RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D Machinery Installations

Rules for the Survey and Construction of Steel Ships
Part D 2020 AMENDMENT NO.2
Guidance for the Survey and Construction of Steel Ships
Part D 2020 AMENDMENT NO.2

Rule No.112 / Notice No.61 24 December 2020
Resolved by Technical Committee on 5 August 2020

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NIPPON KAIJI KYOKAI

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part D Machinery Installations

2020 AMENDMENT NO.2

Rule No.112 24 December 2020

Resolved by Technical Committee on 5 August 2020

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.112 24 December 2020
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 D MACHINERY INSTALLATIONS

Amendment 2-1

Chapter 19 WATERJET PROPULSION SYSTEMS

19.1 General

19.1.2 Terminology

The terms used in this chapter are defined as follows:

Sub-paragraph (14) has been amended as follows.

(14) "Declared steering angle limits" are the operational limits in terms of maximum steering angle or equivalent, ~~that are to be declared by~~ according to ~~the~~ manufacturer ~~/ ship designer~~ guidelines for safe operation, also taking into account ~~vessel~~ship speed, ~~or~~ propeller torque/speed~~,~~ or other limitations~~:~~; furthermore, "declared steering angle limits" are to be declared by the directional control system manufacturer for each ship specific non-traditional steering means, and ship manoeuvrability tests, such as those in the Standards for Ship Manoeuvrability (*IMO* resolution *MSC*.137(76)) are to be carried out with steering angles not exceeding the declared steering angle limits.

19.2 Number of Propulsion Systems and Auxiliary Steering Station

19.2.1 Number of Propulsion Systems

Sub-paragraph -3 has been amended as follows.

3 Notwithstanding the requirements of **-2** above, in cases where each main steering system comprises two or more identical steering actuating systems, an auxiliary steering gear need not be fitted provided that each steering gear:

(1) is capable of satisfying the requirements in **19.5.1-1(2)** while operating with all steering gear steering actuating systems;

(2) is arranged so that after a single failure in its piping or in one of the steering actuating systems, steering capability can be maintained or speedily regained;

~~(3) The above capacity requirements apply regardless whether the steering systems are arranged with common or dedicated power units.~~

The above capacity requirements apply regardless of whether the steering systems are arranged with common dedicated power units.

Chapter 20 AZIMUTH THRUSTERS

20.1 General

20.1.2 Terminology

The terms used in this Chapter are defined as follows:

Sub-paragraph (7) has been amended as follows.

(7) "Declared steering angle limits" are the operational limits in terms of maximum steering angle or equivalent, ~~that are to be declared by~~ according to ~~the~~ manufacturer ~~/ ship designer~~ guidelines for safe operation, also taking into account ~~vessel~~ship speed, ~~or~~ propeller torque/speed~~,~~ or other limitations~~.~~; furthermore, "declared steering angle limits" are to be declared by the directional control system manufacturer for each ship specific non-traditional steering means, and ship manoeuvrability tests, such as those in the Standards for Ship Manoeuvrability (*IMO* resolution *MSC*.137(76)) are to be carried out with steering angles not exceeding the declared steering angle limits.

20.2 Number and Position of Thrusters

20.2.1 Number of Thrusters

Sub-paragraph -3 has been amended as follows.

3 Notwithstanding the requirements of **-2** above, in cases where each main steering system comprises two or more identical steering actuating systems, an auxiliary steering gear need not be fitted provided that each steering gear:

(1) is capable of satisfying the requirements in **20.5.1-1(2)** while operating with all steering gear steering actuating systems;

(2) is arranged so that after a single failure in its piping or in one of the steering actuating systems, steering capability can be maintained or speedily regained;

~~(3) The above capacity requirements apply regardless whether the steering systems are arranged with common or dedicated power units.~~

The above capacity requirements apply regardless of whether the steering systems are arranged with common dedicated power units.

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 24 December 2020.

