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CIRCULAR

No. 00-02-E

To : ALL SURVEYORS

Date : 2000. 04.20

Subject 8.8 : Instruction for approval of the Shop Primer

This instruction is related to the test procedure and acceptance criteria for type approval of a spread type welding shop primer which spread on the steel surface. All surveyors are requested to observe this instruction for type approval of 8.8 shop primer.

1. Application

(1) The welding shop primer should be tested as in the following paragraph 3. It should prove that the shop primer spread on the surface of steel plate does not have a bad effect on the welding.

(2) In case of an application for type approval for general shop primer other than welding shop primer, you may type approve after testing a property of matter only.

2. Data to be submitted

Data to be submitted for type approval of welding shop primer are to comply with Guidance for Approval of Manufacturing Process and Type Approval chapter 3 102.3 and 2202.

3. Kinds of type test

Kinds of type test are to comply with the following table.

Test of the properties of matter	Welding test
(1) Condition of the inside of container	(1) Butt welding test
(2) Suspended time(Mixture)	(2) Fillet welding test
(3) Hardening Dryness Time(Mixture)	
(4) Nonvolatile material(Mixture)	
(5) Metal zinc in heating remainder material.	
(6) Clinging test	
(7) Ericson test	
(8) Impact test	
(9) Flection test	

4. Test Method and Acceptance Criteria

(1) Test of the properties of matter

Refer to the following chart about the test method and Acceptance criteria of the properties of matter.

Kind of Test	Test Procedure	Acceptance Criteria
Condition of the inside of container	In accordance with KSM5000	No mass, no solidification and no membrane
Suspended time(Mixture)	In accordance with KSM5000	Over 5 hours
Hardening Dryness Time(Mixture)	In accordance with KSM5000	Within 24 hours
Nonvolatile material(Mixture)	In accordance with KSM5000	Over 45%
Metal zinc in heating remainder material.	In accordance with KSM5000	Over 75%
Clinging test, Ericson test, Impact test, Flection test	In accordance with the standard chart no. 3.22.1	In accordance with the standard chart no. 3.22.1

(2) Welding test

1). Butt welding test

(a) Test method

① Sharpen 3 test groups of rolled steel plate of thickness of 20~25mm for V sharpening of one side of edge angle 60° and shop primer in the following method. Also, the size of test item is to be in accordance with the requirement in Pt. 2 Ch 2 402.3.

Group	Treatment method of shop primer
1	Paint with the thickness of piece on the maker's advice
2	Paint with 2 times of thickness of piece on the maker's advice
3	No paint

② CO2 welding is to be applied by ordinary welding process in flat position. Also, WPS applied to the welding is to be submitted to this Society for review.

(b) Method of Assessment

Kind of test	Test Procedure	Acceptance Criteria
Radiography test	In accordance with the requirement in Pt.2 Guidance 2-9	Over 2 grade
Macro test	In accordance with the requirement Pt.2 Ch. 2 402.8	In accordance with the requirement Pt.2 Ch. 2 402.8
Bend test	In accordance with the requirement Pt.2 Ch. 2 402.6	In accordance with the requirement Pt.2 Ch.2 402.6
Impact test	In accordance with the requirement Pt.2 Ch. 2 402.7	In accordance with the requirement Pt.2 Ch. 2 402.7

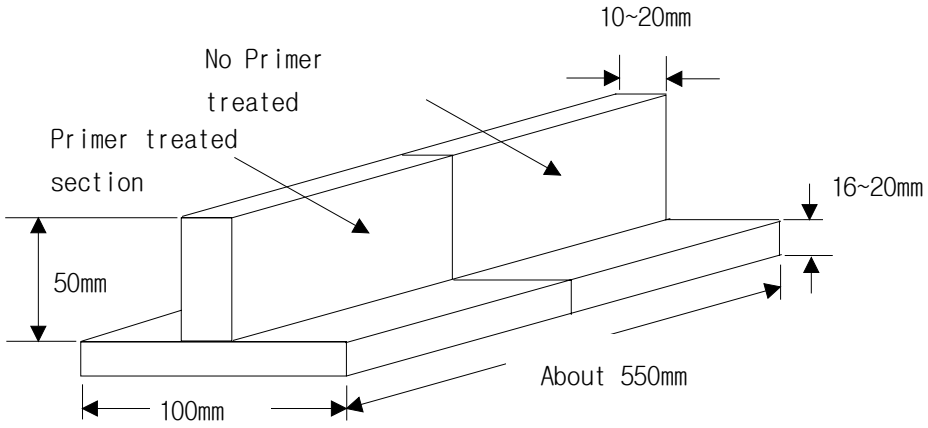
2). Filet Welding Test

(a) Testing Procedure

① Rolled steel test specimen with the following dimensions is to be prepared. However, shop primer treated parts may follow the maker's recommend paint thickness.

