

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 **2018 AMENDMENT NO.2**
Guidance for the Survey and Construction of Steel Ships
Part D **2018 AMENDMENT NO.2**

Rule No.134 / Notice No.103 25 December 2018
Resolved by Technical Committee on 1 August 2018

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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

Part D

Machinery Installations

RULES

2018 AMENDMENT NO.2

Rule No.134 25 December 2018

Resolved by Technical Committee on 1 August 2018

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

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

Chapter 18 AUTOMATIC AND REMOTE CONTROL

18.1 General

Paragraph 18.1.3 has been amended as follows.

18.1.3 Drawings and Data*

Drawings and data to be submitted are generally, as follows. In cases where the Society deems it to be necessary, the submission of drawings and data other than those specified below may be requested.

(1) Drawings and data for approval

~~(a)~~ Drawings and data concerning automation

~~(i)~~ List of measuring points

~~(ii)~~ List of alarm points

~~(iii)~~ Control devices and safety devices

~~1)~~ List of controlled objects and controlled variables

~~2)~~ Kinds of control energy sources (self-actuated, pneumatic, electric, etc.)

~~3)~~ List of conditions for emergency stopping, speed reduction (automatic or demand for reduction), etc.

~~(b)~~ The following drawings and data for the automatic control devices and remote control devices for main propulsion machinery or controllable pitch propellers:

~~(i)~~ Operating instructions of main propulsion machinery such as starting and stopping, change-over of direction of revolution, increase and decreased of output, etc.

~~(ii)~~ Arrangements of safety devices (including those attached to engines) and pilot lamps

~~(iii)~~ Controlling diagrams

~~(c)~~ Following drawings and data for the automatic control devices and remote control devices for boilers:

~~(i)~~ Operating instructions of sequential control, feed water control, pressure control, combustion control and safety devices:

~~(ii)~~ Diagrams for automatic combustion control devices and automatic feed water control devices

~~(d)~~ Diagrams and operating instructions for automatic control devices for electric generating sets (automatic load sharing devices, preference tripping devices, automatic starting devices, automatic synchronous making devices, sequential starting devices, etc.)

~~(e)~~ Panel arrangements of monitoring panels, alarm panels and control stands at respective control stations

~~(f)~~ Drawings and data deemed necessary by the Society for computer based ~~for those computers and computerized~~ systems specified in **18.1.1-3**

(2) Drawings and data for reference

Drawings and data deemed necessary by the Society for computer based systems specified in 18.1.1-3

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 25 December 2018.
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 by the owner or the manufacturer.
* “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.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D

Machinery Installations

GUIDANCE

2018 AMENDMENT NO.2

Notice No.103 25 December 2018

Resolved by Technical Committee on 1 August 2018

Notice No.103 25 December 2018

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

D6 SHAFTINGS

D6.2 Materials, Construction and Strength

D6.2.11 Additional Requirements for Propeller Shaft Kind 1C

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

The wording “the requirements specified otherwise by the Society” in **6.2.11, Part D of the Rules** means the following **(1)** through **(5)**:

- (1) Four sets of drawings and data of the following **(a)** through **(h)** are to be submitted and once approved, one of sets that has been returned is to be kept on board. In this case, submission of any drawings and data included in those specified in **6.1.2(1)(g)** and **6.1.2(1)(h)**, **13.1.2(1)(b)** and **18.1.3(1)(a)**, **Part D of the Rules** may be omitted.

((a) to (h) are omitted.)

((2) to (5) are omitted.)

D18 AUTOMATIC AND REMOTE CONTROL

D18.1 General

Paragraph D18.1.3 has been amended as follows.

D18.1.3 Drawings and Data

1 The “~~The~~ drawings and data deemed necessary by the Society” stipulated in 18.1.3(1)(f)(6), Part D of the Rules refer to the items specified in 1.2(1) of Annex D18.1.1 “COMPUTER BASED SYSTEMS” as a standard. With respect to computer based systems ~~those automatic devices and equipment~~ which have been already approved by the Society in accordance with Chapter 8, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use, only drawings and data on parts that differ from ship to ship need to be submitted.