2. Notwithstanding the amendments to the Rules, the current requirements apply to waterjet propulsion systems or azimuth thrusters whose applications for approval are submitted to the Society before 1 July 2020 installed on ships for which the date of contract for construction* is before 1 July 2020.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amendment 2-2

Chapter 22 EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT

22.7 Tests

22.7.2 Tests after Installation On Board

Sub-paragraph -2(1) has been amended as follows.

2 After installation on board, exhaust gas cleaning systems are to be tested in accordance with the following:

(1) Piping systems for liquids containing sodium hydroxide solutions (except overboard discharge pipes) are to be subjected to leak tests at pressures equal to 1.5 times the design pressure or 0.4 *MPa*, whichever is greater.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 24 December 2020.

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

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is before the effective date upon request of the owner.

Amendment 2-3

Chapter 6 SHAFTINGS

6.2 Materials, Construction and Strength

6.2.10 Stern Tube Bearings and Shaft Bracket Bearings*

Sub-paragraph -1 has been amended as follows.

1 The aftermost stern tube bearing or shaft bracket bearing which supports the weight of propeller is to comply with the following requirements **(1)** ~~and~~ to **(~~2~~3)**:

(1) In the case of oil lubricated bearings.
  (a) In the case of white metal.
    i) The length of the bearing is not to be less than twice the required diameter of the propeller shaft given by the formulae in either **6.2.4-1** or **-2**. However, where the nominal bearing pressure (determined by the static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft in way of the bearing, hereinafter defined the same way in this chapter) is not more than 0.8 *MPa* and special consideration is given on the construction and arrangement in accordance with provisions specified elsewhere and specially approved by the Society, the length of the bearing may be fairly shorter than that specified above. However, the minimum length is to be not less than 1.5 *times* the actual diameter of the propeller shaft.
    ii) The stern tube is to be always filled with oil. Adequate means are to be provided to measure the temperature of oil in the stern tube.
    iii) In cases where a gravity tank supplying lubricating oil to the stern tube bearing is fitted, it is to be located above the load water line and provided with a low level alarm device. However, in cases where the lubricating system is designed to be used under the condition that the static oil pressure of the gravity tank is lower than the water pressure, the tank is not required to be above the load water line.
    iv) The lubricating oil is to be cooled by submerging the stern tube in the water of the after peak tank or by some other suitable means.
  (b) In the case of materials other than white metal.
    i) The materials, construction and arrangement are to be approved by the Society.
    ii) For bearings of synthetic rubber, reinforced resin or plastics materials which are approved for use as oil lubricated stern tube bearings, the length of the bearing is to be not less than twice the required diameter of the propeller shaft given by the formulae in either **6.2.4-1** or **-2**. However, where nominal bearing pressure is not more than 0.6 *MPa* and bearings have a construction and arrangement specially approved by the Society, the length of the bearing may be fairly shorter than that specified above. However, the minimum length is to be not less than 1.5 *times* the actual diameter of the propeller shaft.
    iii) Notwithstanding the requirement given in **ii)**, the Society may allow use of bearings whose nominal bearing pressure is more than 0.6 *MPa* where the material has proven satisfactory testing and operating experience.
(2) In the case of water lubricated bearings.
  (a) The materials, construction and arrangement are to be approved by the Society.

(b) The length of the bearing is to be not less than 4 *times* the required diameter of the propeller shaft given by the formulae in either **6.2.4-1** or **-2**, or 3 *times* the actual diameter, whichever is greater. However, for bearings of synthetic materials, such as rubber or plastics, that are approved for use as water lubricated stern tube bearings and where special consideration is given to their construction and arrangement in accordance with provisions specified elsewhere, the length of the bearing may be fairly shorter than that specified above. However, minimum length is to be not less than twice the required diameter of the propeller shaft given by the formulae in either **6.2.4-1** or **-2**, or 1.5 *times* the actual diameter, whichever is greater.

(3) In the case of grease lubricated bearings.

In cases where the actual diameter of the propeller shaft is not more than 100 *mm*, grease lubricated bearings may be used. The length of the bearing is to be not less than 4 *times* the required diameter of the propeller shaft given by the formulae in either **6.2.4-1** or **-2**.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2021.

