RULES CHANGE NOTICE No.1 April 2022

Part 1 Seagoing Ships

Volume III

RULES FOR MACHINERY INSTALLATIONS

Consolidated Edition 2022

Biro Klasifikasi Indonesia

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Foreword

This Rules Change Notice (RCN) No.1 gives new additions and amendments to the "Rules for Machinery Installations (Pt.1, Vol.III), 2022 Consolidated Edition" along with the effective dates from which these changes are applicable.

Amendments to the preceding Edition are marked by strikethrough, red color, and expanded text. These new additions and amendments are to be read in conjunction with the requirements given in the 2022 Consolidated Edition of the Rules.

The summary of current amendments for each section including the implementation date are indicated in *Table 1 - Amendments Incorporates in This Notice.*

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Further queries or comments concerning this Rules are welcomed through communication to BKI Head Office.

Rules Changes Notice No. 1 – April 2022

Table 1 – Amendments Incorporates in This Notice

Unless otherwise stated in table 1, these amendments are to be implemented on ships contracted for construction on or after 1 July 2022.

Paragraph	Title/Subject	Status/Remark
Section 2 Internal Combustion Engines and Air Compressors		
2.N	Exhaust Gas Cleaning System	
2.N.5	Handling of noxious process substances	
2.N.5.1	Use of Selective Catalytic Reduction (SCR) and Storage	
2.N.5.1.1	Reductant using urea based ammonia (e.g. 40%/60% urea/water solution)	
2.N.5.1.1.8	-	Adding footnote explaining FRP vessels to whom the requirement regarding reductant tanks in this paragraph is not applicable
Section 3 Steam Turbines, Gas Turbines and Exhaust Gas Turbocharges		
3.II	Gas Turbine	
3.II.B	Control and Safety of Gas Turbine for Marine Propulsion Use	
3.II.B.2	Miscellaneous safety devices	
3.II.B.2.1	-	Adding requirements regarding shutdown functions to be provided for gas turbine (refer to Rules for Automations (Pt.1, Vol.VII))
3.II.B.3	Alarming Device	Adding requirements regarding alarm functions to be provided for gas turbine (refer to Rules for Automations (Pt.1, Vol.VII)) subject to FMEA result
Section 5 Gear, Couplings		
5.H	Load Capacity of Involute Parallel Axis Spur and Helical Gears	
5.H.1	Basic principles - introduction and general influence factors	
5.H.1.6	General influence factors	
5.H.1.6.3 Footnote 5	Internal dynamic factor, K_v	Adding ISO edition
Section 12 Fire Protection and Fire Extinguishing Equipment		
12.H	Low-Pressure CO2 Fire-Extinguishing Systems	
12.H.5	Piping, Valves and Fittings	
12.H.5.2	-	Adding requirement regarding the pressure of CO_2 at nozzles
Section 14 Steering Gears, Rudder Propeller Units, Lateral Thrust Units, Winches, Hydraulic Control Systems, Fire Door Control Systems, Stabilizers		
14.A	Steering Gears	
14.A.1	General	

Paragraph	Title/Subject	Status/Remark
14.A.1.1	Scope	
14.A.1.1.1	-	New requirement explaining to what type of steering gears this section applies
14.A.1.1.2	-	New requirement explaining the condition so that steering gear type other than mentioned in 14.A.1.1.1 can be accepted
14.A.1.1.3	-	Renumbering and changing the format of reference to SOLAS
14.A.1.2	Documents for Approval	Adding detailed list of document needed for approval
14.A.1.3	Definitions	Adding definition of terms related to steering gear
14.A.4	Power and dimensioning	
14.A.4.1	Power of steering gears	Changing the format of reference to SOLAS
Section 15 Special Requirement for Tankers		
15.B	General Requirements for Tanker	
15.B.4	Bilge and ballast systems	
15.B.4.3	Ballast systems in the cargo area	
15.B.4.3.4	-	Correcting typo in and changing format of MARPOL reference

Section 2 Internal Combustion Engines and Air Compressors

N. Exhaust Gas Cleaning System

5. Handling of noxious process substances

5.1 Use of Selective Catalytic Reduction (SCR) and Storage

SCR requires the use of a reductant which may be a urea/water solution or, in exceptional cases, aqueous ammonia or even anhydrous ammonia. These requirements apply to the arrangements for the storage and use of SCR reductants which are typically carried on board in bulk quantities.

