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Casebook on Interpretations for KR Technical Rules and Guidances

KR

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This casebook is non-mandatory, but are intended to provide practical technical materials to ship owners, ship operators, shipyards, designers and manufacturers. It might be amended periodically or upgraded to rules and guidances as future technology develops and matures.

Application of “Interpretations for KR Technical Rules and Guidances”

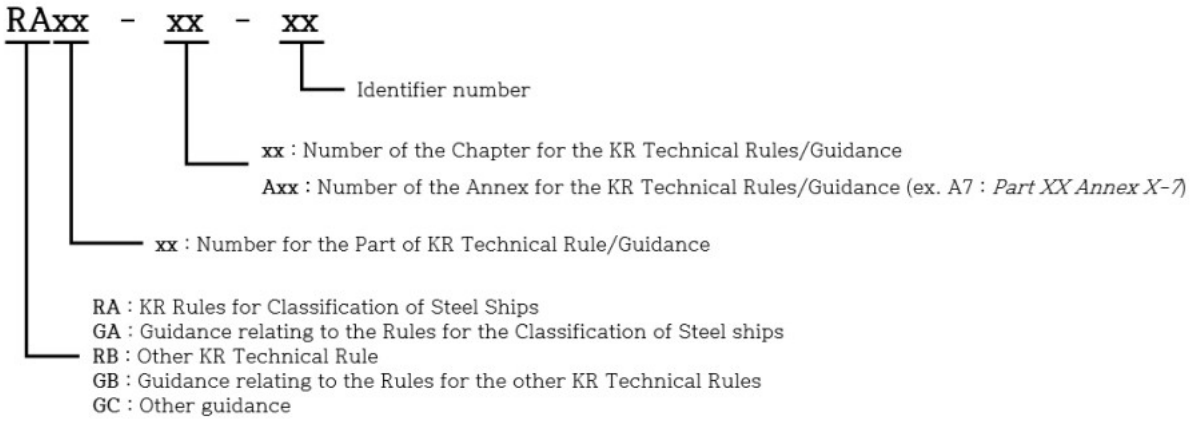
1. The "Casebook on Interpretations for KR Technical Rules and Guidances (hereinafter referred to as the Casebook)" is developed to assist application of the KR Rules for the Classification of Steel Ships, other technical rules, and guidances.

2. Since each case contained in the Casebook may not specify the implementation date of the concerned rules or guidances, due attention should be given to the application date of the concerned rules or guidances to ensure correct application. Nonetheless, the development (or revision) date of the Casebook is specified for information purpose.

3. The Casebook has compiled interpretations developed in response to a various opinions and inquiries on KR Technical Rules and Guidances raised by internal and external customers.

4. Interpretations of the Casebook may be incorporated into KR Technical Rules and Guidances subject to an internal deliberation process, if deemed necessary.

5. Each interpretation is assigned an ID number, in which the meaning of each digit is as follows:
   Ex) GA8-A7-3 : The 3rd interpretation for Annex 8-7 of the guidance relating to KR rules for steel ships



Contents

〈KR Rules and Guidances for the Classification of Steel Ships〉

Shaft survey after the extension of inspection before 2016

The Guidance relating to Rules for the classification of steel ships (2020)
Pt 1, Ch 2, Section 7 Surveys of Propeller Shaft and Stern Tube Shaft, Etc.

'Par. 2 of 702.' of the aforementioned Guidance states as follows:

702. Oil lubricated shafts or closed loop system fresh water lubricated shafts

2. Extension of shaft survey

(1) Instead of the survey specified in Par 1, after survey of the following items, the survey interval may be prolonged for not more than 2.5 years from the due date. (Hereafter, omitted.)

(2) Instead of the survey specified in Par 1, after survey of the following items, the survey interval may be prolonged for not more than 1 year from the due date. (Hereafter, omitted.)

(3) Instead of the survey specified in Par 1, after survey of the following items, the survey interval may be prolonged for not more than 3 months from the due date (Hereafter, omitted.)

〈Interpretation〉

The requirements are applied after 2016. And this allows not to extend five-year (60-month) for the propeller shaft and stern tube shaft survey no longer, but within three months, one year (12 months), or 2.5 years.
A five-year extension had been allowed prior to the amendments. However, it had not allowed to extend a five-year twice consecutively as follow:

703. Extension of Propeller Shaft Survey (As of 2015)

1. Upon the request of the owner, where the propeller shaft is Kind 1 type fitted with oil-lubricated stern tube bearings and oil sealing gland and provided that new oil seals are able to be fitted without removal of the propeller(except in case of keyed propeller), instead of the survey specified in 702., after survey of the following items, the survey interval may be prolonged for not more than 5 years from the due date but not to be applied twice consecutively. However, where the results of the following surveys are not satisfactory, all the surveys required in 702. with the drawn shaft are to be carried out.

(1) The shaft is to be drawn partially to expose the aft bearing contact area of the shaft for the examination. However, it may be exempted where stern tube bearing temperature and oil consumption are recorded and considered to be within permissible limits, and data of lubricating oil analysis in accordance with the Guidance relating to the Rules are satisfactory.

(2) The forward bearing is to be examined as far as possible and all accessible parts of the shaft including the propeller connection to the shaft is to be examined.

(3) Visual examination to confirm the good condition of oil sealing gland is to be carried out. And clearance or wear down of the aft bearing (or the after end of the strut bearing, if any) is to be measured.

(4) For shafts with keyed propeller, examination is to be carried out by an efficient crack detection method for about one-third of the length of the taper from the big end after removal of the propeller.

Regarding the extension of shaft survey, when the inspection is extended by five years in accordance with the previous requirement, the extension of shaft survey can be applicable in accordance with the amended requirements 702. However, the extension period and times shall be considered with the requirements depending on type of propeller connection and stern tube bearing lubrication.