② It is to be made right angle by having tag welding, 30±10mm length, on start and end point .

③ CO2 welding is to be applied welding of 4~5mm length on both fillet side, in flat position. However, the welding should start from the shop primer painted



section. Also, the applied WPS should be submitted to this Society for review.

(b) Method of Assessment

① The assessment should be made for more than 150 mm length from the middle of the test assemblies.

② The assessment procedure and acceptance criteria are to be in accordance with the following table.

Kind of Test	Assessment Procedure	Acceptance Criteria
Visual Inspection	In accordance with Part2. Ch.2 403.4 of the Rules	In accordance with Pt.2 Ch.2 403.4 of the Rules
Fracture Test	Initially welded beads to be removed by gouging, later welded beads to be broken by pressing mechanically	In accordance with Pt.2 Ch.2 403.6 of the Rules

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CIRCULAR

No : 2007-04-E
To : All Surveyors
Date : 2007. 12. 10

Subject : 8.28 Instruction for the Type Approval of Solid Elastomeric Material forming a Steel Sandwich Panel.

This Instruction applies in case where a manufacturer of solid elastomeric material submits an application for the type approval to this Society. Surveyors are requested to observe the relevant requirements given in this Instruction when carrying out the aforesaid type approval.

1. Application

(1) The requirements of this Instruction make provision for the type approval of a solid elastomeric material which formed core material between two steel plates thus forming a steel sandwich panel.

(2) The requirements for the building of steel sandwich panel is to be in accordance with the Instruction specially specified by the Society.

2. Data to be submitted

The manufacturer wishing to obtain the type approval of solid elastomeric material is to submit a copy of the application of type approval together with the following data to the Society.

(1) Type test program and applicable standards, codes or rules 3 copies

(2) Manufacturing process(The mixing of the base components and the injection of the mix to form the elastomer, etc.)

(3) Listing of the base component manufacturer

(4) Certificates of conformity issued by the base component manufacturer and/or manufacturer's own test results including followings for the base components

(a) Polyol

(i) Viscosity

(ii) Moisture content (The requirement for moisture content test may be withdrawn providing the manufacturer provides written evidence the polyol contains a suitable moisture scavenging system.)

(iii) Hydroxyl value

(b) Iso-cyanate

(i) Viscosity

(ii) Iso-cyanate value

3. Data review and plant audit

(1) The Society shall performed the data review and plant audit specified in **Ch. 3, 103.** and **105. of the Guidance for Approval of Manufacturing Process and Type Approval, etc.** to assure the manufacturing process (including that of subcontractor's works) and quality assurance of the solid elastomeric material.

(2) The mixing of the base components and the injection of the mix to form the elastomer is to be carried out according to a written procedure approved by the Society.

(3) Base components are to be provided with unique identifications by their manufacturers.

(4) The manufacturer shall carry out the followings, where applicable, on receipt of any material.

(a) The consignment is to be divided into its respective batches and each batch is to be labelled accordingly.

(b) Each batch is to be visually examined for conformity with the batch number, visual quality and expiry date.

(c) Each batch is to be separately labelled and stored accordingly.

(d) Each unit within the batch is to be labelled with the batch number.

(e) Written records are to be maintained of the above and these are to be cross-referenced with the certificate of conformity for the material and/or the manufacturer's own test results.

(5) Ready use components are to be maintained in stirred tanks at the temperatures recommended by the base component manufacturer. If these are above ambient then suitable calibrated temperature measuring devices are to be maintained.

4. Type test

The requirements in Table 1 are, in principle, to be considered as the criteria for the type tests of solid elastomeric material. The tests are to be carried out under presence of the Surveyor.

Table 2.2.1 Cured elastomer properties

Test items	Standard	Criteria
Density	KS M ISO 845	≥1,000kg/m³ (at RT)
Hardness	DIN 53505	Shore D≥65 (at RT)
Shear modulus	Torsion-pendulum test -20℃~+80℃ KS M ISO 6721-2	G≥312-2.4T(℃)
Tensile stress	KS M ISO 527 or ASTM D412	≥20MPa(at RT) ≥5MPa(+80℃)
Elongation	KS M ISO 527 or ASTM D412	Min. 10%(-20℃) Min. 20%(at RT)
Bond shear strength	ASTM D429-81	≥2.7MPa(shot blasted) ≥4MPa(grit blasted)

5. Notification and announcement of approval, etc.

Notification and announcement of approval, changes in the approved conditions, validity and renewal of approval certificate, Confirmation test, Withdrawal of approval, Marks and Quality control, etc. are to be in accordance with the requirements specified in **Ch. 3, 106.** through **113.** of **the Guidance for Approval of Manufacturing Process and Type Approval, etc.** < End of Document >

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CIRCULAR

No : 2010-14-E
Date : 20 July 2010

To : All Surveyors

Subject : 8.36 Instruction for the type approval of pipe pieces connected to pipes by welding

This instruction is related to the test and inspection for the type approval of pipe pieces connected pipes by welding and manufactured by steel pipes for boilers and heat exchangers, low alloy steel pipes (RSTH 12, 22, 23, 24, RST 412, 422, 423, 424) among steel pipes for pressure piping, stainless steel pipes, steel pipes for low temperature service , rolled steel and other special type steel pipes. All surveyors are requested to observe this instruction when carrying out the aforesaid approval.