2 The “drawings and data deemed necessary by the Society” stipulated in 18.1.3(2), Part D of the Rules refer to the items specified in 1.2(2) of Annex D18.1.1 “COMPUTER BASED SYSTEMS” as a standard. With respect to computer based systems which have been already approved by the Society in accordance with Chapter 8, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use, only drawings and data on parts that differ from ship to ship need to be submitted; this, however, excludes those specified in 1.2(2)(a) of the Annex.

Annex D18.1.1 COMPUTER BASED SYSTEMS

Chapter 1 INTRODUCTION

Section 1.2 has been amended as follows.

1.2 Submission of Drawings and Data

The following drawings and data are, in principle, to be submitted. In cases where deemed necessary by the Society, other drawings and data may be required. However, no submission is required for category I systems unless it is specifically requested by the Society.

- (1) Drawings and data for approval:
 - (a) Documents related to quality management; ~~quality plan (3.1.1-3);~~
 - i) Documents showing satisfaction of a quality system (3.1.1-2)
 - ii) Quality plan (3.1.1-3)
 - iii) Documents related to security policies (3.4.1-1)
 - (b) ~~Test programs and procedures for intra-system integration testing (3.1.3); functional tests and failure tests in integration testing before installation on board (3.1.3);~~
 - (c) ~~Test program for simulation tests for final integration (3.1.5-1);~~
 - (d) ~~Test program for on board tests (includes tests related to wireless data links) (3.1.5-2, 3 and 5.2.2(3));~~ and
 - (e) ~~Test reports of environmental tests specified in according to 18.7.1(1), Part D of the Rules or a certificate issued in accordance with Chapter 1, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use (3.1.4 and Chapter 4).~~
- (2) Drawings and data for reference:
 - (a) List of computer based systems installed on board;
 - ~~(a) documents related to quality systems (includes security policies specified in 3.4.1-1);~~
 - (b) ~~R~~isk assessment report or justification for the omission of risk assessment (3.1.2-4);
 - (c) ~~D~~ocuments related to software code creation and testing (3.1.2-2), etc.:
 - i) Software module functional descriptions and associated hardware descriptions for programmable devices
 - ii) Evidence of verification (detection and correction of software errors) for software modules in accordance with the selected software development standard
 - iii) Evidence of functional tests for programmable devices at the software module, subsystem, and system levels (The functional testing is to be designed to test the provisions of features used by the software but provided by the operating system, function libraries, customized layer of software and any set of parameters.)
 - iv) Functional description of software
 - v) List and versions of software installed in system
 - (d) other drawings and data concerning systems such as the following (~~3.1.3-4(3)~~):
 - ~~i) functional description of software;~~
 - ~~ii) list and versions of software installed in system;~~
 - ~~iii) User manual including instructions for use during software maintenance;~~
 - ~~iv) List of interfaces between system and other vessel systems;~~
 - ~~v) List of standards used for data links; and~~
 - ~~vi) documentation which might include a FMEA or equivalent to demonstrate the~~

~~adequacy of failure test (in cases where deemed necessary by the Society).~~

Section 1.3 has been added as follows.

1.3 Omission of Surveyor Attendance during Testing

For category I systems, the presence of the Surveyor at the tests specified in this Annex may be omitted.

Chapter 3 REQUIREMENTS FOR SOFTWARE AND SUPPORTING HARDWARE

3.1 Life Cycle Approach

Paragraph 3.1.2 has been amended as follows

3.1.2 Design Phase

~~1~~ Risk assessments of systems are to be according to the following (1) to (4):

((1) to (4) are omitted.)

~~2~~ For category II and III systems, the following documentation related to software code creation and testing is to be provided to the Society:

- ~~(1) Software module functional descriptions and associated hardware descriptions for programmable devices. This is to be provided by supplier and system integrator.~~
- ~~(2) Evidence of verification (detection and correction of software errors) for software modules in accordance with the selected software development standard. This is to be supplied by the supplier and system integrator.~~
- ~~(3) Evidence of functional tests for programmable devices at the software module, subsystem, and system levels. This is to be supplied by the supplier via the system integrator. The functional testing is to be designed to test the provisions of features used by the software but provided by the operating system, function libraries, customized layer of software and any set of parameters.~~

Paragraph 3.1.3 has been amended as follows.