Quality of welds

The Rules for the classification of steel ships (2020)

Pt 2, Ch 2, Section 3 Welding Work and Inspection

'Par. 1 of 309.' of the aforementioned Rule states as follows:

> *1. The weld is to have a regular and uniform surface and it to be reasonably free from excessive reinforcements, injurious defects, such as undercuts, overlaps, etc.*

〈Interpretation〉

In general, small pores can be acceptable since those do not affect structurally and are filled with other materials during the paint.

For Chemical tankers, however, pores can cause serious cracks such as Stress Corrosion Cracking (SCC) because it is stored cargo that can accelerate corrosion. Therefore, pores can be harmful defects, even if small, depending on the environment where welds are applied.

Approval scope of base materials in Welding Procedure Qualification Tests

The Rules for the classification of steel ships (2020)

Pt 2, Ch 2, Section 4 Welding Procedure Qualification Tests

'Par. 2 of 407.' of the aforementioned Rule states as follows:

2. Validity of variables for qualified WPS is as follows. However, it may be considered as equivalent for the requirements of the standard internationally recognized (AWS, ASME etc.) are applied.

*(1) **Base metal** Kind of base metal and their validity are as follows. Other materials not specified herein is to be in accordance with the requirements of the standard internationally recognized as deemed appropriate by the Society.*

A. Normal and higher strength hull structural steels

(…)

B. Weldable high strength steels

(…)

C. Weldable C and C-Mn hull steel castings

(…)

D. Weldable C and C-Mn hull and general purpose steel forgings (Hereafter, omitted.)

〈Interpretation〉

As strict requirements than international standards (ISO, ASME, etc.), taking into account the safety of ships, the requirements for the classification of steel ships distinguish rolled steel, steel forgings, steel castings as separate groups, and then define the scope of

approval based on strength and toughness within the groups. Therefore, the scope of approval for rolled steel and steel forgings shall be applied in separate groups.

** Reference **

IACS UR W28

Transfer WPS to cooperative company

The Rules for the classification of steel ships (2022)

Pt 2, Ch 2, Section 4 Welding Procedure Qualification Tests

'Par. 1 of 407.' of the aforementioned Rule states as follows:

407. Validity of qualified welding procedure specification

1. General

(1) Welding procedures qualified at a manufacturer are valid for welding in workshops under the same technical and quality management.

〈Interpretation〉

The approved welding procedure specification(WPS) may be applied to cooperative companies when the company is under same welding techniques with WPS and quality system from the original approved company.

** Reference **

IACS UR W28

Weld length for Ultrasonic Testing (UT)

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 2, Annex 2-7 Guidance for non-destructive testing of ship hull steel welds

'(2) of Par. 4' of the aforementioned Guidance states as follows:

4. Ultrasonic Inspection
(1) Methods of ultrasonic inspection
(Hereafter, omitted.)
(2) Extent of survey
(A) Survey of welded joints of the shell and deck plating in ships
(a) The survey location and distribution of checkpoints of ultrasonic inspection are to comply with the requirements given in (A) of 3 (2).
(b) Test range of ultrasonic inspection is entire length of the joint or 750 mm, whichever is smaller.

〈Interpretation〉

When Ultrasonic Inspection (UT) is performed at the cross joint where the transverse and longitudinal directions met, the test length must be at least 750 mm in the sum of the transverse and longitudinal lengths.

Temperature Conditions of Machinery

The Rules for the classification of steel ships (2020)

Pt 5, Ch 1, Section 1 General

'Par. 2 of 103.' of the aforementioned Rule states as follows:

103. Construction, materials and installation

2. All components and systems of machinery are to be designed to ensure proper operation under the temperature conditions given in Table 5.1.3.

Table 5.1.3 Temperature conditions

Installed location		*Temperature range(°C)*
Air	*On the open deck*	*-25 ~ 45*[1]

〈Interpretation〉

The -25 °C, as the estimated lowest temperature of the year in general to the vessel, means that machinery installed on the exposed deck shall be operable without problems including relevant systems such as lubricating oil, hydraulic oil, bearing, electronic appliances, etc.

In other words, equipment on exposed deck of ordinary vessels shall be capable of operating smoothly from -25°C to 45 °C in accordance with Table 5.1.3 regardless of the application of ICE class and winterization. For vessels with Winterization E2(t) on the Guidance for Ships for Navigation in Ice, the external design air temperature is from -31°C to -45°C.

For reference, -25 °C is the reference temperature of the environmental test for onboard electrical and electronic appliances. (Guidance for Approval of Manufacturing Process and Type Approval, etc., Chapter 3 Section 23 Table 3.23.1 12. Cold test).

Spare parts of Generators

The Rules for the classification of steel ships (2020)

Pt 5, Ch 1, Section 4 Spare Parts and Tools

'Par. 2 of 401.' of the aforementioned Rule states as follows:

401. Application

2. Where two or more machinery of same dimension, type and for same service are installed and their parts are exchangeable, the spare parts for one machinery may be acceptable. Where machinery installations whose number exceeds the required number and each capacity is adequate under the normal service condition of the ship, no spare parts are required for the machinery

〈Interpretation〉

Vessels with more than three identical generators may allow exemption of spare parts in the following cases;

1. A number of installed generators is more than the required by the rules, based on approved Load Analysis; and,
2. When one generator is failed, sufficient power is supplied to the extent without interfering with normal navigation.

The spare parts provided by this society are recommendations, i.e. those are not mandatory items. Kinds and number of spare parts can be changeable in consideration of the design, recommendations of the manufacturer, the discussion with owner, experiences of the same type machinery and maintenance method.

On the other hand, ships with sooth water service or coastal service or fishing vessels are to be applied in general and the Regulations and Instructions regarding Machinery Installations of Ship's of the Korean Government.

