06-420

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 2006 AMENDMENT NO.1
Guidance for the Survey and Construction of Steel Ships
Part H 2006 AMENDMENT NO.1

Rule No.55 / Notice No.67 3rd October 2006
Resolved by Technical Committee on 6th July 2006
Approved by Board of Directors on 25th July 2006

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RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part H Electrical Installations

2006 AMENDMENT NO.1

Rule No.55 3rd October 2006

Resolved by Technical Committee on 6th July 2006

Approved by Board of Directors on 25th July 2006

Rule No.55 3rd October 2006
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

Part H ELECTRICAL INSTALLATIONS

Amendment 1-1

Chapter 3 DESIGN OF INSTALLATIONS

3.3 Emergency Source of Electrical Power

3.3.2 Capacity of Emergency Source of Power

Sub-paragraph -2(8) has been renumbered as (10).

Sub-paragraphs -2(8) and (9) have been added as follows;

(8) For the period of 3 *hours*, intermittent operation of means to bring the stabilizer wings inboard and indicators to show the position of them, as required by Paragraph 9, Regulation 16, Chapter III, the Annex to *SOLAS* Convention.
(9) For the period of 3 *hours*, intermittent operation of the secondary launching appliances of the free-fall lifeboat as required by Paragraph 6.1.4.7, Chapter VI of the International Life-Saving Appliances (*LSA*) Code.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 3 October 2006.
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.

Amendment 1-2

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.1 General

2.1.2 Voltage and Frequency

Sub-paragraph -3 has been amended as follows;

3 Electrical equipment supplied from the main and emergency switchboards 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 H2.1**. 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 H2.1 has been amended as follows;

Table H2.1 Voltage and Frequency Fluctuation

(a) Voltage and frequency fluctuations for a.c. distribution systems (Note 1)

Type of fluctuation	Fluctuation (Note 4)	
	Permanent	Transient
Voltage	＋6%, －10%	±20% (within 1.5 sec)
Frequency	±5%	±10% (within 5 sec)

(b) Voltage fluctuations for d.c. distribution systems (Note 2)

Type of fluctuation	Fluctuation (Note 4)
Voltage fluctuation （Permanent）	±10%
Voltage cyclic fluctuation deviation	5%
Voltage ripple	10%

(c) Voltage fluctuations for battery systems

Systems	Fluctuation (Note 4)
Components connected to the battery during charging (Note 3)	＋30%, －25%
Components not connected to the battery during charging	＋20%, －25%

Note 1: A.C. distribution systems mean a. c. generator circuits and a.c. power circuits produced by inverters.

Note 2: D.C. distribution systems mean d. c. generator circuits and d.c. power circuits produced by converters.
Note 3: Different voltage fluctuations as determined by the charging and discharging characteristics, including voltage ripple from the charging devices, may be considered.
Note 4: Numerical values excluding time in the table mean percentage for the rated values.

Chapter 3 DESIGN OF INSTALLATIONS

3.3 Emergency Source of Electrical Power

3.3.3 Kind and Performance of Emergency Source of Electrical Power

In the main sentence, the wording “either a generator or an accumulator battery” has been amended to “a generator or an accumulator battery or an uninterruptible power system”.

Sub-paragraph (3) has been added as follows;

(3) Where the emergency generator is an interruptible power system, the requirements are as deemed appropriate by the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 January 2007.
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.

Amendment 1-3

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.4 Rotating Machines

2.4.2 Characteristics of Governors

Sub-paragraph -2 has been amended as follows:

2 Characteristics of governors on prime movers driving emergency generators are to be capable of maintaining the speed with the following limits:

(1) Momentary variation is to be of the values specified in **-1(1)** when total emergency consumer load is suddenly thrown off.

(2) Momentary variation is to be of the values specified in **-1(2)**, and the speed is to return to within 1% of the final steady speed in not more than 5 *seconds*, when total emergency consumer load is suddenly thrown on. When difficulty arises to meet the above requirements, characteristics of the governors are to be as deemed appropriate by the Society.

(3) At all loads in a range between no load and the total emergency consumer load, the permanent speed variation is to be of the value specified in **-1(3)**.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 January 2007.

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

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules 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 upon request by the owner.

Amendment 1-4

Chapter 1 GENERAL

1.1 General

1.1.5 Definitions

Sub-paragraphs (2) through (10) have been renumbered to (4) through (12) respectively.

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

(1) "Hazardous areas" are the following areas or the spaces where flammable or explosive substances are placed and where it is likely to arise flammable or explosive gases or vapours from these substances.
   (a) Zone 0: areas or spaces in which an explosive gas atmosphere is present continuously or is present for long periods
   (b) Zone 1: areas or spaces in which an explosive gas atmosphere is likely to occur in normal condition
   (c) Zone 2: areas or spaces in which an explosive gas atmosphere is likely to occur in abnormal condition

Sub-paragraphs (2) and (3) have been added.

(2) "Non-hazardous areas" are the areas or the spaces in which an explosive gas atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
(3) "Source of release" are the point or location from which a gas, vapour, mist or liquid may be released into the atmosphere so that an explosive atmosphere may be formed under normal operating conditions, for example valves and flanges in cargo piping systems. The continuous fully welded parts are not considered as source of release.

1.1.6 Drawings and Data

Sub-paragraphs (2)(f) has been added.

(f) For ships carrying dangerous cargos specified in **19.3.2**, **Part R**, drawings indicating the loaded position of the dangerous cargos and the list of electrical equipment installed in their

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.16 Explosion-protected Electrical Equipment

Paragraphs 2.16.1 and 2.16.2 have been amended as follows.

2.16.1 General

Explosion-protected electrical equipment is to be in accordance with the standard deemed appropriate by the Society or equivalent thereto and also to comply with the requirements in this **2.16**.

2.16.2 Selection of Explosion-protected Construction

The explosion-protected construction used for electrical equipment on board ships is to be selected from the followings.

(1) Flameproof type
(2) Increased safety type
(3) Intrinsically safe type
  (a) Category '*ia*' intrinsically safe type
  (b) Category '*ib*' intrinsically safe type
(4) Pressurized protected type
(5) Encapsulation type
(6) Powder filling type
(7) Oil immersion type

2.16.4 Construction

Sub-paragraph -5 has been amended as follows.

5 The type of explosion-protected electrical equipment, the kind of gases for which the equipment is designed and other items deemed necessary by the Society are to be clearly indicated on a surface of the equipment.

Paragraph 2.16.5 has been amended as follows.

2.16.5 Special Requirement

Explosion-protected electrical equipment is to be in accordance with the requirements otherwise specified by the Society for each explosion-protected construction specified in **2.16.2**.

Paragraph 2.16.6 has been deleted.

Chapter 4 ADDITIONAL REQUIREMENTS FOR SHIPS CARRYING SPECIAL CARGOES

4.2 Tankers, Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk

Paragraph 4.2.1 has been amended as follows.

4.2.1 General

Electrical equipment for tankers, ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk is to comply with all applicable requirements in this part and the requirements in **Chapter 4, Part R, Chapter 10, Part N** and **Chapter 10, Part S**.

4.2.2 Distribution System

Sub-paragraph -3 has been amended as follows.

3 Notwithstanding the requirement in **-1**, an earthed distribution system may be used for the following systems.

(1) Intrinsically safe circuits

(2) Power supplies, control circuits and instrumentation circuits where technical or safety reasons demanded to the earthed systems, provided that the current in the hull is limited to not more than 5A in both normal and fault conditions

(3) Locally earthed systems for limited use or a.c. power networks of 1,000V root mean square line voltages and over, provided that any arising earthing current does not flow directly through any hazardous areas

Sub-paragraph -4 has been added

4 The neutral or earth conductor required for protection against electric shock is not to be connected together with a single conductor in a hazardous area.

Paragraphs 4.2.3 and 4.2.4 have been amended as follows.

4.2.3 Hazardous Areas

1 Hazardous areas for tankers are to be categorized in accordance with the requirements in **4.3.1, 4.4.1** and **4.5.1**.

2 Hazardous areas for ships carrying dangerous chemicals in bulk are to be categorized in accordance with the requirements in **4.3.1, 4.4.1, 4.5.1** and **4.6.1**.