Amendment 2-4

Chapter 15 STEERING GEARS

15.3 Controls

Paragraph 15.3.1 has been amended as follows.

15.3.1 General*

1 Steering gear control is to be provided:

(1) For the main steering gear, both on the navigating bridge and in the steering gear compartment;

(2) In cases where the main steering gear is arranged in accordance with the requirements in **15.2.1-2**, by two independent control systems, both operable from the navigating bridge. This does not require duplication of the steering wheel or steering lever. In cases where the control system consists of a hydraulic telemotor, a second independent system need not be fitted.

(3) For any auxiliary steering gear, in the steering gear compartment; and, if power operated, it is also to be operable from the navigating bridge and to be independent of the control systems for main steering gear.

2 Any main and auxiliary steering gear control system operable from the navigating bridge is to comply with the following:

((1) to (5) are omitted.)

3 For the control systems specified in the requirements of **1(2)** above, at least the following most probable failures that may cause reduced or erroneous system performance are to be automatically detected and individual visible and audible alarms are to be given on the navigation bridge:

(1) Power supply failure

(2) Earth fault on AC and DC circuits

(3) Loop failure in closed loop systems, both command and feedback loops (normally short circuit, broken connections and earth faults)

(4) Data communication errors

(5) Programmable system failures (Hardware and software failures)

(6) Hydraulic locking

(7) In the case of closed loop systems, deviation between rudder order and feedback

Individual visible and audible deviation alarms are to be initiated on the navigation bridge when the rudder's actual position does not reach its set point within acceptable time limits (e.g. follow-up control and autopilot). The deviation alarm may be caused by mechanical, hydraulic or electrical failures.

4 For the control systems specified in the requirements of **1(2)** above, the failures (as defined but not limited to those in **D15.3.1-4**) likely to cause uncontrolled movement of the rudder are to be clearly identified. In the event of such a failure, the following response is to be implemented:

(1) the rudder is to stop in the angle when failure occurs without manual intervention, or

(2) the rudder is to return to the midship/neutral position.

~~**3**~~**5** Cables and pipes of control systems required to be in duplicate by this Chapter are to be separated as far apart as is practicable throughout their entire length.

~~**4**~~**6** For the steering gears which are so arranged that more than one system (either power or control) can be simultaneously operated, where hydraulic locking, caused by a single failure, may lead to loss of steering, audible and visual alarms, which identifies the failed system, are to be provided on the navigation bridge.

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

1. The effective date of the amendments is 1 January 2021.

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

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amendment 2-5

Chapter 21 SELECTIVE CATALYTIC REDUCTION SYSTEMS AND ASSOCIATED EQUIPMENT

21.2 Design

Paragraph 21.2.2 has been amended as follows.

21.2.2 Material

1 ~~SCR systems and related piping systems for reductant agents,~~ Reductant tanks~~, and other components (including pumps, valves, vents, other parts and their joints) which may come into contact with the reductant solution are to be of a suitable grade of non-combustible compatible material established to be suitable for the application~~ are to be of steel or other equivalent material with a melting point above 925 °C.

2 Pipes/piping systems (including pumps, valves, vents, other parts and their joints) are to be of steel or other equivalent material with melting point above 925 °C, except downstream of the tank valve, provided this valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire; in such cases, approved plastic piping in accordance with Annex **D12.1.6-2** "Guidance for the Survey and Construction of Plastic Pipes" may be accepted even if it has not passed a fire endurance test.

3 Reductant tanks and pipes /piping systems (including pumps, valves, vents, other parts and their joints) are to be made with a material compatible with reductant or coated with appropriate anti-corrosion coating.

~~2~~4 Material used for exhaust gas heating devices is~~are~~ to be deemed appropriate by the Society.

21.4 Requirements for Construction and Arrangements, etc.

21.4.1 Construction and Arrangement

Sub-paragraph -5 has been amended as follows.

5 Where reductant agent is stored in tanks which form part of the ship's hull, the following **(1)** to **(~~6~~5)** are to be considered during the design and construction:

((1) to (3) are omitted.)