3.1.3 Integration Testing before Installation On Board

1 Intra-system integration testing ~~including functional and failure tests~~ is to be done between system and sub-system software modules before being integrated on board. The objective is to check the following (1) to (3):

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

(-2 and -3 are omitted.)

4 Category II and III systems are to comply with the following (1) to (3) in addition to the requirements in -1 to -3 above:

((1) and (2) are omitted.)

~~(3) The documentations specified in 1.2(2)(d) are to be provided with the Society;~~

5 In applying -1 to -4 above, the tests are to be carried out when the computer based system

acquires approval of use in accordance with **Chapter 1, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use** or for each product.

Paragraph 3.1.5 has been amended as follows.

3.1.5 Final Integration and On Board Testing

1 For computer based systems integrated with other computer based systems, simulation tests are to be undertaken before installation in cases where it is found necessary to check safe interaction with the other computer based systems and functions which are unable to be previously tested. ~~In such cases, the specifications of the simulation tests are to be submitted to the Society by the system integrator. The simulation tests are to be witnessed by the Surveyor.~~

(-2 is omitted.)

3 ~~In applying the requirements specified in -1 and -2 above, for For category II and III systems, the following requirements are to be applied final integration and on board testing is to comply with the following requirements in addition to those specified in -1 and -2 above:~~

- (1) Test specifications are to be submitted to the Society for approval ~~by the system integrator.~~
- (2) The tests are to be witnessed by a surveyor assigned by the Society.

Chapter 5 REQUIREMENTS FOR DATA LINKS

Section 5.1 has been amended as follows.

5.1 Requirements for Data Links

5.1.1 General Requirements

(-1 to -5 are omitted.)

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 25 December 2018.
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.
3. Notwithstanding the provision of preceding 2., the amendments to the Guidance may apply to ships for which the date of contract for construction* is before the effective date upon request by the owner or the manufacturer.
* “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.

D15 STEERING GEARS

D15.3 Controls

D15.3.1 General

3 The control systems and relevant components specified in the requirements of **15.3.1-1(2)**, **Part D of the Rules** are to comply with following requirements:

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

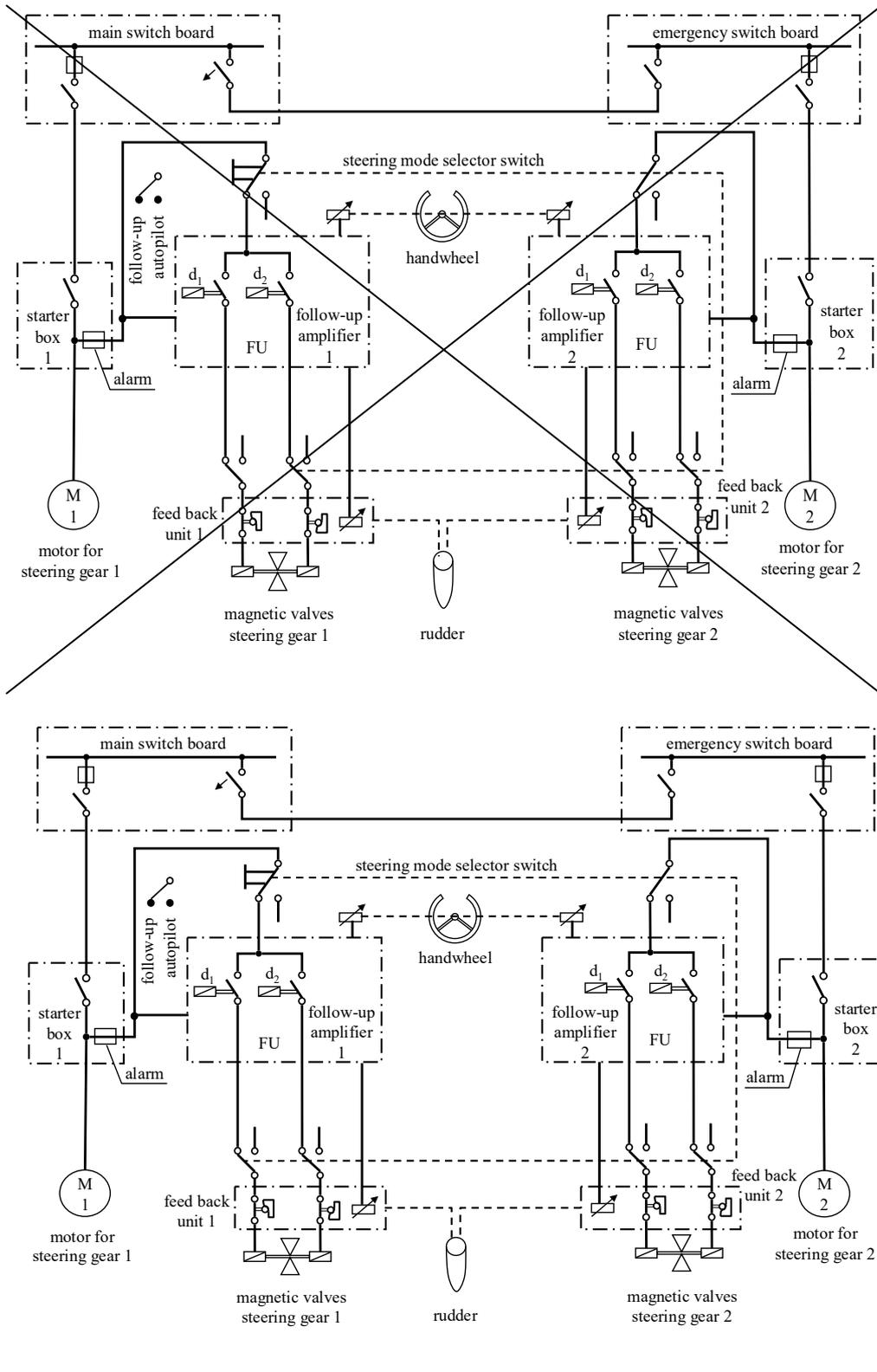
(4) In cases where double follow-up controls are arranged (Refer to **Fig. D15.3.1-2**), the follow-up amplifiers are to be designed and independently supplied so as to be electrically and mechanically separated. In cases where both non-follow-up controls and follow-up controls are arranged, the follow-up amplifiers are to be protected selectively. (Refer to **Fig. D15.3.1-3**)