3 Hazardous areas for ships carrying liquefied gases in bulk are to be categorized in accordance with the requirements in **4.7.1**.

4 Areas and spaces not mentioned in **-1** to **-3**, but considered to present risks of the presence of an explosive gas atmosphere, are to be categorized as hazardous areas in accordance with the requirements otherwise specified by the Society.

5 Access doors or other openings are not to be provided in the following boundaries except where required for operational purposes and safety reasons on ships. Where access doors or

other openings are provided, the areas connected to the boundaries are to be categorized as hazardous areas in accordance with the requirements otherwise specified by the Society.

(1) The boundary between Zone 1 and Zone 2

(2) The boundary between hazardous areas and non-hazardous areas

4.2.4 Electrical Installations in Hazardous Areas

1 Electrical installations are not to be installed in hazardous areas unless essential for operational purposes or safety reasons on ships. However, where the following electrical installations are installed necessarily, the requirements do not apply.

(1) Zone 0

(a) Category '*ia*' intrinsically safe type electrical equipment including simple electrical apparatus (thermocouples, switching devices, etc.) and associated cables

(b) Submerged cargo pump motors and their supply cables (In this case, the motors are to be automatically stopped off with alarms by at least two independent detecting method which are pump delivery low pressure, lower current of motors or low liquid level.)

(2) Zone 1

(a) Electrical installations specified in **(1)**

(b) Category '*ib*' intrinsically safe type electrical equipment including simple electrical apparatus (thermocouples, switching devices, etc.) and associated cables

(c) Flameproof type or pressurized type electrical equipment and associated cables

(d) Hull fittings (terminals or shell-plating penetrations for anodes or electrodes of an impressed current cathodic protection system, or transducers such as those for depth-sounding or log systems) and associated cables

(e) Through runs of cables

(3) Zone 2

(a) Electrical installations specified in **(2)**

(b) Increased safety type, encapsulated type, powder filling type or oil immersion type electrical equipment and associated cables

(c) Other electrical equipments deemed appropriate by the Society and associated cables

2 Where electrical equipment are installed in hazardous areas in accordance with the requirement **-1**, the equipment are to be confirmed that it is safely usable in the explosive gas atmosphere concerned.

3 Aerials and associated riggings are to be sited well clear of gas or vapour outlets.

4 As a rule, no portable electrical equipment is to be located in harzarous areas. Where it is unavoidable to locate the equipment in harzarous areas, it is subject to the approval of the Society.

5 Cables are to be one of the following. Where corrosion may be expected, a *PVC* or chroloprene sheath is to be applied over armour or metallic sheath of cables for corrosion protection.

(1) Mineral insulated and copper sheathed

(2) Lead alloy sheathed and metal armoured

(3) Non-metallic sheathed and metal armoured

6 Installation of cables is to comply with the followings:

(1) Cables are to be installed as close to the hull centre line as practicable.

(2) Cables are to be installed sufficiently distant from decks, bulkheads, tanks and various kinds of pipes.

(3) Cables are, as a rule, to be protected against mechanical damage. Especially, cables installed on open decks are to be protected by metallic casings or non-metallic casings complying with the requirements specified in **2.9.14-3(4)**. Further, the cables and their

supports are to be fitted in such a manner as to withstand expansion, contraction and other effects of the hull structure.

(4) The penetration part of the cables or cable pipes through decks and bulkheads of the hazardous areas is to be constructed so as to maintain gas-tightness and liquid-tightness as the case may require.

(5) When mineral insulated cables are used, special precautions are to be taken to ensure sound terminations.

(6) Cables are to be connected to explosion-protected electrical equipment only by means of a gland or equivalent device.

(7) Where cable joints are used, it is subject to the approval of the Society. In this case, cable joints are permitted to be in zones 1 and 2. Especially for intrinsically-safe circuits, they are permitted to be in zone 0.

(8) Where cables are immersed in cargos, the construction of the cables is to be such as to withstand the substances to which they can be exposed, or the cables are to be enclosed in casings, e.g. metallic pipes, which is capable of withstanding such substances.

(9) Where cables run through cargo pump room entrances, they are to be installed in heavy gauge steel pipes or steel ducts with gastight joints.

7 Metallic coverings of power and lighting cables as listed below are to be earthed at least at both end. Where it is necessary to use single-core cables for alternating current circuits rated in excess of 20*A*, metallic coverings of cables are to be earthed at single point. In this case, the non-earthing point is not to be located in hazardous areas.

(1) Cables passing through hazardous areas

(2) Cables connected to equipment installed in hazardous areas

8 Electrical circuits path through Zone 0 are to be made the following measures.

(1) The circuits other than intrinsically-safe circuits are to be disconnected automatically in the event of an abnormally low level of insulation resistance and high level of leakage current.

(2) The protective systems are to be arranged so that manual intervention is necessary for the reconnection of the circuit after disconnection as the result of a short circuit, overload or earth-fault condition.

9 Where flame-proof type electrical motors for cargo handling equipment are installed in cargo pump room or cargo compressor room, the motors is to be arranged so that it is easy to approach them and make sure to carry out the maintenance and survey for them.

Paragraphs 4.2.5 to 4.2.7 have been added.

4.2.5 Lighting in Hazardous Areas

1 Where hazardous areas are lit by the lighting fittings located in adjacent non-hazardous areas through glazed ports fitted in the bulkheads or decks, these glazed ports are to be so constructed as not to impair the water-tight, gastight, fireproof and strength integrity of the bulkheads and decks. Due consideration is to be given to the ventilation of the lighting fittings so that the excessive temperature rise is not caused on the glazed ports.

2 The lighting fittings installed in cargo pump room and cargo compressor room are to be divided between at least two branch circuits.

3 All switches and protective devices related with the circuits specified in **-2** are to interrupt all poles or phases and to be located in non-hazardous areas.

4.2.6 Ventilation in Hazardous Areas

1 Ventilators installed in cargo pump room or cargo compressor room are to be arranged in order

that discontinuities of ventilation are not expected to occur for long periods and accumulation of gas or vapour are not occurred. In case of failure of the ventilation, an alarm is to be activated in a continually manned space, e.g. the navigation bridge or the machinery control room, in addition to the cargo pump room and cargo compressor room.

2 Electric motors for the ventilators specified in **-1** are to be placed outside the ventilation ducts.

3 The ventilators specified in **-1** are not to produce a source of ignition.

4 In tankers, notwithstanding the requirement in **4.5.4-1(1)**, **Part R**, the air change ratio of the ventilation in cargo pump room is to be at least 30 per hour, based upon the gross volume of the space. However, when deemed appropriate by the Society, these requirements do not apply.

4.2.7 Maintenance for Explosion-protected Electrical Equipment

Maintenance deemed appropriate by the Society for explosion-protected electrical equipment in hazardous areas are to be periodically carried out by experienced personnel who are sufficiently trained about it. The documentations for the maintenance are to be kept on board.

Section 4.3 has been amended as follows.

4.3 Tankers and Ships Carrying Dangerous Chemicals in Bulk Having a Flashpoint Not Exceeding 60℃

4.3.1 Classification of Hazardous Areas

The areas or spaces in tankers and ships carrying dangerous chemicals in bulk having a flashpoint not exceeding 60℃ are to be classified in Zone 0, 1 and 2 as follows.