Application of Plate Type Heat Exchanger

The Rules for the classification of steel ships (2020)

Pt 5, Ch 5, Section 3 Pressure Vessels

'Par. 2 of 301.' of the aforementioned Rule states as follows:

> *2. In cases where pressure vessels are of unconventional construction and the requirements of this Section are unsuitable to be applied, the manufacturer is to submit the detailed drawings, data and strength calculations for the construction to the Society for its approval.*

〈Interpretation〉

A plate-type heat exchanger is regarded as a kind of pressure vessel in accordance with paragraph 12 of Part 5, Chapter 1, 102. However, it has a shape beyond the scope of the formula shown in Part 5, Section 5, Section 3. Therefore, the structure and strength of this shall be approved by submitting detailed drawings and materials including strength calculation in accordance with the Korean Industrial Standards or International Standards deemed to be equivalent to the Rules to the satisfaction of the Society.

Minimum wall thickness of Austenitic stainless-steel pipes

The Rules for the classification of steel ships (2020)

Pt 5, Ch 6, Section 1 General

'Par. 6 of 102.' of the aforementioned Rule states as follows:

102. Pipes

6. Required wall thickness of pipes

(3) The minimum wall thickness of austenitic stainless steel pipes is not to be less than the greater of the minimum wall thickness calculated by Par 7 or the minimum wall thickness shown in Table 5.6.5.

Table 5.6.5 Minimum wall thickness for austenitic stainless steel pipes (mm)

External diameter	Minimum wall thickness	External diameter	Minimum wall thickness
10.2 ~ 17.2	1.0	219.1	2.6
21.3 ~ 48.3	1.6	273.0	2.9
60.3 ~ 88.9	2.0	323.9 ~ 406.4	3.6
114.3 ~ 168.3	2.3	over 406.4	4.0

(NOTES)

Diameters and thicknesses according to national or international standards recognized by the Society may be accepted.

〈Interpretation〉

The minimum wall thickness in Table 5.6.5 refers to the thickness of the pipe to ensure safety in terms of production (bending, etc.), installation, external loads, erosion and corrosion, etc. Therefore, when austenitic stainless-steel pipes are smaller than 10.2 mm (the minimum external diameter indicated in Table 5.6.5) shall be applied 1.0 mm as minimum wall thickness.

Steering gears operable more than 35 degrees of rudder angle

The Rules for the classification of steel ships (2020)

Pt 5, Ch 7, Section 2 Performance and Arrangement,

Pt 5, Ch 7, Section 4 Materials, Constructions and Strength

'Par. 1 of 202. and par. 407.' of the aforementioned Rule states as follows:

202. Performance of main steering gear

1. The main steering gear is to be capable of putting the rudder over from 35 degrees on one side to 35 degrees on the other side with the ship at its load draught and running ahead at the speed specified in Pt 3, Ch 1, 120. and, under the same conditions, from 35 degrees on either side to 30 degrees on the other side in not more than 28 seconds.

407. Tillers etc.

1. The scantlings of tillers, etc. of forged steels or cast steels which transfer power from the rudder actuator to the rudder stock, are to be so determined as the bending stress is not exceeding 118/ K (N/mm2) and the shearing stress is not exceeding 68/K (N/mm2) when the rudder torque T_R is applied.

where :

T_R : Rudder torque specified in Pt 4, Ch 1, Sec 3. (N-m)

K : Material coefficient of the tiller, specified in Pt 4, Ch 1, 102. 1.

〈Interpretation〉

The rudder actuator designed to have a rudder angle greater than 35 degrees shall be satisfied the strength requirements of Part 5 Chapter 7 Section 4 based on " the rudder force and rudder torque obtained through tests or detailed theoretical calculations " in accordance with Part 4 Chapter 1 101. 3 of the Guidance for the classification of steel ships.
Generally, The rule in Part 5, Chapter 7 Section 4 requires the steering gear power unit and the Rudder actuator to have the appropriate strength under the service condition, and the rudder force and torque, which is the basis for calculation, comply with follow Part 4, Chapter 1 of Rule.

The value in Part 5 Chapter 7 Section 4 is based on the conventional design which has rudder angles below 35 degrees and shall be in accordance with Part 4 Chapter 1 ,101. 3 of Guidance, which is designed to have a rudder angle of more than 35 degrees.

** Reference **
Part 4 Chapter 1 ,101. Paragraph 3 of Rule/Guidance for the classification of steel ships (Rudders designed for helm angle exceeding 35°.)

Disposal of lubricating oil purifiers

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 5, Ch 6, Section 8 Lubricating Oil System

'Par. 2 of 804.' of the aforementioned Guidance states as follows:

804. Lubricating oil filters and purifiers

*2. In application to **804. 3** of the Rules, where any one of following is fulfilled, lubricating oil purifiers or equal effective filters may be omitted.*

(1) In case where ships engaged in coastal service area have lubricating oil storage tank with sufficient capacity to exchange the system lubricating oil one time.

(2) In case where ships provided two or more main engines having the independent lubricating oil system, ships are to be obtained a navigable speed even if one of them is out of use and provided lubricating oil storage tank with sufficient capacity to exchange the system lubricating oil at least one time for one main engine.

(3) In case where fishing vessels have lubricating oil storage tank with sufficient capacity to exchange the system lubricating oil one time regardless of tonnage and navigation area.

〈Interpretation〉

When a ship serves in the coastal area or a fishing vessel to dispose of the lubricating oil purifier, a lubricating oil storage tank shall be provided which is capable of replacing system lubricating oil for one main engine sufficiently at least, and the fact which shall be confirmed by the main engine manufacturer.

** Reference **

Article 138 of Machinery Installations of Ship's of the Korean Government

(Lubricating oil filter) ⚓

Welding leg length of Slip-on welding flange

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 5, Ch 6, Section 1 General

'Par. 3 of 103.' of the aforementioned Guidance states as follows:

104. Type of connections

3. Flange connections

(1) The dimensions and configuration of flanges and bolts are to be chosen in accordance with recognized standards

(Hereafter, omitted.)

〈Interpretation〉

The dimensions of the welding part at the Slip-on welding flange should comply with Annex D of KS B 1511 in case of the KS standard.