~~(4) These tanks are to be fitted with but not limited to level gauge, temperature gauge, high temperature alarm, low level alarm, etc.~~

(~~5~~4) These tanks are to be segregated by cofferdams, void spaces, pump rooms, empty tanks or other similar spaces so as to not be located adjacent to accommodation or service spaces, cargo spaces containing cargoes which react with reductant agent in a hazardous manner as well as any food stores, oil tanks and fresh water tanks.

(~~6~~5) These tanks are to be included in the ship's stability calculation.

Paragraph 21.4.3 has been amended as follows.

21.4.3 Ventilation Systems

1 If storage tanks for reductant agent or equipment for using or handling reductant agent, such as reductant agent injection systems, is installed in a closed compartment, the area is to be served by an effective mechanical ~~supply and exhaust~~ ventilation system of extraction type providing not less

than 6 air changes per hour which is independent from the ventilation system of accommodation, service spaces, or control stations. The ventilation system is to be capable of being controlled from outside the compartment ~~and is to be maintained in operation continuously except when the storage tank is empty and has been thoroughly air purged~~. ~~If the ventilation stops, an audible and visual alarm is to be provided outside the compartment adjacent to each point of entry and inside the compartment, together with a warning notice requiring the use of such ventilation~~A warning notice requiring the use of such ventilation before entering the compartment is to be provided outside the compartment adjacent to each point of entry.

2 Notwithstanding the requirements specified in **-1** above, where storage tanks for reductant agent or equipment for using or handling reductant agent, such as the reductant agent injection systems are located within an engine room a separate ventilation system is not required when the general ventilation system for the space is arranged so as to provide an effective movement of air in the vicinity of the storage tank and equipment and is to be maintained in operation continuously except when the storage tank is empty and has been thoroughly ~~air purged~~ventilated.

3 ~~In cases where reductant agent is stored within tanks which form part of the ship's hull, ventilation systems for enclosed compartments normally entered by ship personnel which are located adjacent to such tanks are to be in accordance with the following **(1)** or **(2)**~~ The requirements specified in **1** and **2** above also apply to closed compartments normally entered by persons in accordance with the following **(1)** or **(2)**:

(1) ~~In cases where the tanks are adjacent to the engine room, the requirements of **-2** above apply~~ When they are adjacent to the urea integral tanks and there are possible leak points (e.g. manhole, fittings) from these tanks; or

(2) ~~In cases where the tanks are adjacent to enclosed compartments normally entered by ship personnel, the requirements of **-1** above apply~~When the urea piping systems pass through these compartments, unless the piping system is made of steel or other equivalent material with melting point above 925 °C and with fully welded joints.

21.4.4 Venting Systems of Reductant Agent Storage Tank

Sub-paragraph -1 has been amended as follows.

1 Reductant agent storage tanks are to be arranged so that they can be emptied of urea~~, purged and vented~~ and ventilated by means of portable or permanent systems.

21.7 Safety and Protective Equipment

Paragraph 21.7.1 has been amended as follows.

21.7.1 General

For the protection of crew members, the ship is to have on board at least the following suitable protective equipment and installations. Locations and numbers of the equipment and installations are to be derived from the detailed installation arrangements. Locations where such equipment is stored or installed are to be clearly marked so as to be easily identifiable.

((1) to (3) are omitted.)

~~(4) Safety shower~~

(~~5~~4) Stretcher

EFFECTIVE DATE AND APPLICATION (Amendment 2-5)

1. The effective date of the amendments is 1 January 2021.

2. Notwithstanding the amendments to the Rules, the current requirements apply to SCR whose applications for approval are submitted to the Society before the effective date installed on ships for which the date of contract for construction* is before the effective date.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to SCR whose applications for approval are submitted to the Society before the effective date installed on ships for which the date of contract for construction is before the effective date upon request of the owner.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amendment 2-6

Chapter 22 EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT

22.1 General

22.1.1 Application

Sub-paragraph -3 has been amended as follows.