5.1.1 Reductant using urea based ammonia (e.g. 40%/60% urea/water solution)

.1 Where urea based ammonia (e.g. AUS 40 – aqueous urea solution specified in ISO 18611-1:2014) is introduced, the storage tank is to be arranged so that any leakage will be contained and prevented from making contact with heated surfaces. All pipes or other tank penetrations are to be provided with manual closing valves attached to the tank. Tank and piping arrangements are to be approved.

.2 The storage tank may be located within the engine room.

.3 The storage tank is to be protected from excessively high or low temperatures applicable to the particular concentration of the solution. Depending on the operational area of the ship, this may necessitate the fitting of heating and/or cooling systems. The physical conditions recommended by applicable recognized standards (such as ISO 18611-3:2014) are to be taken into account to ensure that the contents of the aqueous urea tank are maintained to avoid any impairment of the urea solution during storage.

.4 If a urea storage tank is installed in a closed compartment, the area is to be served by an effective mechanical 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. A warning notice requiring the use of such ventilation before entering the compartment shall be provided outside the compartment adjacent to each point of entry.

Alternatively, where a urea storage tank is 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 is to be maintained in operation continuously except when the storage tank is empty and has been thoroughly ventilated.

The requirements above also apply to closed compartments normally entered by persons:

1) when they are adjacent to the urea integral tanks and there are possible leak points (e.g. manhole, fittings) from these tanks; or
2) 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.

.5 Each urea storage tank is to be provided with temperature and level monitoring arrangements. High and low level alarms together with high and low temperature alarms are also to be provided.

.6 Where urea based ammonia solution is stored in integral tanks, the following are to be considered during the design and construction:

1) These tanks may be designed and constructed as integral part of the hull, (e.g. double bottom, wing tanks).

2) These tanks are to be coated with appropriate anti-corrosion coating and cannot be located adjacent to any fuel oil and fresh water tank.
3) These tanks are to be designed and constructed as per the structural requirements applicable to hull and primary support members for a deep tank construction.
4) These tanks are to be fitted with but not limited to level gauge, temperature gauge, high temperature alarm, low level alarm, etc.
5) These tanks are to be included in the ship's stability calculation.

.7 The reductant piping and venting systems are to be independent of other ship service piping and/or systems. Reductant piping systems are not to be located in accommodation, service spaces, or control stations. The vent pipes of the storage tank are to terminate in a safe location on the weather deck and the tank venting system is to be arranged to prevent entrance of water into the urea tank.

.8 Reductant tanks are to be of steel or other equivalent material[1] with a melting point above 925 °C. Pipes/piping systems 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 case, type approved plastic piping may be accepted even if it has not passed a fire endurance test. Reductant tanks and pipes/piping systems are to be made with a material compatible with reductant or coated with appropriate anti-corrosion coating.

.9 For the protection of crew members, the ship is to have on board suitable personnel protective equipment. Eyewash station is to be provided, the location and number of these eyewash stations are to be derived from the detailed installation arrangements.

.10 Urea storage tanks are to be arranged so that they can be emptied of urea, and ventilated by means of portable or permanent systems.

[1] Material requirement "to be of steel or other equivalent material" in the first paragraph with a melting point above 925°C is not applicable for integral tanks on FRP vessels such as those listed below, provided that the integral tanks are coated and/or insulated with a self-extinguishing material.
1) FRP vessels complying with Regulation 17 of SOLAS Chapter II-2 based upon its associated IMO guidelines (MSC.1/Circ.1574), and
2) FRP vessels exempted from the application of SOLAS e.g., yachts, fast patrol, navy vessels, etc., generally of less than 500 gross tonnage, subject to yacht codes or flag regulations.