(1) Zone 0
  (a) Cargo tanks and slop tanks
  (b) Interior of pipes for pressure-relief or venting systems for cargo and slop tanks
  (c) Interior of cargo pipes

(2) Zone 1
  (a) Void spaces adjacent to integral cargo tanks
  (b) Hold spaces containing independent cargo tanks
  (c) Cofferdams and segregated ballast tanks adjacent to cargo tanks (fuel oil tanks, lubricating oil tanks, etc. are regarded as a cofferdam, the same being referred hereinafter.)
  (d) Cargo pump rooms
  (e) Enclosed or semi-enclosed spaces (means spaces separated by decks and bulkheads where the condition of ventilation is significantly different from that of exposed spaces of ships) immediately above cargo tanks or having bulkheads above and in line with cargo tank bulkheads
  (f) Spaces other than cofferdams and segregated ballast tanks, adjacent to and below the top of a cargo tank (for example, trunks, passage-ways, holds, the same being referred hereinafter.)
  (g) Areas on open deck or semi-enclosed spaces on open deck, within a sphere of 3*m* radius from any ventilation outlets, cargo tank openings, gas or vapour outlets (for example, cargo tank hatches, sight ports, tank cleaning openings, sounding pipe openings, etc., the same being referred hereinafter.), cargo manifold valve, cargo valve, cargo pipe flange and cargo pump-room ventilation outlets for pressure

release which permits the flow of small volumes of gas or vapour caused by thermal variation

(h) Areas on open deck or semi-enclosed spaces on open deck, within a vertical cylinder of unlimited height and 6*m* radius from the outlet centre, and within a hemisphere of 6*m* radius below the outlet which permits the flow of large volumes of gas or vapour during loading, discharging or ballasting

(i) Areas on open deck or semi-enclosed spaces on open deck, within 1.5*m* from cargo pump room entrances, within a sphere of 1.5*m* radius from of cargo pump room ventilation inlet and openings specified in **(2)**

(j) Areas on open deck within spillage coamings surrounding cargo manifold valves and 3*m* beyond these, up to a height of 2.4*m* above the deck

(k) Areas on open deck over all cargo tanks (including all ballast tanks within the cargo tank block, the same being referred hereinafter.) where structures are restricting the natural ventilation and to the full breadth of the ship plus 3*m* fore and aft on open deck, up to a height of 2.4*m* above the deck

(l) Compartments for cargo hoses

(m) Enclosed or semi-enclosed spaces in which pipes containing cargos are located

(3) Zone 2

(a) Areas on open deck or semi-enclosed spaces on open deck, within 1.5*m* surrounding the areas specified in **(2)** (except the hazardous areas otherwise specified in the Rules, the same being referred hereinafter.)

(b) Spaces within 4*m* surrounding the areas specified in **(2)(h)**

(c) Spaces forming an air-lock between the areas specified in **(2)** and non-hazardous areas

(d) Areas on open deck within spillage coamings intended to keep spillages clear of accommodation and service spaces and 3*m* beyond these, up to a height of 2.4*m* above the deck

(e) Areas on open deck over all cargo tanks where unrestricted natural ventilation is guaranteed and to the full breadth of the ship plus 3*m* fore and aft on open deck, up to a height of 2.4*m* above the deck

(f) Spaces forward of open deck specified in **(e)** and **(2)(k)**, below the level of the open deck, and having openings at a level less than 0.5*m* above the open deck (except where the openings are situated at least 5*m* from the foremost cargo tank and at least 10*m* measured horizontally from any cargo tank outlet or gas or vapour outlet, or the spaces are mechanically ventilated, the same being referred hereinafter.)

(g) Ballast pump room adjacent to cargo tanks

Sections 4.4, 4.5 and 4.6 have been renumbered to 4.8, 4.9 and 4.10 respectively.

Sections 4.4 through 4.7 have been added.

4.4 Tankers and Ships Carrying Dangerous Chemicals in Bulk having a Flashpoint Exceeding 60℃ and their Cargos are Heated more than Temperature which is 15℃ lower than the Flashpoint

4.4.1 Classification of Hazardous Areas

The areas or spaces in tankers and ships carrying dangerous chemicals in bulk having a flashpoint exceeding 60℃ and their cargos are heated more than temperature which is 15℃ lower than the flashpoint are to be classified in accordance with the requirements specified in **4.3.1**.

4.5 Tankers and Ships Carrying Dangerous Chemicals in Bulk having a Flashpoint Exceeding 60℃ and their Cargos are not Heated or Heated less than Temperature which is 15℃ lower than the Flashpoint

4.5.1 Classification of Hazardous Areas

The areas or spaces in tankers and ships carrying dangerous chemicals in bulk having a flashpoint exceeding 60℃ and their cargos are not heated or heated less than temperature which is 15℃ lower than the flashpoint are to be classified in Zone 2 as follows.

(1) Cargo tanks and slop tanks
(2) Interior of pipes for pressure-relief or venting systems for cargo and slop tanks
(3) Interior of cargo pipes

4.6 Ships Carrying Dangerous Chemicals in Bulk Reacting with other Products to Evolve Flammable Gases

4.6.1 Classification of Hazardous Areas

The areas or spaces in ships carrying dangerous chemicals in bulk reacting with other products to evolve flammable gases are to be classified in Zone 1 and 2 as follows.

(1) Zone 1
  (a) Cargo tanks and slop tanks
  (b) Interior of pipes for pressure-relief or venting systems for cargo and slop tanks
  (c) Interior of cargo pipes
  (d) Cargo pump rooms
  (e) Compartments for cargo hoses
(2) Zone 2
  (a) Areas on open deck or semi-enclosed spaces on open deck, within 1.5*m* surrounding the areas specified in **(1)**
  (b) Void spaces adjacent to integral cargo tanks
  (c) Hold spaces containing independent cargo tanks
  (d) Cofferdams and segregated ballast tanks adjacent to cargo tanks
  (e) Enclosed or semi-enclosed spaces immediately above cargo tanks or having

bulkheads above and in line with cargo tank bulkheads

(f) Spaces other than cofferdams and segregated ballast tanks, adjacent to and below the top of a cargo tank

(g) Enclosed or semi-enclosed spaces in which pipes containing cargos are located

(h) Areas on open deck or semi-enclosed spaces on open deck, within a sphere of 1.5*m* radius from any ventilation outlets, cargo tank openings, gas or vapour outlets, cargo manifold valve, cargo valve, cargo pipe flange and cargo pump-room ventilation outlets for pressure release which permits the flow of small volumes of gas or vapour caused by thermal variation

(i) Areas on open deck within spillage coamings surrounding cargo manifold valves and 1.5*m* beyond these, up to a height of 1.5*m* above the deck

(j) Areas on open deck or semi-enclosed spaces on open deck, within a vertical cylinder of unlimited height and 3*m* radius from the outlet centre, and within a hemisphere of 3*m* radius below the outlet which permits the flow of large volumes of gas or vapour during loading, discharging or ballasting

4.7 Ships Carrying Liquefied Gases in Bulk

4.7.1 Classification of Hazardous Areas

The areas or spaces in ships carrying liquefied gases in bulk are to be classified in Zone 0, 1 and 2 as follows.

(1) Zone 0

(a) Cargo tanks and slop tanks

(b) Interior of pipes for pressure-relief or venting systems for cargo and slop tanks

(c) Interior of cargo pipes

(d) Hold spaces containing independent cargo tanks requiring a secondary barrier

(2) Zone 1

(a) Void spaces adjacent to integral cargo tanks

(b) Hold spaces containing independent cargo tanks not requiring a secondary barrier

(c) Cofferdams and segregated ballast tanks adjacent to cargo tanks

(d) Spaces separated from hold spaces specified in **(1)(d)** by a single gastight boundary

(e) Cargo pump rooms and cargo compressor rooms

(f) Enclosed or semi-enclosed spaces immediately above cargo tanks or having bulkheads above and in line with cargo tank bulkheads

(g) Spaces other than cofferdams and segregated ballast tanks, adjacent to and below the top of a cargo tank

(h) Areas on open deck or semi-enclosed spaces on open deck, within a sphere of 3 *m* radius from any ventilation outlets, cargo tank openings, gas or vapour outlets, cargo manifold valve, cargo valve, cargo pipe flange and cargo pump-room ventilation outlets for pressure release which permits the flow of small volumes of gas or vapour caused by thermal variation

(i) Areas on open deck or semi-enclosed spaces on open deck, within a vertical cylinder of unlimited height and 6*m* radius from the outlet centre, and within a hemisphere of 6*m* radius below the outlet which permits the flow of large volumes of gas or vapour during loading, discharging or ballasting

(j) Areas on open deck or semi-enclosed spaces on open deck, within 1.5*m* from cargo pump room entrances, within a sphere of 1.5*m* radius from of cargo pump room ventilation inlet and openings specified in **(2)**

(k) Areas on open deck within spillage coamings surrounding cargo manifold valves and 3*m* beyond these, up to a height of 2.4*m* above the deck
(l) Areas on open deck over all cargo tanks where structures are restricting the natural ventilation and to the full breadth of the ship plus 3*m* fore and aft on open deck, up to a height of 2.4*m* above the deck
(m) Compartments for cargo hoses
(n) Enclosed or semi-enclosed spaces in which pipes containing cargos are located (except spaces which contains gas detection equipment complied with **13.6.5**, **Part N** of the Rules and which utilizes boil-off gas as fuel in accordance with the requirements in **Chapter 16**, **Part N** of the Rules.)