3 In cases where exhaust gas cleaning systems which do not use chemical agents are used, the term "liquids containing sodium hydroxide solutions" is to be read as "liquids which have passed through scrubber chambers"; this, however, does not apply to **-4**, **-9** and **-10** of **22.4.1**, **22.7.1-2** and **22.7.2-2(1)**.

22.4 Requirements for Construction and Arrangements, etc.

22.4.2 Ventilation Systems

Sub-paragraph -1 has been amended as follows.

1 If storage tanks for sodium hydroxide solutions or equipment for using or handling sodium hydroxide solutions, such as solution supply pumps, is installed in a closed compartment, the area is to be served by an effective mechanical ~~supply and exhaust~~ ventilation system of extraction type providing not less than 6 air changes per hour which is independent from the ventilation system of accommodation, service spaces, or control stations. The ventilation system is to be capable of being controlled from outside the compartment. If the ventilation stops, an audible and visual alarm shall be provided outside the compartment adjacent to each point of entry and inside the compartment, together with a warning notice requiring the use of such ventilation.

EFFECTIVE DATE AND APPLICATION (Amendment 2-6)

1. The effective date of the amendments is 1 January 2021.

2. Notwithstanding the amendments to the Rules, the current requirements apply to EGCS whose applications for approval are submitted to the Society before the effective date installed on ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to EGCS whose applications for approval are submitted to the Society before the effective date installed on ships for which the date of contract for construction is before the effective date upon request of the owner.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part D Machinery Installations

2020 AMENDMENT NO.2

Notice No.61 24 December 2020
Resolved by Technical Committee on 5 August 2020

Notice No.61 24 December 2020
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 D MACHINERY INSTALLATIONS

Amendment 2-1

Annex D1.1.3 GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF COAL BURNING INSTALLATIONS IN SHIPS

1.1 General

1.1.2 Rule Reference

Sub-paragraph -4 has been amended as follows.

(-1 to -3 are omitted.)
4 For the automatic and remote control systems of boilers, the relevant requirements in **Chapter 18, Part D of the Rules** are to be applied. However, in order for ships to be distinguished by ~~the notation~~ the installation characters ~~(~~"**MC**"~~)~~ or ~~(~~"**M0**"~~)~~, consideration will be given on a case by case basis.

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 24 December 2020.

Amendment 2-2

D15 STEERING GEARS

D15.3 Controls

Paragraph D15.3.1 has been amended as follows.

D15.3.1 General

(-1 to -3 are omitted.)

~~**4** The control systems specified in the requirements of **15.3.1-1(2), Part D of the Rules** are to be provided with the following failure detection functions:~~

~~(1) At least the following failures that may cause reduced or erroneous system performance are to be automatically detected and individual visible and audible alarms are to be given on the navigation bridge:~~

~~(a) Power supply failure~~

~~(b) Earth fault on AC and DC circuits~~

~~(c) Loop failure in closed loop systems, both command and feedback loops (normally short circuit, broken connections and earth faults)~~

~~(d) Data communication errors~~

~~(e) Programmable system failures (Hardware and software failures)~~

~~(f) Hydraulic locking~~

~~(g) In the case of closed loop systems, deviation between rudder order and feedback~~

~~Individual visible and audible deviation alarms are to be initiated on the navigation bridge when the rudder's actual position does not reach its set point within acceptable time limits (e.g., follow-up control and autopilot). The deviation alarm may be caused by mechanical, hydraulic or electrical failures.~~

~~**5** For the control systems specified in the requirements of **15.3.1-1(2), Part D of the Rules**, the rudder is to be stopped in either of the following positions in cases where a failure (as defined but not limited to those in **D15.3.1-4**) likely to cause uncontrolled movement of the rudder occurs:~~

~~(1) the rudder angle when failure occurs, or~~

~~(2) the midship/neutral position.~~

~~**6**~~**4** Amplifiers, relays, etc., included in control systems may also be used for automatic pilot systems.

