ~~Where high voltage electrical equipment is not contained in an enclosure but is installed in a space designated for it, the access doors are to be so interlocked that they can not be opened until the electrical power supply is isolated and the equipment earthed down.~~ The degree of protection applying to enclosures of high voltage electrical equipment are to be deemed appropriate by the Society.

14 High voltage switchboards and control boards are to be of an enclosed type ~~having doors with locking devices~~ and the high voltage sections are to be equipped with doors that are either locked by key or some other equivalent means.

~~**15** Each high voltage switch board and control board is to be provided with an earthing conductor extended its entire length. A copper earthing conductor is to have a cross-sectional area of 30 mm^2 or more so as to prevent its current density from exceeding 200 A/mm^2 (for 1 *second*) or 125 A/mm^2 (for 3 *seconds*) in case of an earth fault. The earthing conductor is to be adequately connected to the earth system of the installation.~~

15 Earthing conductors are to be provided for high voltage electrical equipment. These conductors are to be properly connected to the earthing system of the equipment and satisfy the following:

(1) be made of copper.

(2) the cross-section area is to be at least 35 mm^2.

(3) the current density does not exceed 150 A/mm^2 when an earth fault occurs.

16 High voltage switchboards are to comply with the requirements in **2.5.3-1** and **2.5.3-2** of this chapter regardless of the power to the propulsion system being fed or not. In this case, for a neutral earthed system, means of earthing are to be provided for each section. If two separate switchboards are provided and interconnected by cables, a circuit breaker is to be provided at each end of the cables.

17 Each high voltage circuit in high voltage switchboards and control boards is to be fitted with means of earthing and short-circuiting for safe maintenance work. An adequate number of portable earthing and short-circuiting devices may be used as an alternative method.

18 In high voltage switchboards and control boards, an adequate separation is to be provided between lower voltage circuits and higher voltage circuits, in order to prevent the operators from touching the live parts of higher voltage circuits accidentally.

19 Circuit-breakers are to be of the withdrawable type or with equivalent means or arrangements permitting safe maintenance while the busbars are live.

20 Withdrawable circuit breakers and switches are to be provided with mechanical locking facilities at both in-service and withdrawn positions. For ~~the~~ safe maintenance, withdrawable circuit breakers, switches and fixed disconnectors are to be capable of being locked by key or some other equivalent means.

21 The fixed contacts of withdrawable circuit breakers and switches are to be so arranged that the live contacts are automatically covered at the withdrawn position.

22 If electrical energy or physical energy is required for the operation of circuit breakers, switches and the like, a store supply of such energy is to be provided for at least two operations of all the components. If stored electrical energy sources are necessary for the tripping due to overload, short-circuit or under-voltage, alarms which activate upon discontinuity in the release circuits and power supply failures are to be provided.

23 ~~The phase-to-phase or pole-to-pole and the phase-to-earth air clearances of uninsulated busbars and the air clearances of high voltage circuits of high voltage control equipment are not to be less than the values given in **Table H2.16**. However, the Society may accept smaller distances than those given in **Table H2.16** provided that an appropriate voltage impulse test is carried out. The creepage distances are to be determined taking the nature of the insulation materials and so on into consideration.~~ The air clearances (phase-to-phase, pole-to-pole and phase-to-earth) of the non-insulated busbars of high voltage switchboards and control boards, and the air clearances of

high voltage control equipment are not to be less than the values given in **Table H2.16**. When difficulty arises in meeting the above requirements, the measures deemed appropriate by the Society are to be adopted.

~~**24** Oil immersed transformers are to be provided with the following protective devices :~~

~~(1) alarm for low liquid level~~

~~(2) alarm for high liquid temperature~~

~~(3) trip or load reduction for low liquid level~~

~~(4) trip or load reduction for high liquid temperature~~

~~(5) trip for high gas pressure~~

24 The air clearances of high voltage electrical equipment other than the equipment specified in **-23** and the creepage distances of all high voltage electrical equipment are not to be less than the values deemed appropriate by the Society.

25 Control circuits are to be separated from main circuits by partitions insulated with flame-retardant material.

26 The secondary winding of current and voltage transformers for control circuits is to be earthed. In this case, the earthing conductor is to be of copper and have a minimum cross-section area of 4 mm^2.

27 For forced-ventilated transformers, the running condition of the ventilators and the temperature of the cooling air are to be monitored.