Pneumatic test of Piping arrangement

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 5, Ch 6, Section 14 Tests and Inspections

'Par. 1 of 1405.' of the aforementioned Guidance states as follows:

1405. Tests of piping system on board

*1. In application to **1405. 1. (2)** of the Rules, "tests by hydrostatic pressure" are to be in accordance with the following.*

(1) In principle, tests by hydrostatic pressure are to be carried out hydrostatic tests using liquid such as water, etc

(2) In general, airtight tests instead of hydrostatic test are not permitted. Where it is impracticable to carry out the required hydrostatic test, airtight tests may be considered.

(3) In such case, the procedure for carrying out the airtight test, having regard to safety of personnel, is to be submitted to the Surveyor.

〈Interpretation〉

The pneumatic test of the piping arrangement may only be replaced if tests by hydrostatic pressure are not possible after installation on board, and a test procedure shall be submitted containing measures for human safety. The test pressure for the pneumatic test is not defined, but it shall be determined considering the risk and reliability of the test.

Hoisting speed of windlass in deep and unsheltered waters

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 5, Ch 8, Section 2 Windlasses

'204. 3. (5)' of the aforementioned Guidance states as follows:

204. Design

3. Mechanical design

(5) Hoisting speed

The mean speed of the chain cable during hoisting of the anchor and cable is to be at least 0.15 m/s. For testing purposes, the speed is to be measured over two shots of chain cable (55 m in length) and initially with at least three shots of chain (82.5 m in length) and the anchor submerged and hanging free.

〈Interpretation〉

The above guidance applies to anchorage depths of 82.5 m or less. Windlass designed to using in anchorage depth of more than 82.5m and up to 120m in deep and unsheltered waters shall be in accordance with Appendix 4-3 of Rules and guidance for the classification of steel ships.

According to the 5. (3) of Appendix 4-3 in the aforementioned guidance, the speed is to be measured during hoisting more than 37.5 m with submersion and hanging free and the

mean speed of the chain cable during the hoisting of the anchor from 120 m to 82.5 m deep is to be at least 4.5 m/min (0.075 m/s).

If the anchorage depth is deeper than 120m, the Hoisting speed test shall be determined based on consultation between the ship owner, shipyard, and society surveyor.

Drop test for anchor in Deep and Unsheltered Waters

The Guidance relating to the Rules for the classification of steel ships (2020)
Pt 5, Ch 8, Section 2 Windlasses

'Par. 3 of 206.' of the aforementioned Guidance states as follows:

> *3. The braking capacity is to be tested. The anchor is to be fallen freely from the position submerged in the water until getting to sea-bed. At this time, brake systems are to be checked every 1/2 length. In this case, it is considered as a standard that braking distance of brake systems is to be 7 m or less.*

〈Interpretation〉

The guidance applies to anchorage depths of 82.5 m or less. For the anchorage depth exceeds 82.5 m, the braking test shall be conducted based on consultation among the shipowner, shipyard, and surveyor.

** Reference **

Annex 4-3 Anchoring in Deep and Unsheltered Waters, Chapter 4 of the Rules/Guidance for the classification of steel ships
IACS Rec.10

Electrical power source for cargo pumps

The Rules for the Classification of Steel Ships (2020)

Pt 6, Ch 1, Section 1 General

'101. 4. (13)', '202. 1.' of the aforementioned Rule states as follows:

101. General

4. Terminology

(13) ***Essential services*** *are those services essential for propulsion and steering, and safety of the ship, which are made up of "primary essential services" and "secondary essential services". Definitions and examples of such services are given in (A) and (B) below.*

(Omitted)

(B) ***Secondary essential services*** *are those services which need not necessarily be in continuous operation to maintain propulsion and steering but which are necessary for maintaining the vessel's safety. Examples of equipment for secondary essential services are as follows:*

202. Main source of electrical power

1. Capacity and arrangement of generating sets

(1) A main source of electrical power of sufficient capacity to supply essential services and services for habitability is to be provided. This main source of electrical power is to consist of at least two generating sets

(2) The capacity of these generating sets is to be such that in the event of any one generating set being stopped it will still be possible to supply essential services and services for habitability necessary to provide normal operational conditions of propulsion and safety. Minimum comfortable conditions of habitability shall also be

ensured which include at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water

(3) Where the main source of electrical power is necessary for propulsion and steering of the ship, the system is to be so arranged that the electrical supply to equipment necessary for propulsion and steering and to ensure safety of the ship will be maintained or immediately restored in the case of loss of any one of the generators in service. Preference tripping or other equivalent arrangements are to be provided to protect the generators against sustained overload.

〈Interpretation〉

Cargo pumps using in loading and unloading shall be Secondary essential services in Pt 6, Ch 1, 101. 4 (13) of Rules for the Classification of Steel Ships. Therefore, the cargo pumps are not equipment for "continuous operation to maintain propulsion and steering" specified by Pt 6, Ch 1, 202. 1 of Rules for the Classification of Steel Ships.

Harmonic distortion of power distribution system

The Rules for the Classification of Steel Ships (2020)

Pt 6, Ch 1, Section 2 System Design

'Par. 8 of 201. (1), (2)' of the aforementioned Rule states as follows:

201. General

8. Harmonic distortion

(1) General

(A) The total harmonic distortion (THD) of electrical distribution systems is not to exceed 8 % and any single order harmonics not to exceed 3 %.

(2) Harmonic distortion for ship electrical distribution system including harmonic filters

(A) Application

The these requirements apply to ships where harmonic filters are installed on main busbars of electrical distribution system, other than those installed for single application frequency drives such as pump motors.

〈Interpretation〉

As a requirement applied to all vessels, a harmonic is a wave that is a positive integer multiple (especially 3, 5, 7, and 9 times) of the frequency of the original wave. If harmonics are mixed into the original wave, it will cause such loss, noise, and equipment damage so harmonic distortion rate is to be limited.

The total harmonic distortion of electrical distribution system is not to exceed 8% and the distortion rate of any single order harmonics (e.g., 3rd harmonic) are not to exceed 3% specified in the rule requirement.