Section 3 Steam Turbines, Gas Turbines and Exhaust Gas Turbocharges

II. Gas Turbine

B. Control and Safety of Gas Turbine for Marine Propulsion Use

2. Miscellaneous safety devices

2.1 Details of the manufacturer's proposed automatic safety devices to safeguard against hazardous conditions arising in the event of malfunctions in the gas turbine installation are to be submitted to BKI together with the failure mode and effect analysis (FMEA).

Unless the FMEA required by this Section proves otherwise, the shutdown functions for gas turbines are to be provided in accordance with Table 8.5 of the Rules for Automations (Pt.1, Vol.VII) Sec.8.D.

2.2 Main gas turbines are to be equipped with a quick closing device (shut-down device) which automatically shuts off the fuel supply to the turbines at least in case of:

- Overspeed
- Unacceptable lubricating oil pressure drop
- Loss of flame during operation
- Excessive vibration
- Excessive axial displacement of each rotor (Except for gas turbines with rolling bearings)
- Excessive high temperature of exhaust gas
- Unacceptable lubricating oil pressure drop of reduction gear
- Excessive high vacuum pressure at the compressor inlet.

2.3 The following turbine services are to be fitted with automatic temperature controls so as to maintain steady state conditions throughout the normal operating range of the main gas turbine:

- Lubricating oil supply
- Oil fuel supply (or automatic control of oil fuel viscosity as alternative)
- Exhaust gas

2.4 Automatic or interlocked means are to be provided for clearing all parts of the main gas turbine of the accumulation of liquid fuel or for purging gaseous fuel, before ignition commences on starting or recommences after failure to start.

2.5 Hand trip gear for shutting off the fuel in an emergency is to be provided at the manoeuvring station.

2.6 Starting devices are to be so arranged that firing operation is discontinued and main fuel valve is closed within pre-determined time, when ignition is failed.

3. Alarming devices

Although in principle alarming devices listed in Table 8.5 of the Rules for Automations (Pt.1, Vol.VII) Sec.8.D are to be provided, they can be added or omitted, taking into account the result of FMEA specified in item 2.1.

~~3~~4. Other Requirements

Depending on the degree of automation involved, the extent and design of the equipment is also subject to the requirements in Rules for Automation (Pt.1, Vol.VII).

----------*end*----------

Section 5 Steam Turbines, Gas Turbines and Exhaust Gas Turbocharges

H. Load Capacity of Involute Parallel Axis Spur and Helical Gears

1. Basic principles - introduction and general influence factors

1.6 General influence factors

1.6.3 Internal dynamic factor, K_v

Table 5.8 Values of the factor K1 for the calculation of Kv

	K_1 ISO accuracy grades [5]					
No.	3	4	5	6	7	8
spur gears	2,1	3,9	7,5	14,9	26,8	39,1
helical gears	1,9	3,5	6,7	13,3	23,9	34,8

[5] ISO accuracy grades according to ISO 1328-2:2020. In case of mating gears with different accuracy grades, the grade corresponding to the lower accuracy should be used.

Section 12 Fire Protection and Fire Extinguishing Equipment

H. Low-Pressure CO_2 Fire-Extinguishing Systems

5. Piping, valves and fittings

Unless otherwise specified in 5.1 to 5.3, the requirements in G.4., G.5.and G.6 apply analogously together with Section 11, B. wherever relevant.

5.1 Safety relief devices are to be provided in each section of pipe that may be isolated by block valves and in which there could be a build-up of pressure in excess of the design pressure of any of the components.

5.2 The flooding lines are to be so designed that, when flooding occurs, the vaporization of CO_2 does not occur until it leaves the nozzles. ~~The pressure at the nozzles is to be at least 10 bar.~~

The piping system is to be designed in such a way that the CO_2 pressure at the nozzles should not be less than 1 Bar.