(3) Zone 2
(a) Areas on open deck or semi-enclosed spaces on open deck, within 1.5*m* surrounding the areas specified in **(2)**
(b) Spaces within 4*m* surrounding the areas specified in **(2)(i)**
(c) Spaces forming an air-lock between the areas specified in **(2)** and non-hazardous areas
(d) Areas on open deck within spillage coamings intended to keep spillages clear of accommodation and service spaces and 3*m* beyond these, up to a height of 2.4*m* above the deck
(e) Areas on open deck over all cargo tanks where unrestricted natural ventilation is guaranteed and to the full breadth of the ship plus 3*m* fore and aft on open deck, up to a height of 2.4*m* above the deck
(f) Spaces forward of open deck specified in **(e)** and **(2)(l)**, below the level of the open deck, and having openings at a level less than 0.5*m* above the open deck
(g) Spaces within 2.4*m* of the outer surface of cargo tanks where the surface is exposed to the weather

EFFECTIVE DATE AND APPLICATION (Amendment 1-4)

1. The effective date of the amendments is 1 January 2007.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.
(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part H Electrical Installations

2006 AMENDMENT NO.1

Notice No.67 3rd October 2006

Resolved by Technical Committee on 6th July 2006

Notice No.67 3rd October 2006
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:

Amendment 1-1

Part H ELECTRICAL INSTALLATIONS

H3 DEDIGN OF INSTALLATIONS

H3.2 Main Source of Electrical Power and Lighting Systems

H3.2.1 Main Source of Electrical Power

Sub-paragraph -5 has been amended as follows:

5 Provisions for maintaining or immediately restoring the electrical supply to equipment for propulsion and steering specified in **3.2.1-3, Part H of the Rules** are to comply with followings:

(1) Where the electrical power can normally be supplied by one generator, the following requirements are to be complied with.

(a) An adequate provision is to be made for automatic starting and connecting to the main switchboard of a standby generator of sufficient capacity to permit propulsion and steering and to ensure safety of the ship with automatic restarting of the important auxiliaries including sequential operations in case of loss of electrical power of the generator in operation.

(b) The time for automatic starting and connecting to the main switchboard of a standby generator specified in **(a)** above is to be not more than 45 *seconds* after loss of power.

(2) If the electrical power is normally supplied by more than one generator simultaneously in parallel operation, provision is to be made to ensure that, in case of loss of electrical power of one of these generating sets, the remaining ones are kept in operation without overload to permit propulsion and steering, and to ensure safety of the ship. (See **2.3.6, Part H of the Rules**)

(3) Other provisions deemed appropriate by the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 3 October 2006.

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.

Amendment 1-2

H3 DESIGN OF INSTALLATIONS

H3.3 Emergency Source of Electrical Power

H3.3.3 Kind and Performance of Emergency Source of Electrical Power

Existing sub-paragraph has been numbered to -1.

Sub-paragraph -2 has been added as follows;

2 With respect to the requirements **3.3.3(2)(a), Part H of the Rules**, where the inverter or converter is connected to the output circuit of the batteries (consumer side), the maximum permitted voltage fluctuations may be taken as those specified in **Table H2.1(a)** or **H2.1(b), 3.2.1.2-3, Part H of the Rules** respectively, notwithstanding the voltage drop on the battery.

Sub-paragraph -3 has been added as follows:

3 The wording "to be deemed appropriate by the Society" in **3.3.3(3), Part H of the Rules** means **Annex H3.3.3-3**.

Paragraph H3.3.4 has been added as follows:

H3.3.4 Transitional Source of Emergency Electrical Power

With respect to the requirements **3.3.4(1), Part H of the Rules**, where the inverter or converter is connected to the output circuit of the batteries (consumer side), the requirements specified in **H3.3.3-2** may be applied.

Annex H3.3.3-3 has been added as follows:

Annex H3.3.3-3 GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF UNINTERRUPTIBLE POWER SYSTEM UNITS

1.1 General

1.1.1 Application

This Guidance is to apply to interruptible power system (hereinafter referred to as "UPS") units installed in ships as an emergency source of electrical power. The batteries and semi-conductor rectifiers (converters, inverters) combined with UPS units are to be in accordance with the requirements specified in **2.11** and **2.12, Part H of the Rules** in practicable.

1.1.2 Definitions

Definitions of terms used in this Guidance are as follows:

(1) UPS means a source of electrical power with semi-conductor rectifiers, switches and batteries, constituting for maintaining continuity of load in case of input power failure.

(2) Off-line UPS unit means an electrical power which the output load is powered from bypass line under normal operation, and which is only transferred to the inverter if the bypass supply falls or goes outside preset limits.

(3) Line interactive UPS unit means a system specified in **(2)** above which is attached an equipment to control the voltage vibrations.

(4) On-line UPS unit means a system which supplies electrical power to the load via inverter without power interruption.

1.2 Design

1.2.1 Construction

1 UPS units are to be constructed in accordance with *IEC* 62040 or an acceptable and relevant national or international standard.

2 The operation of the UPS units is not to depend on external services.

3 The type of UPS unit (off-line, line-interactive, on-line) is to be appropriate to the power supply requirements of the connected load. (See **2.1.2-3, Part H of the Rules**)

4 UPS units are to have an external bypass circuit.

5 UPS units are to have a self-monitoring function, and audible and visual alarms are to be activated in the space where crews normally attend (e.g., navigation bridge and machinery control space, etc.) in the following cases.

(1) Power supply failure (abnormal voltage or frequency)

(2) Earth fault

(3) Operation of battery protective device

(4) Discharge of battery

(5) Operation of bypass circuit for on-line UPS units

1.2.2 Arrangement

1 UPS units are to be suitably located for use in an emergency condition.

2 Where the batteries combined with UPS units are of a sealed type, the Society may approve that UPS unit is located in compartments with normal electrical equipment, taking account of the characteristics of the batteries and the ventilation arrangements to the compartments.

1.2.3 Performance

1 The output power is to be maintained for the duration time required for the connected equipment as specified in **3.3.2, Part H of the Rules**.

2 No additional circuits are to be connected to UPS units unless the battery capacity is more than the total capacity of the output power specified in **-1** above.

3 On restoration of the input power, the rating of the charging unit is to be sufficient to recharge the batteries while maintaining the power supply to the load.

4 Where supplying to the load via inverter from the batteries in UPS, the maximum permitted voltage fluctuation is to be complied with **H3.3.3-2.(2)**.

1.3 Testing

1.3.1 Shop tests

1 UPS units of 50 *kVA* and over are to be tested at the manufacturer's works or at other works. In addition, the test for semi-conductor rectifiers is to be carried out in accordance with the requirements specified in **1.2.1-1, Part H of the Rules**.

2 Appropriate test is to be carried out in accordance with the following items to demonstrate that the UPS unit is suitable under its intended environment.

(1) Functionality, including operation of alarms
(2) Temperature rise
(3) Ventilation rate
(4) Battery capacity

3 In case where input power failure of UPS is happened, if the continuous power supply is necessary without power interruption, this operation condition is to be verified.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 January 2007.

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.

Amendment 1-3

H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

H2.4 Rotating Machines

H2.4.2 Characteristics of Governors

Sub-paragraph -3 has been added as follows:

3 The wording "to be as deemed appropriate by the Society" in **2.4.2-2(2), Part H of the Rules** means that throwing-on in steps to the prime movers, which this Rule is applied, is to be used. In this case, the following requirements **(1)** through **(3)** are to be adopted.

(1) Total emergency consumer load is to be thrown on within 45 *seconds* after blackout.

(2) Prime movers are to be designed so as to a maximum step load in the emergency consumer load is to be thrown on at one time.

(3) The document, such as a thrown power calculation, declaring the adoption of the throwing-on in steps, is to be submitted.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 January 2007.

2. Notwithstanding the amendments to the Guidance, the current requirements 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.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance 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 upon request by the owner.