(5) Control circuits for additional devices, e.g. steering lever or autopilot, are to be arranged for all-pole disconnection. (Refer to **Fig. D15.3.1-1** to **Fig. D15.3.1-3**)

((6) and (7) are omitted.)

Fig. D15.3.1-2 has been amended as follows.

Fig. D15.3.1-2 Example Layout of Control Systems with Double Follow-up Control and Autopilot or Other Additional Control



EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 25 December 2018.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction* is before 1 July 2011.
* “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.

Annex D1.1.3-1

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF WATERJET PROPULSION SYSTEMS

1.1 General

Paragraph 1.1.4 has been amended as follows.

1.1.4 Terminology

The terms used in this Guidance are defined as follows:

- (1) Waterjet propulsion systems are systems, including the following components **(a)** through **(fd)**, which receives water through inlet ducts and discharges it through nozzles at an increased velocity to produce propulsive thrust ~~and control~~.
 - (a) Shaftings (main shafts, bearings, shaft couplings, coupling bolts and sealing devices)
 - (b) Water intake ducts
 - (c) Waterjet pump units
 - (d) Steering and reversing systems
 - ~~(e) Control systems~~
 - ~~(f) Rudders~~
- (2) Waterjet pump units are made up of impellers, impeller casings, stators, stator casings, nozzles, bearings, bearing housing and sealing devices.
- (3) Impellers are a rotating assemblies provided with blades to give energy to the water.
- (4) Main shafts are shafts that impellers are connected to.
- (5) Water intake ducts are portions that lead water drawn from water intakes to impeller inlets.
- (6) Nozzles are portions that inject rectified water from impellers.
- (7) Deflectors are devices serving as rudders by leading water injected from nozzles either to port or to starboard.
- (8) Reversers are devices to thrust ships to go astern by reversing flow directions of water injected from nozzles.
- (9) Stators are assemblies composed of rows of stationary vanes that reduce any swirl added to water by impellers.
- (10) Steering and reversing systems are those systems consisting of deflectors, reversers and hydraulic power system driving defectors and/or reversers.
- (11) Hydraulic power systems are systems composed of ~~power units (hydraulic pumps and electric motors or engines for driving such pumps and its associated electrical equipment)~~, and hydraulic piping systems and hydraulic actuators.
- ~~(12) Actuators are devices such as hydraulic cylinders for moving reversers and defectors.~~
- ~~(13)~~12) High speed engines are diesel engines complying with the following condition or gas turbines:
$$\left(S \cdot n^2 \right) / \left(1.8 \times 10^6 \right) \geq 90$$
$$\left(\pi \cdot d_j \cdot n \right) / \left(6 \times 10^4 \right) \geq 6$$