1. Application

(1) This instruction is to apply to the tests and inspection for the type approval of pipe pieces, such as elbow, reducer, tee, vent, socket, etc, manufactured by pipes and plates except castings or steel forgings when manufacturers apply.

(2) Pipe pieces manufactured by castings or forgings are to obtain the Approval of Manufacturing Process of the Society in accordance with the requirements in **Ch.2, Sec.4** of **Guidance for Approval of Manufacturing Process and Type Approval, etc.**

(3) Starting material of pipe pieces (pipes or plates) that are used to Class I & Class II piping system is to obtain the Approval of Manufacturing Process of the Society.

(4) In case the pipe pieces are welded during manufacturing, the requirements given in **Pt.5, Ch.6, 105** of **the Rules** is correspondingly to be done.

2. Data to be submitted

In addition to data specified in **Ch.3, Sec.1, 102** of **Guidance for Approval of Manufacturing Process and Type Approval, etc**. the following data is to be submitted

(1) Kind and grade for starting material(pipes or plates) and the reference data by which it can be assured how the material is procures.

(2) Method of forming

(3) Method of heat treating, etc.(if applicable)

3. Type test

(1) Test material

Test material is to be selected by sampling representative size by type of pipe

pieces. In regard to sampling, it is to be as deemed appropriate by the Society.

(2) Type test

(A) Mechanical test

Tension test, impact test, bending test and flattening test are to be made as required by **Pt.2 Ch.1** of **the Rules**. In case it is not feasible to take out test specimens from the products, test method and the dimensions of the specimens are to be consulted with manufacturer.

(B) Micro-structure test and macro test

In case of the materials which may be affected by the heat during manufacturing of pipe pieces, micro-structure test and macro test are to be done.

(C) Non-destructive test

Non-destructive test for the welded parts of pipe pieces is to comply with **Pt.5, Ch.6, 1304.** 2 of **the Rules**.

(D) Hydrostatic test

Pipe pieces belonging to Class I and Class II piping system are to be subjected to a hydrostatic test at the pressure of 1.5 times the design pressure.

(E) Measurement and visual inspection

Each test material is to be visually inspected and measurements made on wall thickness and diameter, and records of inspection are to be submitted.

(F) Regarding duplex stainless steels, one test material is to be sampled additionally and the following corrosion test is to be done..

(a) Test method : ASTM G48 Method A

(b) Test temperature :

① 22 Cr duplex type : +20℃

② 25 Cr duplex type : +50℃

(c) Exposure time : 24 ~ 72 hr

(d) Specimen mass loss : less than 4.0g/㎡ (no pitting on specimen surfaces is allowed when viewed at 20x magnification)

- The end -

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CIRCULAR

No : 2010-20-E
Date : 2010. 12. 31

To : **All Surveyors**

Subject : 8.38 Approval of manufacturing process for heat treatment of metals

The instruction is related to the approval of manufacturing process for manufacturers producing these products by its own manufacturing facilities such as heat treatment processes using semi-finished products manufactured by other manufacturers as specified in Ch. 2, Sec. 4, 403. of the Guidance for Approval of Manufacturing Process and Type Approval, etc,. Surveyors are requested to observe the relevant requirements given in this instruction when carrying out the aforesaid approval.

1. Application

(1) The requirements apply to the approval of manufacturing process for manufacturers producing these products by its own manufacturing facilities such as heat treatment processes using semi-finished products manufactured by other manufacturers.
The approval of manufacturing process for heat treatment also may be applied by manufacturer's option on request of manufacturer.

(2) The other requirements than these are to be in accordance with the Guidance for Approval of Manufacturing Process and Type Approval, etc,

2. Kind of heat treatment and materials to be applied

(1) Kind of heat treatment
Quenching & Tempering, Normalizing, Stress relieving heat treatment, etc.

(2) Kind of materials
(A) Steel & Iron materials (Carbon steels, low alloy steels, alloy steels, stainless steel, etc.)
(B) Nonferrous metals alloy (aluminum alloy, etc.)
(C) Other metal materials

3. Approval application and data to be submitted
The manufacturer wishing to obtain the approval of manufacturing process is to submit a copy of the application for approval of manufacturing process together with three copies of the approval test plan for approval, and two copies of the required data for reference specified in Ch. 2, Sec. 1, 102 of the Guidance for Approval of Manufacturing Process and Type Approval, etc,,

4. Approval test

(1) Manufacturing history of test sample

The following manufacturing history of test sample is to be submitted to this Society before heat treatment for approval is performed.