Amendment 1-4

"Guidance for the Survey and Construction of Steel Ships" has been partly amended as follows:

Part H ELECTRICAL INSTALLATIONS

H1 GENERAL

H1.1 General

Paragraph H1.1.6 has been amended as follows.

H1.1.6 Drawings and Data

"The list of electrical equipment installed in hazardous areas" specified in **1.1.6(2)(d)** and **(f), Part H of the Rules** is to include the followings.

(1) The installation arrangement, kind of construction, type (including the certificate number and the name of test institution), manufacturer, number and use of the explosion-protected electrical equipment

(2) The condition such as ventilation ratio, pressurizations or air-lock influenced to the selection of hazardous areas and related documents to confirm the condition is effective (where applicable)

Table H1.1.6-1 has been deleted.

H2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

H2.1 General

H2.1.3 Construction, Materials, Installations, etc.

Sub-paragraph -6 has been added.

6 Electrical installations in acetylene stores are to be certified safe type explosion-protected electrical equipment specified in **2.16.2(1)** to **(4)**, **Part H of the Rules** and grouped into Gas and Vapour Group *II*C and Temperature Class *T*2 and associated cables.

H2.16 Explosion-protected Electrical Equipment

Paragraph H2.16.1 has been amended as follows.

H2.16.1 General

1 The wording "the standard deemed appropriate by the Society" in **2.16.1**, **Part H of the Rules** means *IEC* 60079.

2 Explosion-protected electrical equipment listed below may be treated as equivalent to those complying with *IEC* 60079.

(1) Explosion-protected electrical equipment complying with the following latest standards for marine use
   (a) *JIS F* 8009: Shipbuilding - General requirements for electrical apparatus for explosive gas atmosphere
   (b) *JIS F* 8422: Shipbuilding - Flameproof ceiling lights

(2) Explosion-protected electrical equipment complying with the following latest standards for industrial use
   (a) *JIS F* 60079-0: Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
   (b) *JIS C* 0931: Electrical apparatus for explosive gas atmospheres - Construction and verification test of flameproof enclosures of electrical apparatus
   (c) *JIS C* 0932: Electrical apparatus for explosive gas atmospheres - Type of protection "p"
   (d) *JIS C* 60079-6: Electrical apparatus for explosive gas atmospheres - Part 6: Oil-immersed apparatus
   (e) *JIS C* 0934: Electrical apparatus for explosive gas atmospheres - Increased safety "e"
   (f) *JIS C* 60079-11: Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsically safety "i"

(3) Explosion-protected electrical equipment complying with the "Guidance for Type Approval of Electrical Apparatus for explosive gas atmospheres" issued by Technology Institution of Industrial Safety in Japan.

(4) Explosion-protected electrical equipment complying with the "Recommended Practices for Explosion-Protected Electrical Installations in General Industries" issued by Research Institute of Industrial Safety, Independent Administrative Institution in Japan. However, the use of the equipment may be restricted because the explosive gas or vapour for which

the equipment is designed, could not be completely consistent with those of equipment complying with *IEC* 60079.

(5) Explosion-protected electrical equipment which has been type tested by the Society in accordance with the following standards. However, the use of the equipment may be restricted because of the same reason specified in **(4)**.
   (a) *JIS F* 8004 (1979): Shipbuilding - General requirements for Construction and verification test of flameproof enclosures of electrical apparatus
   (b) *JIS C* 0903 (1993): Electrical apparatus for explosive gas atmospheres - General requirements

Paragraph H2.16.3, H2.16.4 and H2.16.5 have been added.

H2.16.3 Materials

The wording "materials which minimizes the risk of spark by friction" in **2.16.3-2**, **Part H of the Rules** means the material that sparking caused by the friction or impact of steels does not prompt the ignition explosion to the explosive gas or vapour for which the equipment is designed, and non-sparking characteristic has been confirmed in accordance with *JIS M* 7002: Non-ignition testing methods for non-sparking beryllium copper alloy tools.

H2.16.4 Construction

The wording "other items deemed necessary by the Society" in **2.16.4-5**, **Part H of the Rules** means the followings.

(1) Pressurized protected type electrical equipment
   (a) Inside volume of the equipment
   (b) Pressure and volume of the protection air or gas at the intake side of the equipment
   (c) Pressure of the protection air or gas at the outlet side of the equipment (for ventilated type only)
   (d) Allowable maximum pressure of the protection air or gas for the equipment case

(2) Intrinsically safe type electrical equipment (except single equipment such as detectors)
   (a) Ratings of the intrinsically safe circuit
   (b) Ratings of the non-intrinsically safe circuit
   (c) Limitation for use
   (d) Cautions for apparatuses having non-intrinsically safe circuit which is not to be installed in the hazardous areas and not to be modified and remodeled onto wirings and components where the combined installation
   (e) Circuit diagrams including the position of connection terminal for intrinsically safe circuit and non-intrinsically safe circuit under the combined installation

(3) Type of lighting bulb and its wattage for lighting fittings

H2.16.5 Special Requirements

The wording "the requirements otherwise specified by the Society" in **2.16.5**, **Part H of the Rules** means the followings.

(1) Flameproof type electrical equipment
   (a) Where flameproof lighting fittings are fitted with bulkheads penetrated through, they are to be so installed as not to impair the integrity of the bulkheads.
   (b) In case where a drain discharging devices is provided to the enclosure of flameproof construction, it is to be so constructed as not to impair the flameproof characteristics even with the device in the open position.

(c) In case where a waterproof packing is provided to the flameproof construction, it is to be so constructed as not to impair the flameproof joints, such as length of flame path and gaps etc., caused by the water intrusion.

(d) In case where a cable is connected to a terminal box by the cable pipe connecting method, sealing fittings are to be provided near the terminal box.

(2) Increased safety type electrical equipment

(a) Enclosures of increased safety lighting fittings are to be of a robust construction made of non-hygroscopic flame-retardant or incombustible material, and also they are to be of watertight construction or equivalent thereto.

(b) In case where an increased safety type motor or transformer is used, the efficient protection for overload and overheat is to be provided. Especially for a squirrel cage induction motor, the additional protection is to be provided not so as to use it over an allowable restraint time and abnormal temperature rise is not to be occurred under the restraint condition of the rotor.

(c) In case where there is a limitation for use in order to maintain an explosion protecting performance, the approval for use by the Society is to be necessary.

(3) Intrinsically safe type electrical equipment

(a) Intrinsically safe electrical equipment is to be installed independently against general electrical equipment. Where the combined installation with general equipment is necessary, earthed metallic partitions are to be provided between these equipment.

(b) The wires for intrinsically safe circuits are to be measured to discriminate easily against those for other circuits. And the wires are also to be separated 50 *mm* or more from those for other circuits and to be shielded electrically, if necessary.

(c) Connection terminal for intrinsically safe circuit and non-intrinsically safe circuit under the combined installation are to comply with either of the followings.

i) Connection terminals for the both circuits are to be installed in individually circuit boards separated from 50 *mm* each other.

ii) Earthed metallic partitions having efficient mechanical strength and insulation are to be provided between the connection terminals for the both circuits.

(d) Even if an electrical fault for general circuit other than intrinsically safe circuits is happened, the function of a safety barrier is to be kept operating.

(e) Safety barriers are to be located in non-hazardous areas.

(f) Safety barriers are to be structured by at least two same components unless one component specified below is used. In case where one of the components is broken, an explosion protecting performance is to be maintained.

i) Power Transformers

The insulation between first and second field windings is to be ensured by earthed partitions made by copper. And each field winding is to have an efficient insulation performance.

ii) Current Limitation Resistors

The surface of the resistors is to be covered by a synthetic resin or the resistors are to be embedded in a formed resin.

iii) Blocking Condensers

The condenser is to be structured by two solid dielectric type capacitors connected with each other in series which have high reliability. Electrolytic capacitors including tantalum type are not to be used.

(4) Pressurized protected type electrical equipment

(a) When air is used as the pressurized medium, the air inlet is to be located in a safe

space.

(b) Where air or inert gas is used as the pressurized medium, an interlock device is to be provided to ensure a displacement of air within the apparatus of at least 10 times the free volume of its enclosure and thus to obtain the required pressure before it can be energized.