In addition, harmonic distortion is to be constantly monitored through filters to reduce harmonics in the electrical network of vessels in accordance with Pt 6, Ch 1, 201. 8 (2). However, harmonic filters to control frequency of an individual panel is not required. ⚓

IP grade of navigation communication equipment in the steering room

Guidance relating to the Rules for the Classification of Steel Ships (2020)
Pt 6, Ch 1, Section 2 System Design

'201. 1. (2) (A) (c)' of the aforementioned Guidance states as follows:

201. General

1. Construction and installation

(2) Installation and protective enclosure

(omitted)

(c) Application of degree of protection

As a guide for the selection of degree of protection for the electrical equipment on the basis of the circumstances of the place of installation, the requirements given in Table 6.1.6 of the Guidance are to be taken into consideration.

〈Interpretation〉

The navigation/communication equipment in the steering room shall be at least IP22 the same as other electrical devices (e.g. motors, transformers, lightings).

Pressure testing of cargo and process pipe systems

The Rules for the Classification of Steel Ships (2021)

Pt 7, Ch 5, Section 5 Process Pressure Vessels and Liquid, Vapour, and Pressure Piping Systems

'513. 2' of the aforementioned Rules states as follows:

513. Testing requirements

2. System testing requirements

(2) After assembly, all cargo and process piping are to be subjected to a strength test with a suitable fluid. The test pressure is to be at least 1.5 times the design pressure (1.25 times the design pressure where the test fluid is compressible) for liquid lines and 1.5 times the maximum system working pressure (1.25 times the maximum system working pressure where the test fluid is compressible) for vapour lines. When piping systems or parts of systems are completely manufactured and equipped with all fittings, the test may be conducted prior to installation on board the ship. Joints welded on board are to be tested to at least 1.5 times the design pressure.

(4) In double wall gas-fuel piping systems, the outer pipe or duct is also to be pressure tested to show that it can withstand the expected maximum pressure at gas pipe rupture.

〈Interpretation〉

1. After the assembly of a piping system, strength testing is required. This means that strength tests are required for the entire cargo or low-flashpoint fuel pipe on board. It can be tested for water pressure before installation onboard, however, the part welded on board shall be tested after the installation on board to confirm the safety of the entire system.

2. The strength test of the pipe systems shall be applied to all of the gas fuel pipe equipment in the engine room regardless of the design pressure.

3. The outer pipe or duct can be applied as a test pressure at the expected maximum pressure at inner gas pipe rupture.

4. Strength test shall be applied to pressure test using fresh water. If a pressure test is carried out through compressible fluids in lieu of fresh water, a test procedure shall be submitted containing measures for human safety in consideration of Pt 5, Ch 6, Par. 1 of 1405. Guidance for the Classification of Steel Ships. When conducting a strength test by compressible fluids, there is generally no restriction on the kind of fluids used, but flammable or toxic gases shall not be used to prevent fire and casualties during the test.

5. In case, ships apply Rules for the Classification of Ships Using Low-flashpoint Fuels do not accept the pressure test by compressible fluids, in principle, so 1.25 times a pneumatic test cannot be applied.

** Reference **

Pt 16, Ch 7, 702. 2. Rules for the Classification of Ships Using Low-flashpoint Fuels (2021)

Hydraulic Test of Double-walled Gas Fuel Pipe

The Rules for the Classification of Steel Ships (2020)

Pt 7, Ch 5, Section 5 Process Pressure Vessels and Liquid, Vapour, and Pressure Piping Systems

'513. 2.' of the aforementioned Rule states as follows:

513. Testing requirements

2. System testing requirements

(4) In double wall gas-fuel piping systems, the outer pipe or duct is also to be pressure tested to show that it can withstand the expected maximum pressure at gas pipe rupture.

〈Interpretation〉

1. The purpose of the pressure test of the pipe systems is to verify the effectiveness and integrity of the pipework while the design pressure is applied.

2. Therefore, even if a gas detector is installed on the outer pipe to detect gas leakage and ventilate through a ventilation system, pressure tests shall be carried out to verify the situation in which the maximum pressure is acting on the outer pipe at the moment.

3. However, if the hydraulic pressure test is realistically difficult after installation on board, it can be replaced by a pressure test before installation on board and non-destructive test of the welded part after installation.

Non-destructive testing of pressure vessels and pipe system for processes

The Rules for the Classification of Steel Ships (2021)

Pt 7, Ch 5, Section 5 Process Pressure Vessels and Liquid, Vapour, and Pressure Piping Systems

'509. 3.' of the aforementioned Rule states as follows:

509. Welding, post-weld heat treatment and non-destructive testing

3. Non-destructive testing

In addition to normal controls before and during the welding, and to the visual inspection of the finished welds, as necessary for proving that the welding has been carried out correctly and according to the requirements of this paragraph, the following tests are to be required:

(1) 100 % radiographic or ultrasonic inspection of butt-welded joints for piping systems with design temperatures colder than -10 °C, and with inside diameters of more than 75 mm, or wall thicknesses greater than 10 mm.

(2) when such butt-welded joints of piping sections are made by automatic welding procedures approved by the Society, then a progressive reduction in the extent of radiographic or ultrasonic inspection can be agreed, but in no case to less than 10% of each joint. If defects are revealed, the extent of examination is to be increased to 100 % and is to include inspection of previously accepted welds. This approval can only be granted if well-documented quality assurance procedures and records are available to assess the ability of the manufacturer to produce satisfactory welds

(3) for other butt-welded joints of pipes not covered by (1) and (2), spot radiographic or ultrasonic inspection or other non-destructive tests are to be

carried out depending upon service, position and materials. In general, at least 10 % of butt-welded joints of pipes are to be subjected to radiographic or ultrasonic inspection.

〈Interpretation〉

1. Non-destructive testing methods for butt weld joints recognizes radiography (RT) or ultrasonic inspection (UT), except for other non-destructive testing methods prescribed in 509., 3. (3) of Rule.