~~**7**~~**5** For electrohydraulic steering gears equipped with power units comprising variable-displacement pumps, two sets each of hydraulic servo cylinders and associated hydraulic systems (including pump driving electric motors and control equipment) or electric servo motors for controlling displacement of pump plungers are to be provided.

~~**8**~~**6** In general, the following cases are not considered to be one of the cases "where hydraulic locking, caused by a single failure, may lead to loss of steering" that is specified in **15.3.1-4**~~**6**~~**, Part D of the Rules**,

(1) Steering systems with performance at least equal to that required for auxiliary steering gear are fitted as stand-by systems and are operable from navigation bridges. In such cases, stand-by systems are to be designed so that they do not run parallel using interlocking devices, etc.

(2) Not less than 3 systems are operated parallel and, in the case of a single failure, steering capability at least equal to that required for auxiliary steering gears is maintained.

(3) Steering gears designed to avoid leading to any loss of steering by automatically by-passing failed systems using duplicated control valve systems. These arrangements are subject to

special consideration with respect to any reduced reliability due to increased complexity.

~~9~~7 Those "audible and visual alarms, which identify failed systems" specified in **15.3.1-~~4~~6, Part D of the Rules**, are, in general, to be activated under the following conditions:

(1) In cases where positions of variable displacement pump control systems do not correctly respond to given commands.

(2) In cases where incorrect positions of 3-way full flow valves or similar constant delivery pump systems are detected.

~~10~~8 The location of sensors for those alarms specified in the aforementioned ~~-9~~7, are to be as near as possible to actuators. However, in cases where two or more pumps are mechanically interconnected by floating bars or by similar devices, special consideration does not need to be given to their breakage. An example of some acceptable locations of alarm sensors is given in **Fig. D15.3.1-4**.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 1 January 2021.

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

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amendment 2-3

Appendix D2 GUIDANCE FOR EVALUATION OF FATIGUE TESTS

4.1 Full Size Testing

4.1.3 Use of Results and Crankshaft Acceptability

Sub-paragraph -1 has been amended as follows.

1 In order to combine tested bending and torsion fatigue strength results in calculation of crankshaft acceptability (See **1.8** of **Annex D2.3.1-2(2)**), the Gough-Pollard approach and the maximum principal equivalent stress formulation can be applied for the following cases:

(1) Related to the crankpin diameter:

$$Q = \left(\sqrt{\left(\frac{\sigma_{BH}}{\sigma_{DWCT}} \right)^2 + \left(\frac{\tau_{BH}}{\tau_{DWCT}} \right)^2} \right)^{-1}$$

where:

σ_{DWCT} : fatigue strength by bending testing

τ_{DWCT} : fatigue strength by torsion testing

(2) Related to crankpin oil bore:

~~$Q = \left(\sqrt{\left(\frac{\sigma_{BO}}{\sigma_{DWOT}} \right)^2 + \left(\frac{\tau_{BO}}{\tau_{DWOT}} \right)^2} \right)^{-1}$~~ $Q = \frac{\sigma_{DWOT}}{\sigma_V}; \quad \sigma_V = \frac{1}{3}\sigma_{BO} \cdot \left[1 + 2\sqrt{1 + \frac{9}{4}\left(\frac{\sigma_{TO}}{\sigma_{BO}} \right)^2} \right]$

where:

σ_{DWOT} : fatigue strength by ~~bending~~ means of maximum principal stress from torsion testing

~~τ_{DWOT} : fatigue strength by torsion testing~~

(3) Related to the journal diameter:

$$Q = \left(\sqrt{\left(\frac{\sigma_{BG}}{\sigma_{DWJT}} \right)^2 + \left(\frac{\tau_G}{\tau_{DWJT}} \right)^2} \right)^{-1}$$

where:

σ_{DWJT} : fatigue strength by bending testing

τ_{DWJT} : fatigue strength by torsion testing.

2 In case increase in fatigue strength due to the surface treatment is considered to be similar between the above cases, it is sufficient to test only the most critical location according to the calculation where the surface treatment had not been taken into account.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2021.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to reciprocating internal combustion engines for which the application for approval is submitted to the Society before the effective date.