(c) Pressurized protected electrical equipment is to be automatically disconnected from the source of electrical power in the event of the loss of pressure within its enclosure. However, if this arrangement increases the hazard to the ship, it may be permitted for loss of pressure to operate an alarm device only.

(5) Encapsulation type electrical equipment

(a) Where some protection components are installed in order to limit a temperature rise, the setting value is not to be changed.

(b) In case where there is a limitation for use in order to maintain an explosion protecting performance, the approval for use by the Society is to be necessary.

(6) Powder filling type electrical equipment

(a) The enclosure is to be at least IP54 or higher specified in **H2.1.3-4**. If it is IP55 or higher grade, a breathing device is to be provided.

(b) A powder material filled in the enclosure is to be quartz or solid glass particles and have an efficient insulation performance.

(c) The total stored energy of all capacitors in an enclosure is not to exceed 20 *J* in normal operation.

(d) In case where there is a limitation for use in order to maintain an explosion protecting performance, the approval for use by the Society is to be necessary.

(7) Oil immersion type electrical equipment

(a) The oil level indicating device is to be provided so that the liquid level can easily checked in service.

(b) Live parts of the electrical equipment are to be immersed to a depth of not less than 25 *mm* below the surface of protective liquid.

(c) Where connecting cables are dipped into protective liquid, they are to be of oil resistant type.

(d) In case where there is a limitation for use in order to maintain an explosion protecting performance, the approval for use by the Society is to be necessary.

H4 ADDITIONAL REQUIREMENTS FOR SHIPS CARRYING SPECIAL CARGOES

Section H4.2 has been amended as follows.

H4.2 Tankers, Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk

H4.2.3 Hazardous Areas

1 The wording "the requirements otherwise specified by the Society" in **4.2.3-4**, **Part H of the Rules** means the categorization technique specified in **4.1.4** in *IEC* 60092-502 (1999). This technique is to categorize the hazardous areas adjacent to the space (basis hazardous area) which flammable or explosive gas atmosphere is present or likely to occur taking into account an effectiveness of the source of release and ventilation. (Refer to Fig. H4.2.3-1)

2 The wording "the requirements otherwise specified by the Society" in **4.2.3-5**, **Part H of the Rules** means the following requirements.

(1) Enclosed spaces with openings or doors other than those with bolted, gastight or watertight openings which are kept closed under seagoing condition, to Zone 1 or 2 are to be categorized as the same hazardous areas in which the openings or doors are located. However, the cases specified in **(2)** to **(4)** below are excluded.

(2) Enclosed spaces which have doors into adjacent Zone 1 may be categorized as Zone 2 provided that the spaces comply with all of the following requirements.

(a) The doors are to be gastight self-closing type doors and notice placard which displays the doors kept closed is to be provided.

(b) The mechanical ventilation complying with all the following requirements are to be provided so that inside air in the space flow to Zone 1 when the doors are opened.

i) It is ensure that there is no accumulation of gas or vapour in the ventilated spaces and secure the safety of crew's working environment.

ii) The audible and visual alarms are to be activated in a continually manned space, e.g. the navigation bridge or the machinery control room, when the failure of the ventilation is happened.

iii) Any duct used for the ventilation of hazardous areas is to be separate from those for the ventilation of non-hazardous areas.

(3) Enclosed spaces specified in **(a)** and **(b)** which have openings into adjacent Zone 1 may be categorized as non-hazardous areas.

(a) The doors are to be doubly protected gas-tight doors forming an air-lock with both self-closing devices and without holding back arrangements. The notice placard which displays the doors kept closed is to be provided.

(b) The mechanical ventilation complying with all the following requirements are to be provided so that the space is pressurized against to hazardous areas.

i) A minimum overpressure of 25*Pa* with respect to the adjacent hazardous space is to be maintained at all points inside the space and its associated ducts at which leaks are liable to occur, all doors and windows being closed.

ii) When the space is not suitably pressurized as **i)**, e.g. during initial start-up or after shut-down conditions, electrical installations other than those permitted by **4.2.4, Part H of the Rules** (hereinafter referred to as "permitted electrical installations") are not to be energized unless the internal atmosphere is ensured

as non-hazardous (the concentration of explosive gases or vapours in the space is below 30 % of the lower explosive limit) or prior purging of sufficient duration that the internal atmosphere may be considered as non-hazardous is proceeded.

iii) Monitoring device is to be provided to ensure the satisfactory functioning of pressurization of the space. In case where a flow-monitoring device is used, it is to be verified that either the required pressurization level is maintained with any door or other opening open, or an alarm is activated if any door or other opening is not closed.

iv) In case where the pressurization level required in **i)** is not maintained, an alarm is to be activated in a continually manned space, e.g. the navigation bridge or the machinery control room, and permitted electrical installations are to be automatically switched off. However, essential electrical equipment for the safety of the ship or personnel are to be permitted electrical installations to avoid automatic switch-off.

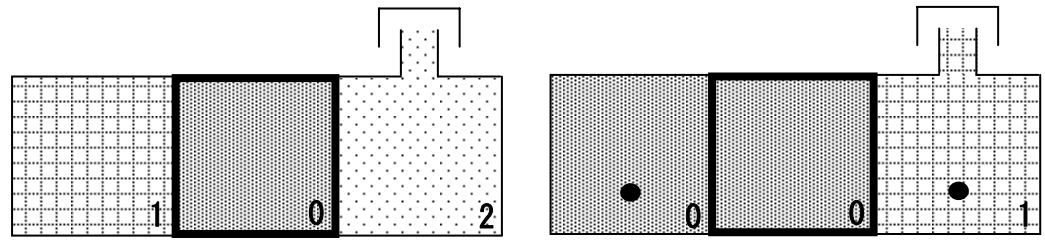
v) Any duct used for the ventilation of hazardous areas is to be separate from that used for the ventilation of non-hazardous areas.

(4) Enclosed spaces which have doors into adjacent Zone 2 may be categorized as non-hazardous areas provided that the spaces complying with all of the following requirements.

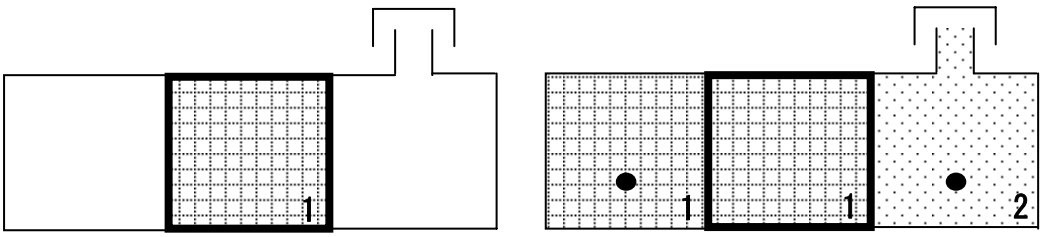
(a) The doors are to be gastight self-closing type doors, opening into the spaces inside and notice placard which displays the doors kept closed is to be provided.

(b) The mechanical ventilation complying with the requirements in **(2)(b)i)** to **iii)** are to be provided so that inside air in the space flow to Zone 2 when the doors are opened.