28 For transformers using a heat exchanger equipped with a closed circuit cooling method, the temperature sensors are to be provided so as to monitor the cooling air temperature. Transformers, particularly those employing a water forced-cooled system, are also to be provided with leakage monitoring devices and fitted so that leakage-water and condensed moisture are kept away from the transformer windings.

Table H2.16 Minimum Air Clearances

Rated voltage (*V*)	Non-insulated busbars (*mm*)	High voltage control equipment (*mm*)
above 500 and 1,000 or below	35	20
above 1,000 and 3,600 or below	55	30
above 3,600 and 7,200 or below	90	60
above 7,200 and 12,000 or below	120	100
above 12,000	160	--

2.17.4 Protective Devices, etc.

1 Fuses are not to be used for overload protection.

2 ~~Generator circuits are also to be protected from electrical faults at the generator side of the circuit-breakers.~~ In order to protect a generator from any internal malfunctions and from any electrical failures between the generator and its circuit breakers, differential protection relays are to be provided.

3 Excitation systems of generators are to be so designed that faulty generator can be de-excited automatically.

4 ~~Where the temperature sensors used for rotating machines are of embedded type, means are to be provided to protect the circuits against over voltage.~~ In order to prevent any problems of over voltage, protective devices are to be provided for the temperature sensor circuits of the windings that are fitted to rotating machines.

5 Circuit-breakers are generally to be used for short-circuit protection at the primary side of transformers.

6 When transformers are arranged in parallel, tripping of the protective device at the primary side

is to be followed automatically by tripping of the switch connected at the secondary side.

~~**7** Transformers are to have current limiting devices, if necessary, in order to prevent excessive voltage drop on the system due to current inrush, when the transformers are switched on.~~

7 Oil immersed transformers are to be provided with the following alarms and safety devices.

(1) Alarms for low oil level and high oil temperature

(2) Stopping or load reducing devices for low oil level and high oil temperature

(3) Stopping devices for high gas pressure

8 When a single consumer, such as bow thruster or others, is supplied directly at a higher voltage via step-up transformer, the transformer may be protected at the lower-voltage side.

9 ~~Voltage transformers are to be provided with overload and short circuit protections on the secondary side. When the loss of power may cause a critical condition in the system, the overload protections may not be provided.~~ Protective measures are to be taken to prevent any problems of short circuit in both the primary and secondary sides of voltage-transformers used for control circuits. However, these protective measures may be omitted in cases where any power loss causes a critical condition in any related system.

10 Low voltage circuits fed through step-down transformers from high voltage circuits are to be protected so ~~as not to be induced high voltage due to the primary to secondary fault in the transformer~~ that there is no chance of any overlapping between the high voltage and low voltage circuits.

11 A device capable of indicating any earth fault in the system by means of a visual and audible alarm is to be provided.

12 In low impedance neutral earthed systems or direct neutral earthed systems, a provision is to be made to disconnect the faulty circuits automatically. High impedance neutral earthed systems, where outgoing feeders are not isolated in case of an earth fault, are to be capable of withstanding the transitional over voltage caused by the earth fault.

2.17.5 Cables

1 High voltage cables are to have a metallic sheath or a metallic armour. Where the high voltage cables having neither metallic sheath nor metallic armour are used, they are to be protected by metallic ducts or pipes or electrically conductive non-metallic ones complying with the requirements specified in **2.9.14-3(4)** through their length. These ducts or pipes are to be ensured of their electrical continuity with earthing.

2 High voltage cables associated with different voltages are not to be run in the same duct or pipe. These cables may be run on the same tray if they are fixed by individual clips and isolated each other at a distance of at least the air clearance of ~~uninsulated~~ non-insulated busbars (for the higher voltage cable) given in the **Table H2.16**.

3 High voltage cables are to be installed as far apart from lower voltage cables as possible and to be laid in a place not liable to mechanical damage. These cables are not to be run on or in the same tray, duct or pipe.

4 Where practicable, high voltage cables are not to be run through accommodation spaces. In case where these cables are necessarily run through accommodation spaces, they are to be installed for their entire length in enclosed cable pipes.