- Inspection report of material(Chemical composition, heat number, tensile strength, hardness, etc.)
- Manufacturing process (forging, casting, welding, rolling, etc.)
- To check the heat treatment
- To check the processing or correcting(cutting, plastic processing, correcting, etc.)

(2) Test items and acceptance criteria

(A) Mechanical test

The test items such as tensile and/or impact test, etc. specified in base metal are to be performed. The acceptance criteria is not less than the minimum specified value of base metal or drawings. Tests are required from one position only that irrespective of the dimensions or mass of the forging.

(B) Surface inspection

No cracks and other harmful defect on surface. Visual and suitable NDT are to be carried out.

(C) Hardness test

The acceptance criteria is not less than the minimum specified value of base metal or drawings.

Hardness deviation is to be measured within one test sample and same lots. The recognised National or International Standard is appled as the acceptance criteria of hardness deviation for each heat treatment to be approved

Same lots indicates one heat treatment in each furnace for batch type and same heat treatment condition for continuous heating furnace

(D) Microscopic test of metal

Microscopic test of metal is to be performed (X100 and X500)

No remarkable growth of grain size and other harmful defects.

(E) Deformation

The deformation is no difficult in subsequent machining and to use

5. Plant audit

The requirements of **Guidance for Approval of Manufacturing Process and Type Approval, etc,** are to be applied to plant audit.

6. Marking of approval certificate for manufacturing process

On the approval certificate for manufacturing process, the following information is to be stated.

- Type of products (Carbon steel, alloy steel, etc)
- Method of heat treatment (Quenching &Tempering, etc)
- Maximum heat treatment weight.

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CIRCULAR

To : All Surveyor and whom it may concern

No : 2011-08-E
Date : 2011.04.11

Subject : 8.39 Instruction for the type approval of Planned Maintenance System Procedure software

This instruction is related to the test and inspection for the type approval of software for Planned Maintenance System Procedure(hereafter, PMS), which is specified in **Pt 1, Annex 1-8 of Rule for the Classification of Steel Ships.** All surveyor and whom it may concern are requested to apply to this instruction immediately when carrying out type approval.

1. Application

This instruction is to apply to type approval of PMS software **when manufacturers only apply.**

2. Data to be submitted

The documents listed below are to be submitted together with the application form.

(1) Software : 1 set (demonstrational software may be submitted. In cases where a dedicated installer is necessary to install such software, the installer is to be submitted together with the software)

(2) Operation manual which indicates the following contents in detail: 3 sets (1 set of the manual may be submitted in the case of an electronic manual)

(A) System requirements (central processing unit, operating system, required capacity of the hard disc and memory, etc.)

(B) Procedure to install and uninstall the software

(C) Function of the software

(D) Operating method

(3) Other documents deemed necessary by the Society

3. Functional requirements

(1) Planned Maintenance Function

Software is to have the following planned maintenance functions

(A) It is to be capable of registering the maintenance plans not only for those survey items required by the machinery maintenance scheme but for all machinery.

(B) It is to be capable of specifying the time schedule of maintenance or running hours for each item of machinery and equipment including their parts.

(C) It is to be capable of displaying a list of at least the following items. The list is to classify the registered machinery, equipment and their parts and to be displayed in a tree structure format, etc.

(a) Names of machinery, equipment and their parts

(b) Maintenance items

(c) Maintenance interval (next inspection date or running hour)

(d) Maintenance schedule (It is to be able to directly input the inspection date or calculate from the maintenance interval)

(e) Person in charge of maintenance

(D) Maintenance intervals are not, in principle, to exceed five years. Maintenance intervals are to be capable of being displayed on the list of maintenance within a term which is arbitrarily designated.

(E) In cases where there are maintenance items which expire after the maintenance period, such items are to be easily identified.

(2) Maintenance Records Function

The software is to have the following maintenance record functions

(A) It is to be capable of managing and recording the results of the maintenance conducted by the planned maintenance specified in the above (1). The items regarding management and record are to be included the following

(a) Names of machinery, equipment and their parts

(b) Maintenance items and results (including an exchange of parts)

(c) Maintenance completion date

(d) Total running hour

(e) Next inspection date

(f) Measurement data (including original design dimensions and allowable tolerance) However, such data is only required in cases where measurements are taken

(g) The condition of damage and the repair method in cases where damage was found.

(B) List of the maintenance items within the designated term is to be displayed. Such lists are to include the name of machinery, equipment and their parts together with the maintenance items and the maintenance completion date.