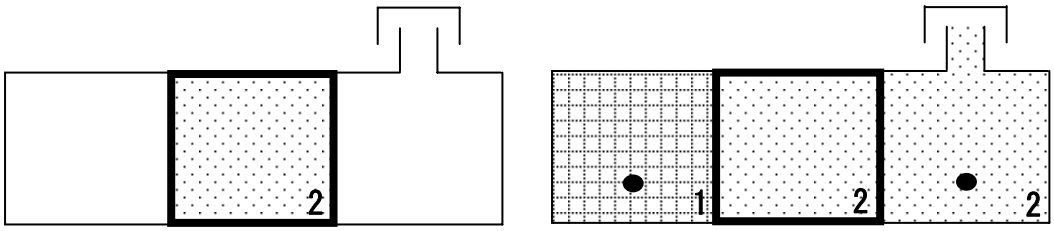
Fig. 4.2.3-1 Hazardous areas adjacent to the basis hazardous areas



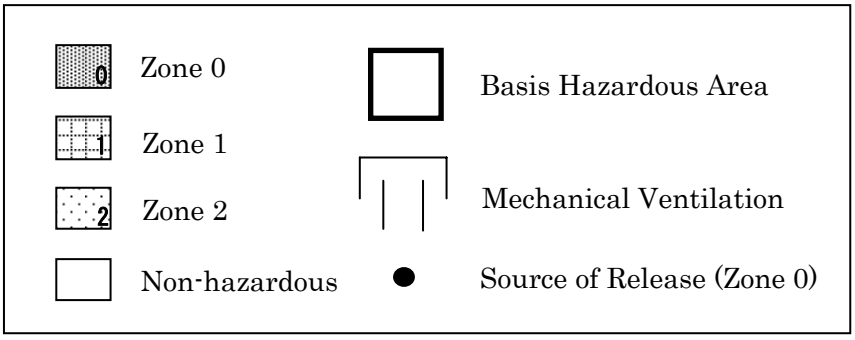
(a) In case where the basis hazardous area is Zone 0



(b) In case where the basis hazardous area is Zone 1



(c) In case where the basis hazardous area is Zone 2



H4.2.4 Electrical Installations in Hazardous Areas

1 Hull fittings complied with the requirement in **4.2.4-1(2)(d)**, **Part H of the Rules** are to be of totally enclosed gastight type or to be housed in a gastight enclosure. In addition, they are not to be located adjacent to cargo tanks. The associated cables of them connecting to upper deck are to be installed in heavy gauge galvanized steel pipes and their connection joints are to be of gastight type.

2 The wording "other electrical equipments deemed appropriate by the Society" in **4.2.4-1(3)(c)**, **Part H of the Rules** means one of the followings.

(1) Electrical equipment of the type "n" protection in accordance with *IEC* 60079-15(2001)

(2) Electrical equipment of a gas enclosed type which is certified by an appropriate authority

(3) Electrical equipment of a type which ensures the absence of sparks or arcs as well as no part of surface having temperature which may cause ignition of gases or vapours of the cargoes, during its normal operation

3 The wording "the equipment are to be confirmed that it is safely usable in the explosive gas atmosphere concerned" in **4.2.4-2**, **Part H of the Rules** means the followings.

(1) For tankers carrying only crude or product oil, explosion-protected electrical equipment complying with the requirements in **2.16, Part H of the Rules** and grouped into Apparatus Group *II*A, Temperature Class *T*3 as specified in *IEC* 60079-0 or Explosion Class *d*1, Ignition Group *G*3 as specified in Technical Recommendation issued by National Institute of Industrial Safety, Independent Administrative Institution in Japan and approved by the Society in accordance with the requirement in **1.2.1-4**, **Part H of the Rules** or equivalent thereto, or the equipment of a type which may not cause ignition of gases or vapours of the cargoes

(2) For ships carrying liquefied gases in bulk, the equipment complying with the requirements in **10.1.5, Part N of the Rules**

(3) For ships carrying dangerous chemicals in bulk, the equipment complying with the requirements in **10.1.5, Part S of the Rules**

4 For small ships, where a part of the fore castle deck is contained in the hazardous areas on open

deck over all cargo tanks to the full breadth of the ship plus 3*m* fore and aft on open deck, up to a height of 2.4*m* above the deck, the electrical equipment having the enclosure of a degree of protection at least IP55 other than explosion-protected type may be installed in the area subject to the following requirement **(1)** and **(2)** instead of the requirements in **4.2.4-2**, **Part H of the Rules**.

(1) Steel type gas barrier wall without any openings is to be provided on the forecastle deck.

(2) The height of gas barrier wall is to be 2.4 m or more from open deck and the breadth is to be full breadth of the forecastle deck at the gas barrier wall specified in **(1)**.

5 In applying **4.2.4-4**, **Part H of the Rules**, "approval of the Society" includes the drop test specified in *IEC* 60079-0.

6 In applying **4.2.4-5**, **Part H of the Rules**, "corrosion may be expected" means that cables are installed on open deck for example.

H4.2.6 Ventilation in Hazardous Areas

1 The wording "not to produce a source of ignition" in **4.2.6-3**, **Part H of the Rules** means the construction complying with the requirement in **R4.5.4-1(2)**.

2 The wording "when deemed appropriate by the Society" in **4.2.6-4**, **Part H of the Rules** means that the electrical equipment installed in the cargo pump room are limited to lighting fittings and audible indicators for general/fire alarms of flameproof or pressurized type instead of applying the requirement in **4.2.4-1(2)(c)**, **Part H of the Rules**.

H4.2.7 Maintenance for Explosion-protected Electrical Equipment

The wording "maintenance deemed appropriate by the Society" in **4.2.7**, **Part H of the Rules** means the followings.

(1) Maintenance carried by the procedure in **Annex H4.2.7**

(2) Any repair or overhaul of the equipment (if necessary)

(3) Confirmation of the explosion-protected performance in case where any modification, additions or adjustment of the equipment are carried out

Section H4.3 has been amended as follows.

H4.3 Tankers and Ships Carrying Dangerous Chemicals in Bulk having a Flash Point not Exceeding 60℃

H4.3.1 Classification of Hazardous Areas

The hazardous areas specified in **4.3.1, Part H of the Rules** are as shown in **Fig. H4.3.1(1)** to **Fig. H4.3.1(3)** for example.

Fig. H4.3.1(1) Example of Zone 0

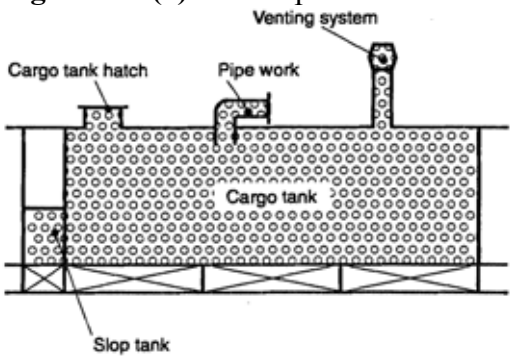


Fig. H4.3.1(2) Example of Zone 1

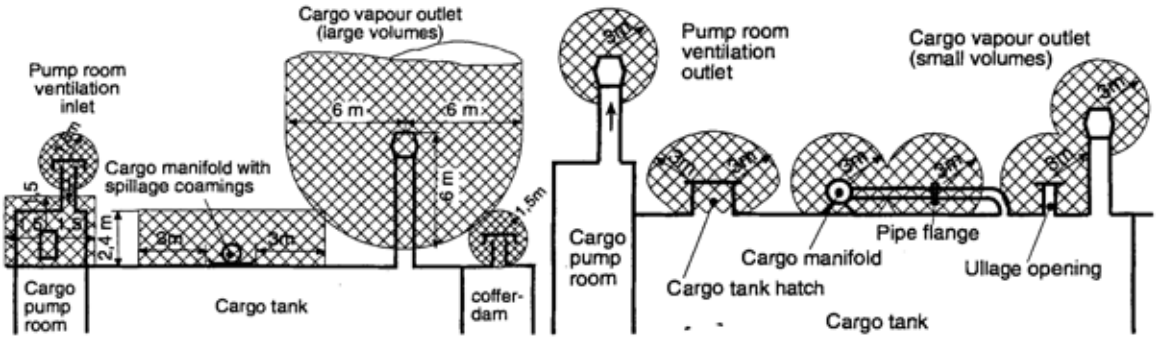
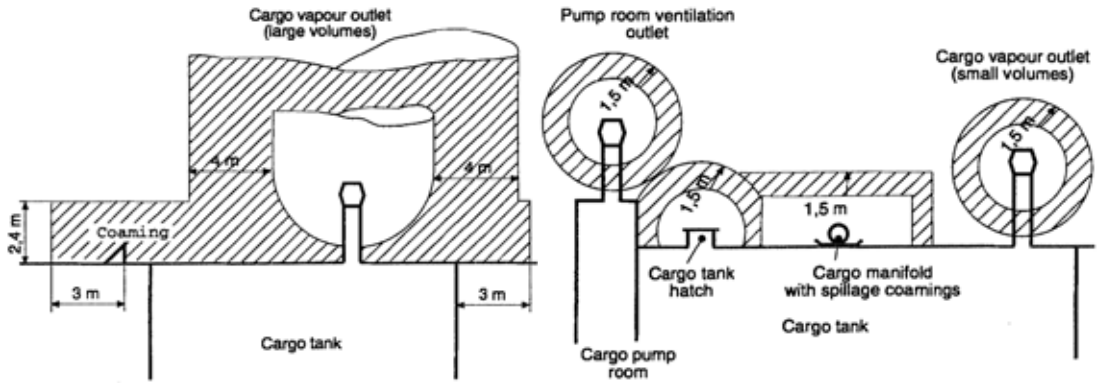


Fig. H4.3.1(3) Example of Zone 2



Section H4.5 has been deleted.