S : Length of stroke (*mm*)
n : Number of revolutions of an engine at maximum continuous output (*rpm*)
d_j : Diameter of journal (*mm*)

1.5 Steering and Reversing Systems

Paragraph 1.5.1 has been amended as follows.

1.5.1 Capability of Steering and Reversing

1 ~~Each~~ ~~Deflectors~~ ~~is~~ ~~are~~, in principle, to be capable of changing direction of the ship's directional control system from one side to the other at declared steering angle limits at an average rotational speed of not less than 2.3°/s with the ship running ahead at speeds specified in **2.1.8, Part A of the Rules** ~~while operating with all power units~~. In addition, ships are to have sufficient steering capability according to their ship type. The wording "declared steering angle limits" refers to the operational limits of deflectors in terms of maximum steering angle according to manufacturer guidelines for safe operation.

2 Reversers are to be such that they provide sufficient power for going astern to secure proper control of the ship under all normal circumstances, and when transferred from ahead to astern runs, they are to have astern power to provide effective braking for ships.

~~3 Propulsion systems are to be arranged so that after a single failure in its piping or in one of the power units, ship steering capability (but not individual propulsion system operation) can be maintained or speedily regained (e.g. by the possibility of positioning the failed deflector and reverser in a neutral position in an emergency, if needed).~~

~~4 The requirements of 1 and 3 are to apply regardless whether the propulsion systems are arranged with common or dedicated power units.~~

1.5.2 General Construction of Steering and Reversing Systems

Sub-paragraph -5 has been deleted.

1 Design pressures of the scantlings of piping and other components of hydraulic power systems subject to internal hydraulic pressure are to be at least 125% of the maximum working pressure expected under the worst permissible operating condition, taking into account any pressure which may exist in the low pressure side of systems. Design pressures are not to be less than relief valve setting pressures.

2 Reversers are to have sufficient strength against any thrusts at maximum astern power output.

3 The construction and strength of hydraulic pumps and hydraulic systems are to comply with the requirements in **10.5, 12.2.1, 12.3, 12.4.2** through **12.4.4** and **12.5.1, Part D of the Rules**.

4 The arrangements of piping, relief valves and measuring devices for hydraulic systems and the construction of liquid level indicators are to comply with the requirements in **13.2.1** and **13.8.4, Part D of the Rules**.

~~5 Propulsion systems are to be provided with an additional possibility of positioning and locking the failed deflector and reverser in a neutral position after a failure of its own power unit(s) and actuator(s).~~

1.6 Electric Installations

1.6.3 Electrical Installations for Steering and Reversing Systems

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

In cases where hydraulic pumps for hydraulic power systems are driven by electric motors, electrical installations for steering and reversing systems are to comply with the following requirements in (1) through (7):

- (1) Each propulsion system is to be served separately by ~~at least two~~ exclusive circuits fed directly from main switchboards. In cases where three or more propulsion systems are provided, at least two those exclusive circuits are required. However, one of these circuits, however, may be supplied through the emergency switchboard.
- ((2) to (7) are omitted.)

1.12 Special Requirements for Propulsion Systems Installed in Ships with Restricted Area of Service and Small Ships

Paragraph 1.12.1 has been amended as follows.

1.12.1 Ships with Class Notation “Coasting Service”, “Smooth Water Service” or Equivalent

1 For ships with the Class Notation “Coasting Service”, “Smooth Water Service” or equivalent, the requirements specified in 1.11 are not necessary.

2 For ships with the Class Notation “Coasting Service”, “Smooth Water Service” or equivalent, which are not engaged in international voyages, or whose gross tonnage is less than 500 tons, the following requirements are not necessary in addition to the requirement in -1.