(C) Past maintenance records are to be displayed in cases where machinery, equipment and their parts are arbitrarily selected.

(3) Spare Parts Management Function

The software is to be able to manage spare parts of machinery, equipment and their parts

(4) Condition Monitoring Function (optional function)

(A) The software is to have a function for the condition monitoring of machinery, equipment and their parts as necessary. Such condition monitoring is to be capable of trend analysis if necessary. In cases where trend analysis is adopted, the following requirements are to be satisfied:

(a) In cases where measurement data is affected by temperature, running speed, load, etc., the data is to be standardized and trend analysis is to be conducted against the index except in those cases where trend analysis is conducted against measurement data obtained during steady operating conditions.

(b) The upper limit and lower limit values of measurement data are to be

determined in accordance with the recommended values of the manufacturer or through statistical processing based on initial values. In cases where such values are determined by statistical processing, limit values are to be automatically calculated based on accumulated data. However, these values may be determined by other methods deemed appropriate by the Society.

(c) Trends of measurement data together with relevant limiting values are to be able to be displayed by a simple operation.

(B) Maintenance management based on the condition monitoring specified in the above (A) is to satisfy the following:

(a) Planned maintenance

(i) Machinery, equipment and their parts are to be capable of being registered apart from those which are periodically during open up examination.

(ii) The registration of the machinery, equipment and their parts which apply to condition monitoring are to include the following items:

① Names of machinery, equipment and their parts

② Kind of measured signal

③ Measurement interval

④ Limiting value (This value is to be set up for each measured signal)

(b) Measuring process and recording

(i) Measurement date and measurement value are to be recorded.

(ii) In cases where open up examinations are conducted, it is to be capable of recording the same results of the maintenance specified in the above 3. (2).

4. Administration of Software

(1) Administration of Revision

System manufacturers and administers are to handle any software revisions caused by changes in the system. Specific information related to software revisions are to be verified on main displays or menus.

(2) Administration of Backup

System manufacturers and administers are to specify proper procedures for backing up administrated maintenance data.

5. Type approval(verification) Test

In principle, the Society will conduct verification tests of those functions specified in the above 3. after examining the documents specified in the above 2. Verification tests may be conducted under the conditions that the systems are actually used at either the ship management company or onboard the ship. However, in cases where the relevant functions can be verified by the software which has been submitted, verification tests may be omitted.

Executive Vice President
Technical Division

(d) Jigs for welding, jigs for conveying steel materials, and blocks are to be disposed appropriately after completion of the relevant work so as not to be harmful for strength. Harmful scratches that have occurred during removal of jigs are to be appropriately repaired by welding, grinding or other means.

(e) Consideration are to be given to the hardness matching between weld metal and base metal on the fracture toughness of welded joint.

(2) Welding procedure qualification test

(a) Welding procedure qualification test items, test methods and acceptance criteria for YP47 steel plates are to be in accordance with Table 5.

Table 5. Welding procedure qualification test items, test methods and acceptance criteria

Test items	Test methods	Acceptance criteria
V-notch Charpy impact test(1)	(a) Test specimens are to be taken from positions of plate surface, 1/4t and 1/2t with proper temperature intervals (10~20℃) to find transition curve of absorbed energy and brittle fracture surface ratio. (b) Notch position : WM, FL, HAZ(FL+1mm, +3mm, +5mm)	Requirement : 67J at -20°C.
Hardness test	Measurement points are to include mid-thickness position in addition to the required points in accordance with Pt.2, Ch.2, 404. 3 of the Guidance	HV10: To be not more than 400.
Tensile test	According to the requirement specified in Pt.2, Ch.2, 404. 5. of the Rules	TS to be not less than 570N/mm^2
Brittle fracture test	(a) Deep notch test or CTOD test. (b) CTOD test to be carried out in accordance with BS 7448 or equivalent. (c) When performing the deep notch test, manufacturer is to submit the detailed test procedure to the Society. (d) To be consulted with the Society the dimension of test specimen, test condition, etc (e) Brittle fracture test may be waived for the welding procedure of heat input less than 50kJ/cm.	As considered appropriate by the Society.
Note : (1) Test assemblies are to be welded for highest heat input and lowest heat input position and all applicable tests are to be made on those assemblies		

(b) The approved thickness is to be the maximum thickness of the test material. The lower limit is to be in accordance with the requirements in Pt 2, Ch 2, Sec 4. of the Rules

(c) The approval range for leg length of fillet welds are to be in accordance with the requirements in Pt 2, Ch 2, Sec 4. of the Rules.

(d) The field surveyor to the corresponding branch office shall witness the welding procedure qualification test based on the Head office's review results of the submitted preliminary WPS.

(3) Welders

(a) Welders engaged in YP47 welding work are to possess welder's qualifications specified in Pt 2, Ch 2, Sec 5. of the Rules based on the applicable welding process and welding position

(b) The shipbuilder should give education and training related to YP47 welding work.