~~**5** Terminations and connections of high voltage cables are to be protected by insulation, as far as practicable, to minimize electrical accidents. Materials used for terminations and connections are to be compatible with the materials of cables. In terminal boxes, if conductors are not insulated, phases are to be separated from earth and from each other by substantial barriers of suitable insulating materials.~~

5 The terminal ends of high voltage cables and the connecting parts for high voltage cables are to be made of materials that will not negatively impact the overall integrity of the cable as well as be

sufficiently protected by insulation in order to prevent, as much as is practically possible, any electrical accidents.

6 When the conductors inside of a terminal box are not insulated, sufficiently insulated shields are to be provided to ensure proper phase-to-phase and phase-to-earth separation.

7 High voltage cables are to be appropriately marked or color-coded to ensure easy identification.

~~**Table H2.16 Minimum Air Clearances**~~

~~Rated voltage (*V*)~~	~~Uninsulated busbars (*mm*)~~	~~High voltage control equipment (*mm*)~~
~~Above 500 and 1,000 or below~~	~~35~~	~~20~~
~~Above 1,000 and 3,600 or below~~	~~55~~	~~30~~
~~Above 3,600 and 7,200 or below~~	~~90~~	~~60~~
~~Above 7,200 and 12,000 or below~~	~~120~~	~~100~~
~~Above 12,000~~	~~160~~	~~-~~

2.17.6 Testing

1 High voltage electrical equipment and cables are to be tested in accordance with all applicable requirements of ~~this part~~ **Part H of the Rules**. High voltage test, however, is also to comply with the following requirements in this **2.17.6**.

~~**2** Test voltages for high voltage switchboards, section boards and distribution boards are not to be less than the following values :~~

~~Switchboards, section boards and distribution boards whose rated voltages are~~
~~above 500 *V* and 1,000 *V* or below : twice the rated voltage + 1,000 *V*~~
~~above 1,000 *V* and 3,600 *V* or below : 10,000 *V*~~
~~above 3,600 *V* and 7,200 *V* or below : 20,000 *V*~~
~~above 7,200 *V* and 12,000 *V* or below : 28,000 *V*~~
~~above 12,000 *V*: 38,000 *V*~~

~~**3** Test voltages for high voltage transformers are not to be less than the following values :~~

~~Transformers whose rated voltages are~~
~~above 500 *V* and 1,100 *V* or below : 3,000 *V*~~
~~above 1,100 *V* and 3,600 *V* or below : 10,000 *V*~~
~~above 3,600 *V* and 7,200 *V* or below : 20,000 *V*~~
~~above 7,200 *V* and 12,000 *V* or below : 28,000 *V*~~
~~above 12,000 *V*: 38,000 *V*~~

~~**4** At least five impulses are to be applied to the individual coils for high voltage rotating machines. The peak value of the test voltage is not to be less than $\sqrt{6}$ times the rated voltage.~~

~~**5** Test voltages for high voltage cables are not to be less than the following values :~~

~~Cables whose rated voltages are~~
~~above 500 *V* and 1,000 *V* or below : 3,500 *V*~~
~~above 1,000 *V* and 3,600 *V* or below : 6,500 *V*~~
~~above 3,600 *V* and 7,200 *V* or below : 11,000 *V*~~
~~above 7,200 *V* and 12,000 *V* or below : 15,000 *V*~~
~~above 12,000 *V*: 22,000 *V*~~

~~**6** After the installation on board of high voltage cables, a *d.c.* voltage equal to 168% of the test voltages specified in **5** is to be applied to high voltage cables for 15 *minutes*. However, the Society may accept an *a.c.* voltage test at power frequency in accordance with **(1)** or **(2)** below as an alternative.~~

~~(1) For 5 *minutes* with the system voltage applied between the conductor and the screen~~

~~(2) For 24 *hours* with the system voltage~~

2 Internal arc fault tests on high voltage switchboards, in accordance with the standards deemed appropriate by the Society, are to be carried out at the place of manufacturer, etc. However, the subsequent testing of identical units of the same series may be omitted subject to the approval of the Society.