~~(1) 1.5.1-3~~

~~(2) 1.5.2-5~~

~~(3) 1.5.4-4~~

~~(4) 1.6.2~~

~~(5) 1.6.3(2), (5) (only those requirements concerned with overload alarms of motors) and (7)~~

~~(6) 1.7.1-7~~

~~(7) 1.10.2~~

~~3 For the ships specified in -2, the following requirements may be applied:~~

~~(1) Notwithstanding the requirements of 1.6.3(1), each propulsion system may be served separately by exclusive circuits fed directly from main switchboards. In cases where three or more propulsion systems are provided, these exclusive circuits may be composed of at least two systems. In addition, one of these circuits may be supplied through the emergency switchboard.~~

1.1 General

Paragraph 1.1.4 has been amended as follows.

1.1.4 Terminology

The terms used in this Guidance are defined as follows:

- (1) Thrusters are propulsion units ~~which control ship direction through~~ with steering functions enabled by their own capability of azimuthing. Thrusters include the following components:
 - (a) Propellers
 - (b) Propeller shafts
 - (c) Gears, clutches and gear shafts for transmission of propulsion torque (when integrated in thrusters)
 - (d) Azimuth thruster casings
 - (e) Azimuth steering gears
 - (f) Control systems
- (2) Azimuth thruster casings are watertight structures that include steering columns (or struts), propeller pods, propeller nozzles and nozzle supports.
- (3) Azimuth steering gears are devices for applying steering torque to thrusters, and include ~~power units~~ electric motors, hydraulic pumps, hydraulic systems, ~~actuators~~, hydraulic motors and gear assemblies for azimuth steering gears ~~and rudder~~.
- ~~(4) Power units, depending on the type of steering gear, are defined as follows:

 - (a) an electric motor and its associated electrical equipment (in the case of electric steering gear); or
 - (b) a hydraulic pump, electric motor and its associated electrical equipment (in the case of electrohydraulic steering gear).~~
- ~~(5) Actuators are devices such as hydraulic motors and electric motors for transmitting power to the gear assemblies for azimuth steering gears.~~

1.4 Construction and Strength

1.4.1 General

Sub-paragraph -3 has been deleted.

1 The installation and construction of thrusters are to be such that ship stability is not adversely affected even when sea water enters azimuth thruster casings and floods compartments where they are installed.

2 Sealing devices are to be provided in cases where thrusters penetrate hull structures to prevent any sea water from entering ships.

~~3 Thrusters are to be provided with an additional possibility of positioning and locking the failed thruster in a neutral position after a failure of its own power unit(s) and actuator(s).~~

1.5 Azimuth Steering Gears

Paragraph 1.5.1 has been amended as follows.

1.5.1 Capability of Azimuth Steering Gears

1 The steering arrangements of ~~each~~ thrusters ~~is~~are to be capable of changing direction of the ship's directional control system from one side to the other at declared steering angle limits at an average rotational speed of not less than 2.3°/s with the ship running ahead at speeds specified in **2.1.8, Part A of the Rules** ~~while operating with all power units~~. The wording "declared steering angle limits" refers to the operational limits in terms of maximum steering angle according to manufacturer guidelines for safe operation.

2 In addition to the requirements specified in ~~-1~~, the rate of turning for azimuth steering gears is to be not less than 1.0 *rpm* in static conditions of ships if astern power is obtained by turning thrusters.

~~3 Thrusters are to be arranged so that after a single failure in its piping or in one of the power units, ship steering capability (but not individual steering system operation) can be maintained or speedily regained (e.g. by the possibility of positioning the failed thruster in a neutral position in an emergency, if needed).~~

~~4 The requirements of ~~-1~~ and ~~-3~~ are to apply regardless whether the thrusters are arranged with common or dedicated power units.~~

1.6 Electric Installations

1.6.1 General

Sub-paragraph -1 has been amended as follows.

1 Each thruster is to be served separately by ~~at least two~~ exclusive circuits fed directly from main switchboards. In cases where three or more thrusters are provided, at least two those exclusive circuits are required. ~~However, Either~~ One of these circuits, however, may be supplied through the emergency switchboards.

2 Cables used in those exclusive circuits required in ~~-1~~ are to be separated, as far as practicable, throughout their length.