(4) Welding consumables

(a) Selection of Welding consumable is to comply with the requirements for the "High strength quenched and tempered steels for welded structures" specified in Pt 2, Ch 2, 303. of the Rules.

(b) Approval test is to be in accordance with the requirements in Pt 2, Ch 2, 609. of the Rules. Specifications of dedicated welding consumable are to be as Table 6.

Table 6. Specifications of dedicated welding consumable of YP47 steel plates

Grade	Tensile test			Impact test	
	Yield strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation(%) ($L=5.65\sqrt{A}$)	Test temp. (℃)	Average absorbed energy(J)
					L
3Y46-H	460 min.	570~720	17 min.	-20	67 min.

(The End)

Executive Vice President
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* *Circular 2010-04-E(8.35 Instruction for the approval and inspection of high strength and extremely thick steel plate of specified yield strength of 460 N/mm^2 with thickness over 50mm) has been deleted as implementing of this Circular.*

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CIRCULAR

No : 2011-10-E
Date : 2011. 04. 04

To : **All Surveyors and whom it may concern**

Subject : 8.41 Instruction for the application and inspection of extremely thick steel plates

This Instruction applies to the extremely thick steel plates with thicknesses of over 50mm and not greater than 80mm, and with specified yield strength of 315 N/mm^2 and over for longitudinal structural members of container carriers (including both new ships and existing ships). You are kindly requested to apply this Instruction in carrying out related surveys.

1. Application

(1) This Instruction applies to the extremely thick steel plates with thicknesses of over 50mm and not greater than 80mm, and with specified yield strength of 315 N/mm^2 and over (eg. YP32, YP36, YP40 and YP47 steel plates, hereinafter refer to "extremely thick steel plates") for longitudinal structural members of container carriers (including both new ships and existing ships).

(2) Longitudinal structural members include the hatch side coaming, hatch coaming top, upper deck, uppermost strake of longitudinal bulkhead and sheer strake (including attached long. stiffeners, deck longitudinals, long. frames, and etc.) as shown in Fig. 1.

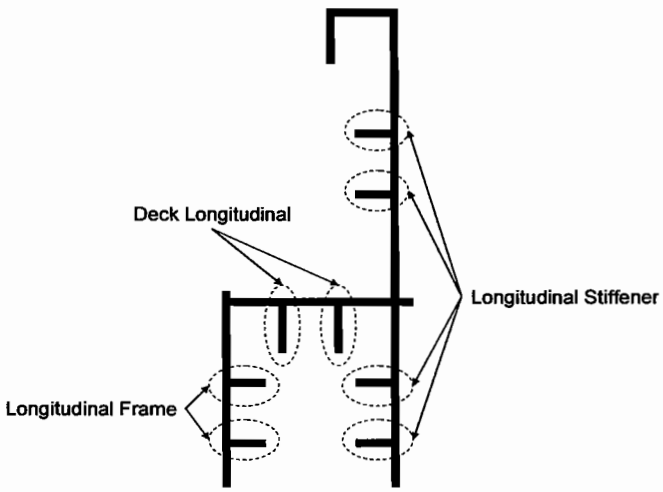


Fig 1. Application of extremely thick steel plates

(3) Where the thickness of extremely thick steel plate exceeds 80mm, the requirements considered as appropriate by the Society should be applied. Especially, in this case, appropriate measures to prevent brittle crack initiation and propagation are to be taken considering this Instruction.

(4) "Existing ships" means the ships to which the measures for extremely thick steel plates have not been applied during their construction.

2. Prevention of Brittle crack propagation (Brittle crack arrest design)

(1) Measures for prevention of brittle crack propagation are to be taken on all butt joints in the hatch side coaming, hatch coaming top, upper deck and uppermost strake of longitudinal bulkhead. Following designs could be considered as examples of the brittle crack arrest design

① Butt-shift

② Arrest weld type design without butt-shift

③ Arrest hole type design without butt-shift

(2) In case where butt-shift is applied, butt weld lines should be properly shifted with a distance of more than 300 mm from each other as shown in Fig. 2. Extremely thick steel plates used for hatch side coaming and upper deck should be with high brittle crack arrestability (Kca 6,000 $\geq N/mm^{3/2}$).