3 The following high voltage tests on high voltage electrical equipment and cables are to be carried out at the place of manufacturer, etc.:

(1) Test voltages for high voltage switchboards and control boards of the following values.
Rated voltages above 500*V* and 1,000*V* or below : twice the rated voltage + 1,000*V*
Rated voltages above 1,000*V* and 3,600*V* or below : 10,000*V*
Rated voltages above 3,600*V* and 7,200*V* or below : 20,000*V*
Rated voltages above 7,200*V* and 12,000*V* or below : 28,000*V*
Rated voltages above 12,000*V* : 38,000*V*

(2) Test voltages for high voltage transformers of the following values.
Maximum voltages above 500*V* and 1,100*V* or below : 3,000*V*
Maximum voltages above 1,100*V* and 3,600*V* or below : 10,000*V*
Maximum voltages above 3,600*V* and 7,200*V* or below : 20,000*V*
Maximum voltages above 7,200*V* and 12,000*V* or below : 28,000*V*
Maximum voltages above 12,000*V* : 38,000*V*

(3) At least five impulses are to be applied to the stator coils for high voltage rotating machines. The peak value of the test voltage is $\sqrt{6}$ times the rated voltage.

(4) Test voltages for high voltage cables of the following values.
Rated voltages above 500*V* and 1,000*V* or below : 3,500*V*
Rated voltages above 1,000*V* and 3,600*V* or below : 6,500*V*
Rated voltages above 3,600*V* and 7,200*V* or below : 11,000*V*
Rated voltages above 7,200*V* and 12,000*V* or below : 15,000*V*
Rated voltages above 12,000*V* : 22,000*V*

4 High voltage cables, after installation on board, are to be confirmed as having no abnormalities by testing them with the voltage in direct current (*d.c.*) equal to 4.2 times the rated voltage for a period of 15 *minutes*. However, in certain cases, alternative testing procedures, in lieu of that specified above, may be accepted by the Society.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 October 2008.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships other than ships for which the application for Classification Survey during Construction is submitted to the Society on and after the effective date.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part H Electrical Installations

GUIDANCE

2008 AMENDMENT NO.1

Notice No.37 29th May 2008

Resolved by Technical Committee on 1st February 2008

Notice No.37 29th May 2008
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

Section H2.17 has been mended as follows.

H2.17 High Voltage Electrical Installation

H2.17.2 Distribution

The expressions "High-impedance" and "Low-impedance" in **2.17.2-1(2)(a)** and **(b)**, **Part H of the Rules**, refer to the value of the earthing factor derived from the following formula. Earthing factors greater than or equal to 0.8 are considered to be "High-impedance". Those lower than 0.8 are considered to be "Low-impedance".

$$earthing\ \ factor = \frac{phase\ to\ earth\ voltage}{phase\ to\ \ phase\ voltage}$$

H2.17.3 Construction and Location

1 For high voltage electrical equipment whose rated voltage is above 1,000*V* listed below, the wording "~~a standard~~ standards ~~which is~~ deemed appropriate by the Society" in **2.17.3-1**, **Part H of the Rules** means a current standard of *International Electrotechnical Commission* (*IEC*) listed below or equivalent thereto.

(1) Transformers
IEC 60076 *Power transformers*

(2) Switchboards and control boards
~~*IEC* 60466 *A.C. insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 38 kV*~~
~~*IEC* 60470 *High-voltage alternating-current contactors and contactor-based motor starter*~~
IEC 60694 *Common specification for high-voltage switchgear and controlgear standard*
IEC 62271-200 *High-voltage switchgear and controlgear-Part 200: A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

(3) High voltage circuit breakers
IEC 62271-100 *High-voltage switchgear and controlgear-Part1: High-voltage alternating-current circuit breakers*

(4) High voltage fuses
~~*IEC* 60282 *High-voltage fuses*~~

IEC 60282-1 *High-voltage fuses-Part 1: Current limiting fuses, -Part 2: Expulsion fuses*

(5) High voltage switches
IEC 60265 *High-voltage switches*

(6) High voltage *a.c.* contactors
IEC 60470 *High-voltage alternating-current contactors and contactor based motor-starters*

(7) Current transformers and voltage transformers
IEC 60044 *Instrument transformers*

2 The wording "suitably designed to avoid excessive circulating currents" in **2.17.3-6, Part H of the Rules** means ~~the~~ that generators in which the third harmonic content of the waveform does not exceed 5% may be considered adequate.

3 In cases where it is not practicable for ~~the~~ high voltage electrical equipment whose rated voltage is above 500*V* and 1,000*V* or below to comply with appropriate requirements, ~~data regarding kinds, particular and location are to be submitted for the approval by the Society.~~ or where it is irrational or impossible to apply the requirements of **2.17, Part H of the Rules**, documentation regarding the type, principal components and the installation location of the equipment is to be submitted to the Society for approval. The air clearances between control boards may be in accordance with **Table H2.17.3-1**.