5.3 A filling connection with the necessary means of pressure equalization is to be provided on either side of the ship.

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Section 14 Steering Gears, Rudder Propeller Units, Lateral Thrust Units, Winches, Hydraulic Control Systems, Fire Door Control Systems, Stabilizers

A. Steering Gears

1. General

1.1 Scope

The requirements contained in this subsection ~~A~~. apply ~~to the steering gear~~ to electrohydraulic and hand hydraulic steering gear operating a rudder for the purpose of steering the vessel, including all the equipment used to operate the rudder, the steering station and all transmission elements from the steering station to the steering gear. For the rudder and manoeuvring arrangement, see the Rules for Hull (Pt. 1, Vol.II) Sec. 14.

Steering gear other than electrohydraulic type, will be accepted provided that safety and reliability can be documented to be equivalent to or better than the requirements of this section.

The requirements set out in, ~~Regulations 29 and 30 of SOLAS Chapter II-1 as amended by IMO resolutions up to MSC.436 (99) (hereinafter the same)~~ SOLAS II-1/29 and SOLAS II-1/30 as well as ~~and~~ related Guidelines (see Annex 2 of IMCO document MSC XLV/4) are integral part of this rules and are to be applied in their full extent.

For integrated propulsion and steering units such as azimuth drives, waterjets, etc. the interpretation of ~~SOLAS Chapter II-1 Regulation 29~~ SOLAS II-1/29 as given in Guidance for Code and Convention Interpretation (Pt.1, Vol.Y) Sect. 11, SC 242, is to be applied. See also B.

1.2 Documents for approval

Assembly and general drawings of all steering gears, diagrams of the hydraulic and electrical equipment together with detail drawings of all important load-transmitting components are to be submitted to BKI in electronic format. The plans and related documents submitted for approval and review may be itemized as follows:

- Arrangement of steering gear machinery,
- Hydraulic piping system diagram,
- Power supply system diagrams,
- Motor control system diagrams,
- Steering control system diagrams,
- Instrumentation and alarm system diagrams,
- Drawings and details for rudder actuators,
- Drawings and details for torque transmitting parts and parts subjected to internal hydraulic pressure,
- Details and specifications of welding procedure,
- Rated torque.

The drawings and other documents are to contain all the information relating but not limited to materials, working pressures, pump delivery rates, drive motor ratings etc. necessary to enable the documentation to be checked.

Regarding seating see the Guidance for Seating of Diesel Engine Installation (Pt.1, Vol.U).

1.3 Definitions

For the purpose of this Section the definitions in Table 14.1 are applied.

Table 14.1 Definitions

Item	Description
Steering gear control system	The equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.
Main steering gear	The machinery, rudder actuator(s), the steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions.
Steering gear power unit	in the case of electric steering gear, and electric motor and its associated electrical equipment, in the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump, in the case of other hydraulic steering gear, a driving engine and connected pump.
Item	Description
Auxiliary steering gear	The equipment other than any part of the main steering gear necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.
Power actuating system	The hydraulic equipment provided for supplying power to turn the rudder stock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, i.e. tiller, quadrant and rudder stock, or components serving the same purpose.
Maximum ahead service speed	The greatest speed which the ship is designed to maintain in service at sea at her deepest sea going draught at maximum propeller RPM and corresponding engine MCR.

Table 14.1 Definitions (*continued*)

Item	Description
Rudder actuator	The component which converts directly hydraulic pressure into mechanical action to move the rudder.
Maximum working pressure	The maximum expected pressure in the system when the steering gear is operated to comply with SOLAS II-1/29.3.2.

----------*end*----------

4. Power and dimensioning

4.1 Power of steering gears

The power of the steering gear has to comply with the requirements set out in 3.2 and 3.3, see also ~~SOLAS Chapter II-1, Part C, Regulation 29~~ SOLAS Part C II-1/29.