2. Radiographic inspection (RT), ultrasonic inspection (UT), or other non-destructive inspection methods can be applied for butt welding joints.

** Reference **

Ch 16, sec 6, 603. Rules for the Classification of Ships Using Low-flashpoint Fuels (2021)

Classification of Fresh air intake trunk

The Rules for the Classification of Steel Ships (2020)

Pt 8, Ch 1, Section 1 General

'103. 30.' of the aforementioned Rule states as follows:

> *30. **Machinery spaces** are machinery spaces of category A and other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.*

〈Interpretation〉

Fresh air intake trunks are regarded as open decks, not machinery spaces. However, when the ventilator room containing mechanical ventilation, it should be considered as other machinery spaces due to the installation of ventilation equipment.

Fire Detectors in Paint store

The Rules for the Classification of Steel Ships (2020)

Pt 8, Ch 7, Section 1 Thermal and Structural Boundaries

'Par. 1 of 103.' of the aforementioned Rule states as follows:

103. Cargo Ships except tankers

1. Methods of protection in accommodation

(1) One of the following methods of protection shall be adopted in accommodation and service spaces and control stations:

*(A) Method IC : The construction of internal divisional bulkheads of non-combustible "B" or "C" class divisions generally without the installation of an automatic sprinkler, fire detection and fire alarm system in the accommodation and service spaces, except as required by **Ch5, 305. 1;***

*(B) Method IIC : The fitting of an automatic sprinkler, fire detection and fire alarm system as required by **Ch5, 305. 2** for the detection and extinction of fire in all spaces in which fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheads; or*

*(C) Method IIIC : The fitting of a fixed fire detection and fire alarm system as required by **Ch5, 305. 3** in spaces in which a fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheads, except that in no case must the area of any accommodation space or spaces bounded by an "A" or "B" class division exceed 50 m2 Consideration may be given by the Society to increasing this area for public spaces. 【See Guidance】*

〈Interpretation〉

1) Paint stores are classified as service areas. Service areas shall be protected through one of methods ⅠC, ⅡC or ⅢC taking into account a structural perspective of fire prevention, fire detection and extinguishment. And for tankers, it shall be applied the methods ⅠC in accordance with the guidance Pt.8 Ch.7 104. 1.

2) The methods ⅡC and ⅢC, fire detector shall be installed while there is no restriction on the type of internal divisional bulkheads. On the other hands, the method IC is constructed as non-combustible 'B' or 'C' class structures instead of providing fire detection and alarm devices and automatic sprinkler devices. In short, in case of the method ⅠC, the installation of fire detector is not required mandatory.

3) In addition to the aforementioned rule requirements, the title 46 of Code of Federal Regulations (CFR) requires installation smoke detectors in paint store in accordance with 118.400 and 76.27-80.

** Reference **

46 CFR 118.400 & 76.27-80 -Installation

Gaskets in fixed gas fire extinguisher

The Rules for the Classification of Steel Ships (2020)

Pt 8, Ch 8, Section 3 Fixed Fire-extinguishing Systems

'Par. 1 of 301.' of the aforementioned Rule states as follows:

301. Types of fixed fire extinguishing systems

*1. A fixed fire extinguishing system required by **Sec. 4** below may be any of the following systems:*

(1) a fixed gas fire-extinguishing system complying with the provisions of the FSS Code;*

(2) a fixed high-expansion foam fire-extinguishing system complying with the provisions of the FSS Code;*

(3) a fixed pressure water-spraying fire-extinguishing system complying with the provisions of the FSS Code.*

**** FSS code chapter 5 Fixed gas fire-extinguishing systems***

2.1.2.5 All discharge piping, fittings and nozzles in the protected spaces shall be constructed of materials having a melting temperature which exceeds 925 deg.C. The piping and associated equipment shall be adequately supported.

〈Interpretation〉

The gaskets used in fixed gas fire extinguishing system may not be subject to the melting temperature in 2.1.2.5 of FSS Code Ch. 5, should be suitable for the environment of use alternatively.

Fixed multi-fire extinguisher systems in machinery spaces of category A

The Rules for the Classification of Steel Ships (2020)

Pt 8, Ch 8, Section 4 Fire Extinguishing Arrangements in Machinery Spaces

'Par. 1 of 401.' of the aforementioned Rule states as follows:

402. Machinery spaces of category A containing internal combustion machinery

1. Fixed fire-extinguishing systems

Machinery spaces of category A containing internal combustion machinery shall be provided with one of the fixed fire-extinguishing systems in 301..

〈Interpretation〉

The installation of fixed multi-fire extinguisher systems is installed in the machinery spaces of category A after approval of the Flag administration. In this case, the fire damper of the duct shall be applied at the same level of fire resistance protection.

Application of fire integrity in Converter room

The Guidance relating to the Rules for the Classification of Steel Ships (2020)

Pt 8, Ch 7, Section 1 Thermal and Structural Boundaries

'101. 1. Table 8.7.1' of the aforementioned Guidance states as follows:

*1. Spaces of categories for the application of the standards of fire integrity are also to be complied with **Table 8.7.1** of the Guidance.*

Table 8.7.1 Categories of spaces of fire integrity

Control stations	Spaces containing navigational apparatus (steering stand, compass and radar equipment), Electric rooms (where charging/discharging panels or battery charges are located), battery rooms, generator rooms (or inverter rooms) for navigational apparatus and radio, Spaces containing control systems and storage rooms of fire-extinguishing medium for fixed fire extinguishing systems, Navigation locker
Service spaces (low risk)	Shore connection box rooms, accommodation ladder winch machinery rooms, spaces where distribution panels and starters are located, ballast control rooms, main cargo control rooms Electric rooms (where transformers, switchboards, motor-generators, etc. of less than 50 kVA (kW) are located and having area s of less than 4 m2)
Other machinery spaces	Storage rooms for hydraulic units for deck machinery and cargo gears, steering gear room, Spaces containing deck foam systems, inert gas fan rooms, Electric rooms (except those categorized as control stations or service spaces with low risk of fire), Propulsion motor rooms, Propulsion motor control rooms, Emergency fire pump rooms, Spaces other than machinery spaces of category A where fuel oil piping lines are located
(Omitted below)	

〈Interpretation〉

The Converter room is regarded as the electric room. Therefore, the fire integrity shall be considered as a control place in accordance with Pt 8, Ch 7, 101. 1.