3 Audible and visual alarms are to be given on navigation bridges and at positions from which main engines are normally controlled in the event of any power failure to electric motors for propulsion and steering.

4 For items not specified in this section **1.6.1**, those requirements specified in **Part H of the Rules** are to apply.

1.13 Special Requirements for Thrusters Installed in Ships with Restricted Areas of Service and Small Ships

Paragraph 1.13.1 has been amended as follows.

1.13.1 Ships with Class Notation “Coasting Service”, “Smooth Water Service” or the Equivalent

1 For ships with the Class Notation “Coasting Service”, “Smooth Water Service” or the equivalent, the following requirements are not necessary and may be omitted.

(1) Those requirements for auxiliary fans specified in **1.10.1-3**

(2) **1.12.1**

2 For those ships with the Class Notation “Coasting Service”, “Smooth Water Service” or the equivalent which are not engaged in international voyages or whose gross tonnage is less than 500 tons, in addition to those requirements specified in -1, the following requirements are not necessary and may be omitted.

~~(1) 1.4.1-3~~

~~(2) 1.5.1-3~~

~~(3) 1.5.3(4)~~

~~(4) 1.6.1-2~~

~~(5) 1.6.2~~

~~(6) Those requirements for overload alarms of motors specified in 1.6.3(2)~~

~~(7) 1.6.3(4)~~

~~(8) 1.7.1-5~~

~~(9) 1.11.2~~

~~3 For the ships specified in -2, the following requirements may be applied.~~

~~(1) Notwithstanding the requirements of 1.6.1-1, each thruster may be served separately by exclusive circuits fed directly from main switchboards. In cases where three or more thrusters are provided, such exclusive circuits may be composed of at least two systems. In addition, one of these circuits may be supplied through emergency switchboard.~~

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 25 December 2018.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to waterjet propulsion systems or azimuth thrusters 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 Guidance may apply to waterjet propulsion systems or azimuth thrusters 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 by the owner.

Annex D1.3.1-5(1) GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF SELECTIVE CATALYTIC REDUCTION SYSTEMS AND ASSOCIATED EQUIPMENT

1.5 Requirements for Construction and Arrangements, etc.

1.5.1 Construction and Arrangement

Sub-paragraph -5 has been amended as follows.

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

((1) to (4) are omitted.)

(5) 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 ~~or~~ ~~machinery~~ 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) is omitted.)

1.5.3 Ventilation Systems

Sub-paragraph -3 has been amended as follows.

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 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.

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.

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 provided with mechanical exhaust ventilation systems. These ventilation systems are to be capable of giving at least 20 air changes per hour and of being operated from outside the compartment 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.

(2) In cases where the tanks are adjacent to enclosed compartments normally entered by ship

personnel, the requirements of -1 above apply.

Annex D1.3.1-5(2) GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT

1.5 Requirements for Construction and Arrangements, etc.

1.5.1 Construction and Arrangement

Sub-paragraph -5 has been amended as follows.

5 Where sodium hydroxide solution is stored in ~~integral~~ tanks which form part of the ship's hull, the following are to be considered during the design and construction:

((1) to (4) are omitted.)

(5) 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 or machinery~~ spaces, cargo spaces containing cargoes which react with sodium hydroxide solutions in a hazardous manner as well as any food stores, oil tanks and fresh water tanks.

((6) is omitted.)

1.5.2 Ventilation Systems

Sub-paragraph -3 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 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.

2 Notwithstanding the requirements specified in **-1** above, where storage tanks for sodium hydroxide solutions or equipment for using or handling sodium hydroxide solutions, such as the solution supply pump 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.

3 In cases where sodium hydroxide solutions are 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 provided with mechanical exhaust ventilation systems. These ventilation systems~~ are to be capable of giving at least 20 air changes per hour and of being operated from outside the compartment 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.

(2) In cases where the tanks are adjacent to enclosed compartments normally entered by ship personnel, the requirements of **-1** above apply.

Annex D2.1.1-5 GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS RECIRCULATION SYSTEMS AND ASSOCIATED EQUIPMENT

Section 1.2 has been amended as follows.