4 The phrase "sufficient width allowing such access" in **2.17.3-8, Part H of the Rules** means, in principle, a width of at least 1*m*. However, in cases where operation and maintenance can be properly preformed, the width of the passageway may be reduced as long as it is greater or equal to 0.5*m*.

~~**4**~~**5** ~~Degree of protection of enclosures of high voltage electrical equipment is to comply with the following requirements as well as to comply with **H2.1.3-4** except the high voltage electrical equipment is installed in accordance with the requirements specified in **2.17.3-13, Part H of the Rules.**~~ The phrase "to be deemed appropriate by the Society" in **2.17.3-13, Part H of the Rules** means that, in addition to the requirements in **H2.1.3-4**, the following are also to be complied with:

(1) The degree of protection of enclosures of rotating machines is to be at least IP 43 and the degree of protection of terminals of them is to be at least IP 44. However, for rotating machines installed in key-locked spaces, the degree of protection of the enclosure may be IP 23.

(2) The degree of protection of enclosures of transformers is to be at least IP 43. However, for transformers installed in key-locked spaces, the degree of protection of the enclosure may be IP 23. And where transformers are installed in a switch board, protection of the enclosure may be dispensed with.

(3) The degree of protection of enclosures of switchboards and control boards is to be at least IP 42. However, for switchboards, ~~and~~ control boards and their low voltage compartments installed in key-locked spaces, the protection of IP 32 may be acceptable.

6 The clause "the measures deemed appropriate by the Society" in **2.17.3-23**, **Part H of the Rules** means that value for minimum air clearances may be reduced in cases where sufficient insulation performance has been confirmed by an impulse voltage test carried out according to paragraph 4.2 of *IEC* 60694 (1996).

7 The clause "the values deemed appropriate by the Society" in **2.17.3-24**, **Part H of the Rules** refers to the values given in paragraph 4.5 of *IEC*60092-503 (Ed.2).

~~**Table H2.17.3-1 Minimum Air Clearances and Creepage Distances**~~

~~Rated voltage (*V*)~~	~~Air clearance (*mm*)~~	~~Creepage distance (*mm*)~~
~~Exceeding 500 and not exceeding 660~~	~~10~~	~~14~~
~~Exceeding 660 and not exceeding 750~~	~~12~~	~~16~~
~~Exceeding 750 and not exceeding 1,000~~	~~14~~	~~22~~

Table H2.17.3-1 Minimum Air Clearances and Creepage Distances

Rated voltage (*V*)	Air clearance (*mm*)	Creepage distance (*mm*)
above 500 and 660 or below	10	14
above 660 and 750 or below	12	16
above 750 and 1,000 or below	14	22

H2.17.4 Protective devices

~~**1** The wordings "high impedance" and "low impedance" in **2.17.4-12**, **Part H of the Rules** mean that the eatrhing factor defined by the following formula is not lower than 0.8 and lower than 0.8 respectively.~~

$$earthing\ \ factor = \frac{phase\ to\ earth\ voltage}{phase\ to\ phase\ voltage}$$

~~**2** The wording "be protected so as not to be induced high voltage due to the primary-to-secondary fault" in **2.17.4-10**, **Part H of the Rules** means as follows for example.~~

~~(1) To provide a direct earthing of the lower voltage system~~

~~(2) To install an appropriate neutral voltage limiter~~

~~(3) To provide an earthed screen between the primary and secondary windings~~

The phrase "be protected so that there is no chance of any overlapping between the high voltage and low voltage circuits" in **2.17.4-10**, **Part H of the Rules** refers to, but not confined, any of the following:

(1) A direct earthing of the low voltage circuits.

(2) Installation of a neutral voltage limiter.

(3) Installation of a grounded shield between the primary and secondary windings of a transformer.

H2.17.6 Testing

1 The clause "the standards deemed appropriate by the Society" in **2.17.6-2**, **Part H of the Rules** refers to Appendix A of *IEC*62271-200.

2 The phrase "the alternative testing procedures" in **2.17.6-4**, **Part H of the Rules** refers to either of the following:

(1) Testing the supply voltage in alternating current (*a.c.*) between the conductors and the shields for 5 *minutes*.

(2) Testing the supply voltage in alternating current (*a.c.*) for 24 *hours*.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 October 2008.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships other than ships for which the application for Classification Survey during Construction is submitted to the Society on and after the effective date.