Application of alarm system to EGCS room

The Rules for the Classification of Steel Ships (2021)

Pt 9, Ch 3, Section 4 Operating Systems for Periodically Unattended Machinery Spaces

'403. 3. (4)' of the aforementioned Rule states as follows:

403. Safety measures, means of communication, etc.

3. Alarm systems

(4) Audible alarm devices which will provide warning of faults in machinery and equipment specified in 101. 7 (14) (A) to (G) are to be installed in the spaces where main propulsion machinery, boilers, electric generating sets, etc. are situated.

〈Interpretation〉

When a separate room (e.g., EGCS ROOM) to install equipment only for EGCS(Exhaust Gas Cleaning System) is provided, the control room is not considered where devices for the main propulsion, boilers or power generation system are not installed. Thus, alarms for machinery and equipment specified in Pt 9, Ch 3 101. 1. (14) (A)~(G) of Rules for the Classification of Steel Ships are not required for the equipment installed in the room.

Securing navigation bridge visibility via CCTV

The Rules for the Classification of Steel Ships (2020)

Pt 9, Ch 5, Section 3 Bridge Layouts and Bridge Working Environments

'301. 2. (6), (C), (a)' of the aforementioned Rule states as follows:

301. General

2. General

(6) The navigation bridge visibility of the ship is to be as follows

(C) It is to be possible to observe all objects necessary for navigation, such as ships and lighthouses, in any direction from inside the wheelhouse.

(a) There is to be a field of view around the vessel of 360° obtained by an observer moving within the confines of the wheelhouse.

〈Interpretation〉

Closed circuit televisions (CCTVs) accepted by the Society are allowed to secure the bridge visibility prescribed in Pt 9, Ch 5, 301. 2. (6), (C), (a) of Rules for the Classification of Steel Ships.

Installation of a cable reel after delivery of Vessels

The Rules for the Classification of Steel Ships (2021)
Pt 9, Ch 8 Section 3 Testing and Inspection

'302., (10)' of the aforementioned Rule states as follows:

302. Test after installation

(10) integration tests to demonstrate that the shipside installations like power management system, integrated alarm, monitoring and control system work properly together with the new installation.

〈Interpretation〉

1. There are two notations for additional installations, HVSC and HVSC-Partial, for high voltage shore connection systems.

2. When a cable reel is provided after delivery, the 'HVSC-Partial' notation can be assigned before installation firstly, and then the 'HVSC' can be given after the cable reel installation and integration test.

Removal of notation from ships with Ballast Water Management Systems

The Rules for the Classification of Steel Ships (2020)

Pt 9, Ch 10, Section 1 General

'101. 1.' and '103.' of the aforementioned Rule states as follows:

101. Application

1. The requirements in this Chapter apply to ballast water management complying with the International Convention for the Control and Management of Ship's Ballast Water and Sediments (hereinafter referred to the Convention), of the ships classed with or intended to be registered under the Society.

103. Class notations

Ships which comply with this Chapter may be assigned with the one or a combination of following notations

1. BWE : Ships in which the ballast water exchange system is installed in accordance with Sec 2 for ballast water management

2. BWT : Ships in which the ballast water management system is installed in accordance with Sec 3 for ballast water management

And

Pt 9, Ch 10, Section 3 Ballast Water Management Systems

'301. 1. (1)' of the aforementioned Rule states as follows:

1. Application

Requirements of this Section are to be applied to ships where ballast water management systems are accepted as a ballast water management process.

〈Interpretation〉

Vessels installed ballast water management systems shall be given the BWT notation in Pt 9, Ch 10, 103.

However, if the shipowner wants to remove the BWT notation, the notation can be deleted by confirmation not to use the systems, for example, vessel does not serve for ocean going. In such cases, it shall be stated on a report that the ballast water management system is installed voluntarily by shipowner regardless of the classification survey to find out the fact.

Inspection of cylinders for emergency release equipment on underwater vehicles

Guidance Relating Rules for the Classification of Underwater Vehicles (2021)
Part 3 Chapter 1 Tourist Submersibles
Section 1 General

'2. of 101.' of the aforementioned Rule states as follows:

101. Application and Descriptions
(…)
2. Despite of the above 1 the requirements specified in Pt 1, Ch 5 (Pressure Hull) and Ch 9 (Piping system, Pumps and Compressors) of the Rules shall be complied with.

And
Rules for the Classification of Underwater Vehicles (2021)
Part 1 Chapter 9 Piping systems, pumps and compressors
Section 3 Materials, Manufacture and Calculations

'301.' of the aforementioned Rule states as follows:

301. Materials, manufacture and calculations
With regard to materials, manufacture and calculations of pipes, valves, fittings and pumps, they are to be in accordance with Pt 5 of Rules for the Classification of Steel Ships.

〈Interpretation〉

Cylinder(s) for emergency release equipment for heavyweight mass is/are to be inspected including drawing approval by this Classification Society, if necessary, taking into account design pressure since the equipment is regarded as one of essential equipment for the safety of life and ship.

Penetration of Aluminum Pipe in Aluminum Vessels

The Guidance relating to the Rules for the Classification of High Speed and Light Crafts (2020)

Pt 5, Ch 2, Section 1 General

'Par. 1 of 102.' of the aforementioned Guidance states as follows:

102. Materials for piping arrangement

*1. In application to **102, 2** and **3** of the Rules, the term "required by the Society" means cases as specified **in Pt 5, Ch 6, Sec 102, 3 of Guidance for the Classification of Steel Ships.** However, aluminium alloy pipes may be used for following cases only in case where hull is made of aluminium.*

(1) Any pipe penetrating either A class division or B class division

(2) Air pipes, overflow pipes and Sounding pipes to the tanks which do not form part of ship's structure

(3) Bilge pipes and ballast water pipes which are not included in pipes which directly affect water ingress by damage when fire.