Section H4.7 has been added.

H4.7 Ships Carrying Liquefied Gases in Bulk

H4.7.1 Classification of Hazardous Areas

The hazardous areas specified in **4.7.1, Part H of the Rules** are as shown in **Fig. H4.7.1(1)** to **Fig. H4.7.1(3)** for example.

Fig. H4.7.1(1) Example of Zone 0

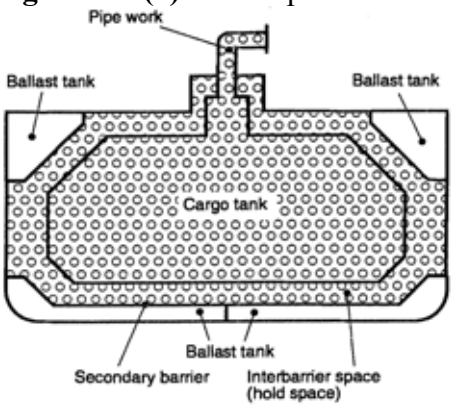


Fig. H4.7.1(2) Example of Zone 1

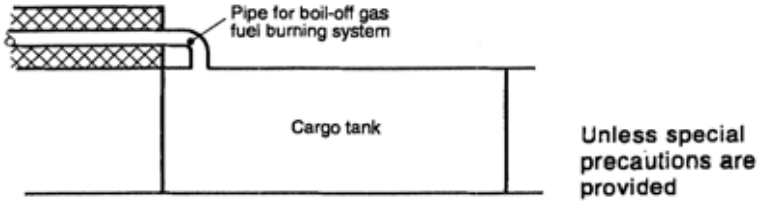
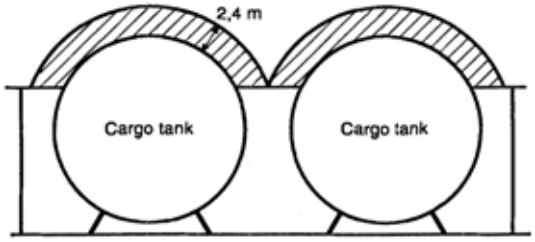


図 H4.7.1(3) Example of Zone 2



Section H4.9 has been added.

H4.9 Coal Carriers

H4.9.1 Electrical Installations in Cargo Holds

1 The wording "Electrical equipment is to be of explosion-protected type as deemed appropriate by the Society and to have an enclosure for safe operation in coal dust" specified in **4.9.1-2(1), Part H of the Rules** means those meeting the requirements in **2.16, Part H of the Rules** and having an intrinsically safe, flameproof or pressurized construction grouped into Apparatus Group *II*A and Temperature Class *T*4 as specified in *IEC* 60079-0 or Explosion Class *d*1 and

Ignition Group *G*4 as specified in Technical Recommendation issued by, National Institute of Industrial Safety, Independent Administrative Institution in Japan, and having the enclosure of a degree of protection at least IP55 in accordance with **H2.1.3-4** or equivalent thereto.

2 The wording "considered by the Society equivalent with regard to the safety to explosion -protected electrical installations" specified in **4.9.1-2(1), Part H of the Rules** means the special type cargo lights which complying with *JIS F* 8442.

3 The wording "non-sparking type" specified in **4.9.1-2(4), Part H of the Rules** means a type complying with the requirements of **R4.5.4-1(2)**.

4 In applying **4.9.1-2(3), Part H of the Rules**, "the cables led to electrical equipment installed in the cargo holds" are to complying with the requirements in **4.2.4-5, Part H of the Rules**.

5 The wording "an enclosure less liable to permit the ingress of coal dust" specified in **4.9.1-3(1), Part H of the Rules** means the enclosure of a degree of protection at least IP55 in accordance with **H2.1.3-4**.

Annex H4.2.7 has been added as follows;

Annex H4.2.7 GUIDANCE FOR THE MAINTENANCE FOR EXPLOSION-PROTECTED ELECTRICAL EQUIPMENT

1.1 General

1.1.1 Scope

The requirements in this Guidance apply to the periodical maintenance for explosion-protected electrical equipment installed in tankers, ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk.

1.1.2 Definitions

Definitions of terms used in this Guidance are as follows:

(1) Connecting Surface means a connecting part which is the flat connecting part, thread part, faucet joint, coupling part, shaft penetrating part, for example.

(2) Container means a component formed explosion-proof construction, which is box and casing containing electrical equipment, glass globes for lighting, for example.

1.2 Maintenance

1.2.1 Maintenance Items

The major maintenance items and expected conditions for explosion-protected electrical equipment are as follows. Additional maintenance items are to be required when it is necessary.

(1) Flameproof type electrical equipment
   (a) There are no cracks, fractures and extensive corrosion to the containers
   (b) The bolts of the container are tight and there are no broken and falling off
   (c) There are no corrosion and strain to the connecting surface, and flange gap dimensions are within proper values
   (d) The cable lead-in parts of the cable entry devices of explosion-proof packing are tight and the packing are not corroded and worn out
   (e) The thread connecting parts of the cable entry devices by conduit tube connecting method are tight and the compound in the sealing fitting are sufficiently filled and not damaged
   (f) The guard for lighting is not damaged and deformed
   (g) There are no strains, poor insulation and loosen connection to the electrical equipment in the containers

(2) Increased safety type electrical equipment
   (a) The packing to keep the sealing condition of the container are not corroded and worn out
   (b) There are no strains, poor insulation and loosen connection to the electrical equipment in the container
   (c) Where the compound is filled in the container, it is sufficiently filled and not damaged

(3) Intrinsically safe type electrical equipment

(a) At inside the intrinsically safe type electrical equipment (e.g. power supply unit) installed in non-hazardous areas, the separation is maintained between the terminals of intrinsically safe circuits and other circuits
(b) There are no modifications to the circuit in intrinsically safe type electrical equipment
(c) The barrier is not damaged
(d) The cable terminals connected to intrinsically safe type electrical equipment (e.g. sensor) installed in hazardous areas are separated from the terminals of other circuit in junction boxes

(4) Pressurized protected type electrical equipment
(a) There are no cracks, fractures and extensive corrosion to the ducts, pipes and containers
(b) The protective gas pressure and flow are adequate
(c) The packing to keep the sealing condition of the containers are not corroded and worn out

(5) Encapsulation type electrical equipment
(a) There are no strains, poor insulation and loosen connection to the electrical equipment in the containers
(b) There are no cracks, fractures and extensive corrosion to the containers
(c) The resin in the container is sufficiently filled and not damaged

(6) Powder filling type electrical equipment
(a) There are no strains, poor insulation and loosen connection to the electrical equipment in the containers
(b) There are no cracks, fractures and extensive corrosion to the containers
(c) The ventilating openings on the containers are in good condition
(d) The powder in the containers is filled uniformly

(7) Oil immersion type electrical equipment
(a) There is no leakage of oil form the containers or cable lead-in parts
(b) The quantity of oil is adequate

1.2.2 Regular Maintenance

The regular maintenance is to be carried out at least every year. In this case, a part of maintenance items specified in **1.2.1** which can be inspected visually are to be examined and no visible unauthorized modifications are to be confirmed.

1.2.3 Close Maintenance

The close maintenance is to be carried out at least twice every five years. In this case, all maintenance items specified in **1.2.1** are to be examined by ladders and inspection tools. Furthermore, it is to be confirmed that the apparatus group and temperature class for which the explosion-protected electrical equipment is designed are correct and there are no visible unauthorized modifications.

EFFECTIVE DATE AND APPLICATION (Amendment 1-4)

1. The effective date of the amendments is 1 January 2007.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.