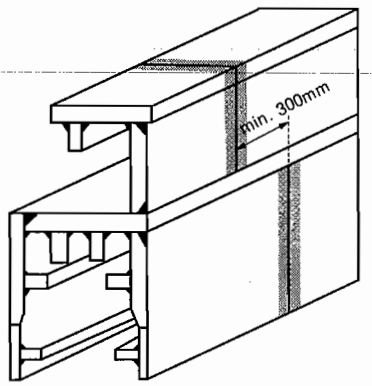
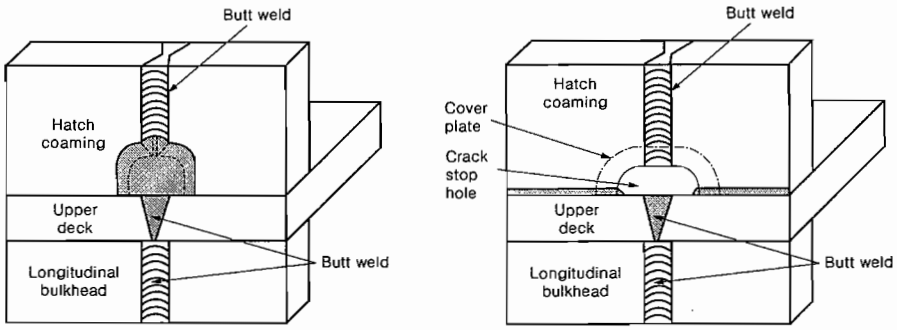


Fig 2. An example of butt-shift

(3) Instead of butt-shift the measures for prevention of brittle crack propagation such as Fig 3, which specially designed for arresting the brittle crack propagation and approved its arrestability by the Society may be applied.

(4) For arrest weld type design without butt-shift, countermeasures are to be taken for the possibilities that brittle crack may run into upper deck or hatch side coaming.

(5) Arrest designs other than those specified in (1) are to be confirmed by the Society through appropriate brittle fracture tests.



(a) Arrest welding type (b) Arrest hole type

Fig 3. An example of joint arrangement for arresting the brittle crack propagation

3. Prevention of Brittle crack initiation (Non-destructive testing)

(1) UT should be carried out on all targeted butt joints of longitudinal structural members (including attached long. stiffeners, deck longitudinals, long. frames, etc.).

(2) Survey locations, extent and timing of UT are to be in accordance with Table 1.

Table 6. Locations, extent and timing of UT

Kinds		Locations	Extent	Timing
new ships	during construction	For erection butt welds	100% UT	during construction
		For pre-erection butt welds without butt-shift	100% UT	
		For pre-erection butt welds with butt-shift	To comply with the Annex 2-7 of the Guidance	
		attached long. stiffeners, deck longitudinals, long. frames		
	after construction(1)	For erection butt welds	100% UT	No.2 Special Survey and every even Special Survey after that (e.g. No.4, No.6, etc.)
		For pre-erection butt welds without butt-shift	100% UT	
		For pre-erection butt welds with butt-shift	To comply with the Annex 2-7 of the Guidance	
		attached long. stiffeners, deck longitudinals, long. frames		
existing ships(1)		For erection butt welds	100% UT	No.2 Special Survey and every Special Survey after that.(2)
		For pre-erection butt welds without butt-shift	100% UT	
		For pre-erection butt welds with butt-shift	To comply with the Annex 2-7 of the Guidance	
		attached long. stiffeners, deck longitudinals, long. frames		

Notes

(1) In case good records of previous NDT are available, extent and timing of UT may be changed considering the ship's engaged navigation routes in past and/or results of previous UT.

(2) Assumed service route and service life of container carriers are taken as the North Pacific Ocean and 25 years, respectively.

(3) Testing procedure and acceptance criteria of UT

(a) Testing procedure and acceptance criteria of UT not specified in this Instruction are to comply with the requirements in Pt 2, Annex 2-7 of the Guidance Relating to the Rules for the Classification of Steel Ships.

(b) Scanning has to be performed from at least one surfaces and both sides of the welded seam as shown in Fig. 4. (Scanning from root face is recommended.)

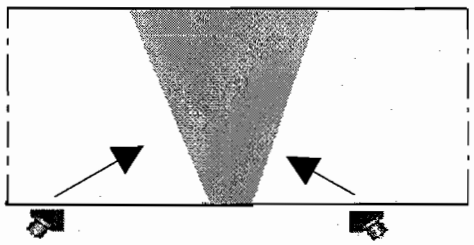


Fig 4. Scanning from root face and both sides

(c) Testing has to be performed with two probes 70° and 45° or 70° and 60° depending on the bevel preparation.

(d) Any possible differences in attenuation and surface character between the calibration block and the welded seam to be tested are to be checked in accordance with KS B 0896 or equivalent.

(e) In case where the detected echo signal is suspicious as vertically oriented defect such as lack of fusion(LF) based on the calculation of sound path, the length of the detected echo signal is to be measured by 6 dB drop method and evaluated regardless of echo height.(acceptance criteria : ≤25mm)

(f) For the NDE personnel engaged in UT of extremely thick steel plates welds, the shipyard should give education and training related to the detecting and evaluation of vertically oriented defect.