〈Interpretation〉

1. Aluminium alloy pipes shall not penetrate aluminium hulls, except for the case of arranging the fire integrity on aluminium to class A or class B.

2. Aluminium alloy pipes shall not be used as fuel pipeline in accordance with Pt 5, Ch 6, Sec 102, 3 of Guidance for the Classification of Steel Ships. However, if the fuel oil tank consists of a Hull tank with the engine room bulkhead of an aluminium vessel, aluminium alloy can be used for the fitting of the fuel oil tank because it is regarded as a part of hull tank.

PAUT applied to Type B tank

Rules for the Classification of Ships Using Low-flashpoint Fuels (2022)

Ch 16, Section 3

Welding of Metallic Materials and Non-destructive Testing for the Fuel Containment System

'306.' of the aforementioned Rule states as follows:

306. Non-destructive testing

1. All test procedures and acceptance standards are to be in accordance with recognized standards, unless the designer specifies a higher standard in order to meet design assumptions. Radiographic testing is to be used in principle to detect internal defects. However, an approved ultrasonic test procedure in lieu of radiographic testing may be conducted, but in addition supplementary radiographic testing at selected locations is to be carried out to verify the results. Radiographic and ultrasonic testing records are to be retained.

2. For type A independent tanks where the design temperature is below -20°C, and for type B independent tanks, regardless of temperature, all full penetration butt welds of the shell plating of fuel tanks are to be subjected to non-destructive testing suitable to detect internal defects over their full length. Ultrasonic testing in lieu of radiographic testing may be carried out under the same conditions as described in 1.

〈Interpretation〉

For applying Phased Array Ultrasonic Testing(PAUT) instead of Radiographic testing(RT) to Type B tanks,

1) Procedure qualification test for PAUT shall be approved in accordance with Annex 2-12 of Part 2 in the Guidance Relating to the Rules for the Classification of Steel Ships
2) Furthermore, places shall be determined by a surveyor to confirm the reliability of PAUT as compared with RT.

Tests and inspections for small-diameter valves

Guidance Relating Rules for the Classification of Ships Using Low-flashpoint Fuels (2022)
Annex 1 Requirements for Equipment Used for Low-flashpoint Fuel Supply Systems
Section 8 Valves

'2. of 803.' of the aforementioned Rule states as follows:

803. Tests and inspections

(…)

2. Production tests

(…)

(2) For valves used for isolation of instrumentation in piping not greater than 25mm, unit production testing need not be witnessed by the Surveyor. Records of testing are to be submitted for review.

〈Interpretation〉

Production test of valves for isolation of instrumentation not greater than outer diameter 25 mm does not need to witness by the surveyor. However, valves for the process of fuel handling such as gas-freeing or inerting on fuel supply system shall be carried out production test witnessed by surveyor.

Notation for Battery Systems

The Guidance relating to the Rules for Battery Systems on Board of Ships (2021)
Chapter 1, Section 1 General

'103.' of the aforementioned Guidance states as follows:

103. Class notations

(1) In all other cases, except for cases where the requirements for main source of electrical power of the ship are satisfied by only the battery system complying with the requirements of this guidance, the ship may be assigned with the additional installations notation ***Battery-A****.*

(2) If only the battery system in accordance with the requirements of this guidance satisfies the requirements for main source of electrical power of the ship, the ship may be assigned with the additional installations notation ***Battery-M****. Basically, the requirements corresponding to the* ***Battery-A*** *notation shall be satisfied.*

〈Interpretation〉

The **Battery-M** notation can be assigned when battery systems comply with the requirements for main source of electrical power specified in the guidance.
The **Battery-A** notation can be assigned when battery systems is applied to other purposes. For example, when generators which meet main source of electrical power specified in Pt.6 and battery systems which used only for assist of propulsion are installed together, the **Battery-A** notation can be assigned.

Classification of battery rooms

The Guidance for Battery Systems on Board of Ships (2020)

Chapter 3, Section 7 Risk Assessment

'701. 1.' of the aforementioned Guidance states as follows:

701. General

1. A risk assessment shall be carried out with an emphasis on ship and life safety. And, causes and effect analysis for all possible accident scenarios and remedies for high risk potential shall be presented.

〈Interpretation〉

1. According to the risk assessment to verify problems for electrical accidents by batteries, battery room shall be classified as safe or hazardous area.

2. Explosion-protected electrical equipment is to be installed in the battery room classified as hazardous area.

3. Ventilation fans or power shutdown system may be required based on the risk assessment when the room is classified as safety area.

Separation of DC Bus

The Guidance for DC Distribution Systems (2020)

Ch 2, Section 1 System Design

'Par. 2 of 103. (5)' of the aforementioned Guidance states as follows:

103. Distribution System

2. DC bus

(5) Where the main source of electrical power is necessary for propulsion of the ship, the main DC bus shall be subdivided into at least two sections, which are to be connected by DC circuit breakers or other approved means.

〈Interpretation〉

The main DC bus shall be separated into two sections in the distribution panel as required by Pt 6, Ch 1, Par. 1 of 402. of Rules for the Classification of Steel Ships.

Ventilation for Urea storage tank

The Guidance for Prevention System of Pollution from Ships (2021)

Ch 1, Section 2 Selective Catalytic Reduction system

'Par. 1 of 205.' of the aforementioned Guidance states as follows:

205. Handling urea solution as reductant agent

1. Urea solution storage tank

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

〈Interpretation〉

1. The urea storage tank shall be ventilated for the safety of life in case of internal inspection of the tank or when entering the tank due to various reasons.

2. The procedure is developed confirmation the oxygen concentration prior to entering the urea storage tank, it can be acceptable to use the portable fan or general service air for ventilation of the tank.