1.2 Class Surveys

1.2.1 Classification Surveys

1 Classification Survey during Construction

(1) Plans and documents for approval and reference

In addition to applying the requirements of **(1)** and **(2)** of **1.2.1-1** of the **Annex D1.3.1-5(2)** “GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT”, the ~~following~~ plans and documents listed in (a) to (c) below for reference are to be submitted for reference. ~~When in such cases~~ applying (1) and (2) of 1.2.1-1, “exhaust gas cleaning system” is to be read as “exhaust gas recirculation system”.

~~(1a)~~ Specifications of blowers fitted onto exhaust gas recirculation systems

~~(2b)~~ Assembly of exhaust gas recirculation systems (except in cases where it is submitted in accordance with **Chapter 2, Part D of the Rules**)

~~(3c)~~ Construction and arrangement of thermal insulation for exhaust gas pipes fitted onto exhaust gas recirculation systems (except in cases where it is submitted in accordance with **Chapter 2, Part D of the Rules**)

(2) ~~For~~ Tests at ~~Facilities~~ (~~Shop~~ Tests)

~~In~~ addition to applying the requirement of **1.2.1-1(3)** of the **Annex D1.3.1-5(2)** “GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT”, the ~~following~~ tests listed in (a) to (f) below are to be carried out ~~as~~:

~~(1a)~~ Starting and stopping test of exhaust gas recirculation systems

~~(2b)~~ Test for load response

~~(3c)~~ Emergency stop test

~~(4d)~~ Test at normal load with exhaust gas recirculation systems running

~~(e)~~ Hydrostatic test (at a pressure equal to 1.5 times the maximum working pressure for the pressure receiving parts of the cooling systems for blowers fitted onto exhaust gas recirculation systems and the cooling sides of heat exchangers fitted onto exhaust gas recirculation systems)

~~(5f)~~ Other tests deemed necessary by the Society

~~3~~ ~~Pressure receiving parts on the cooling systems for blowers fitted onto exhaust gas recirculation systems and cooling side of heat exchangers fitted onto the exhaust gas recirculation systems are to be subjected to hydrostatic tests at a pressure equal to 1.5 times the maximum working pressure.~~

(3) Tests after Installation On Board

~~(a)~~ The requirement of **1.2.1-1(4)** of the **Annex D1.3.1-5(2)** “GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT” applies. In such cases, “exhaust gas cleaning system” is to be read as “exhaust gas recirculation system”.

~~(4b)~~ At the sea trials specified in ~~2.1.3~~ **2.3.1, Part B of the Rules**, running tests of engines are to be carried out with exhaust gas recirculation systems in operation, and the satisfactory operation of the engine and exhaust gas recirculation system are to be confirmed.

(4) Documents to be Maintained On Board

At the completion of a Classification Survey during construction, the Surveyor confirms that instruction and operation manual of exhaust gas recirculation systems, including cautionary notes for the safety of the operators, are on board the ship.

2 Classification Survey of Ships Not Built under Survey

(1) Plans and Documents

For ships subject to the Classification Survey of ships not built under survey, plans and documents necessary for registration to the Society are to be submitted according to the relevant requirements in (1) of -1 above.

(2) Surveys

The tests listed in 1.2.2-3 of the Annex D1.3.1-5(2) “GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT” are to be carried out. In such cases, “exhaust gas cleaning system” is to be read as “exhaust gas recirculation system”.

(3) Documents to be Maintained On Board

At the completion of a Classification Survey of ships not built under survey, the Surveyor confirms that those specified in (4) of -1 above are on board the ship.

1.2.2 Periodical Surveys

1 Annual Surveys, Intermediate Surveys and Special Surveys

The requirements of -1 to -3 of 1.2.2 of the Annex D1.3.1-5(2) “GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF EXHAUST GAS CLEANING SYSTEMS AND ASSOCIATED EQUIPMENT” are to be applied. In such cases, “exhaust gas cleaning system” is to be read as “exhaust gas recirculation system”.

2 Occasional Surveys

For ships where exhaust gas recirculation systems specified in this Guidance are newly installed, surveys are to be carried out in accordance with 1.2.1-1.

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

1. The effective date of the amendments is 25 December 2018.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to SCR systems, EGR systems and 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 Guidance may apply to SCR systems, EGR systems and 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 by the owner.