The maximum effective torque for which the steering gear is to be equipped is not to be less than:

$$M_{max} = \frac{\left(\frac{D_t}{4,2}\right)}{k_r} \quad [Nm] \qquad (1)$$

D_t = theoretical rudder stock diameter [mm], derived from the required hydrodynamic rudder torque for the ahead running conditions in accordance with the Rules for Hull (Pt.1, Vol.II) Sec.14.C.1 and Sec.15.B.9 and D.3.7.

The working torque of the steering gear is to be larger than the hydrodynamic torque Q_R of the rudder according to Rules for Hull (Pt.1, Vol.II) Sec.14.B.1.2, B.2.2, B.2.3 and cover the friction moments of the related bearing arrangement.

The corresponding maximum working pressure is the maximum expected pressure in the system, when the steering gear is operated to comply with the power requirements as mentioned above.

Frictional losses in the steering gear including piping have to be considered within the determination of the maximum working pressure.

The design pressure p_c for calculation to determine the scantlings of piping and other steering gear components subjected to internal hydraulic pressure is to be at least 1,25 times the maximum working pressure as defined above and has not to be less than the setting of the relief valves as described under 3.8.2.

In the case of multi-surface rudders controlled by a common steering gear the relevant diameter is to be determined by applying the formula:

$$D_{ti} = \sqrt[3]{D_{t1}^3 + D_{t2}^3 + \ldots}$$

k_r material characteristic

$$k_r = \left(\frac{235}{R_{eH}}\right)^e \quad (2)$$

e = 0,75 where $R_{eH} > 235$ N/mm^2

= 1,0 where $R_{eH} \leq 235$ N/mm^2

R_{eH}= yield strength of rudder stock material. The applied value for R_{eH} is not to be greater than 450 N/mm^2 or 0,7 . Rm, whichever is less [N/mm²]

R_m = tensile strength [N/mm^2]

----------*end*----------

Section 15 Special Requirement for Tankers

B. General Requirements for Tankers

4. Bilge and ballast systems

4.3 Ballast systems in the cargo area

4.3.4 Ballast piping passing through cargo tanks and cargo oil pipes passing through segregated ballast tanks, as permitted by Regulation ~~19.6.3.6~~ 19.3.6 of MARPOL Annex I ~~as amended by IMO resolutions up to MEPC.314 (74)~~, are to comply with the following requirements:

- The pipes are to be of heavy gauge steel of minimum wall thickness according to the table hereunder with welded or heavy flanged joints the number of which is to be kept to a minimum

  Expansion bends only (not glands) are permitted in these lines within cargo tanks for serving the ballast tanks and within the ballast tanks for serving the cargo tanks. Minimum wall thicknesses:

up to	DN 50	6,3 mm
	DN 100	8,6 mm
	DN 125	9,5 mm
	DN 150	11,0 mm
	DN 200 and larger	12,5 mm

- The thicknesses shown in the above refer to carbon steel. Only completely welded pipes or equivalent are permitted
- Where cargoes other than oil products are carried, relaxation from these requirements may be approved by BKI.
- Connection between cargo piping and ballast piping referred to above is not permitted except for emergency discharge as specified in the Unified Interpretation to Regulation 1.18 of MARPOL Annex I ~~as amended by IMO resolutions up to MEPC.314(74)~~

  Nevertheless, provision may be made for emergency discharge of the segregated ballast by means of a connection to a cargo pump through a portable spool piece. In this case non-return valves should be fitted on the segregated ballast connections to prevent the passage of oil to the ballast tanks. The portable spool piece should be mounted in a conspicuous position in the pump room and a permanent notice restricting its use should be prominently displayed adjacent to it.

  Shut-off valves shall be provided to shut off the cargo and ballast lines before the spool piece is removed.

The ballast pump is to be located in the cargo pump room, or a similar space within the cargo area not containing any source of ignition.

----------*end*----------