(g) In order to detect transverse defects, scanning to be made with an angle probe angled about 15 degree from weld axis on at least one surface and both sides or with an angle probe along the centre line of the weld as shown in Fig. 5.

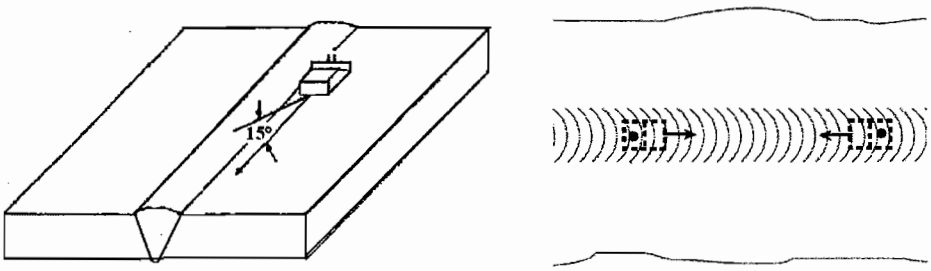


Fig 5. UT scanning examples for detecting the transverse defects

(h) To detect the vertically oriented defects accurately, following advanced UT technologies are recommended to apply.

① Using a high resolution probe with 2MHz, 14x14mm

② Applying the advanced UT technologies such as Phased Array UT(PAUT), TOFD, etc.

- The End -

Executive Vice President
Technical Division

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No : 2015-9-E
To : KR surveyors, Ship owners, Other relevant parties **Date : 2015.12.01**

Subject	**8.55 Guidance for approval of Ship Handling Simulator**
Application	**2015.12.01.**

1. Application

1.1 This guideline applies to the approval of Bridge Operation Simulator System used for training or assessment of all relative competency according to The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (or STCW).

1.2 It applies to following simulators;

.1 Bridge Operation Simulator System which is used for training, education and assessment of ship's crew

.2 Bridge Operation Simulator System which is used for competency and demonstration of continued proficiency of ship's crew

.3 Bridge Operation Simulator System which is used for assessment of marine traffic safety according to Maritime Traffic Safety Assessment scheme

2. Normative Reference

2.1 This guideline may comply with a part or whole of the following rules. For other requirement which is not mentioned in this guideline can be in accordance with engineering verifications or international standards.

.1 Korean Maritime safety law activate rule appendix 7, 2) Na) (Minimum instruments and performance function and capacity of SHS (Ship handling simulation} Simulator)

.2 Korean Guidance of Maritime Traffic Safety Assessment scheme (Notice by ministry of land 2012-129) Ch.4-2-4l (the criteria of instruments)

.3 STCW Convention Reg. 1/12

.4 STCW Code Part A -I/12

.5 STCW Code Part A-Ⅱ/1,2,3,5

.6 COLREG Part B,C,D

.7 KIt rules Pt.9 Ch.5

3. Approval application

3.1 Submission of the data

The manufacturer wishing to obtain the approval of Bridge Operation Simulator System is to submit a copy of the application together with two copies(or electric documentations) of the following data in 3.2 to this Society and those data should include all equipment of simulator and facility/instrument of training and assessment.

3.2 Data to be submitted

.1 Data for approval;

a. Drawings and specification;

- Assembly layout and drawing with dimension of each equipment
- Arrangement of system
- Specifications and drawings showing interactions of each equipment
- Information about design and arrangement including drawings, dimensions & pictures of user input & output
- Functions of each key and details of each display statement
- Details of all alarms from each equipment

b. Software Quality Plan

c. Performance test procedure for field assessment;

Performance test procedure shall specify the detailed descriptions of the required functions in the following code and the visual output and criterion of the each test item

- STCW Code Part A -I/12 (Standards governing the use of simulators)
- STCW Code Part A-Ⅱ/1,2,3,5 (Standards of competence for masters and officers)

.2 Data for reference

a. Certificate or Approval data of each equipment on simulator system

- Approval certificates or test reports related to user safety and performance of each equipment

b. Operation and installation manual

c. Cross reference data between STCW convention requirements and performance of the simulator

4. Assessment

4.1 General

.1 Assessment consists of data assessment and field assessment.

.2 This Society examines the submitted data and where deemed appropriate to 4.2., those are to be approved and returned to the manufacturers

4.2 Document review

.1 Simulator shall be designed to have similar functions and specifications with real equipment used and these equipment shall comply to IMO performance standards.

.2 Users manuals for the simulator equipment and operational manual shall be available to the learners for use during exercise.

.3 Control System shall have functions to plan a passage, and develop and apply for ship's model and 3D terrain features, and control the simulation processing.

.4 Visual System shall reproduce realistic visual scenarios of the land and maritime environments regarding their shape and size to give the information affecting decision making to operators. In this regard, simulator shall have the following performance according to the kind of system.

-No 1 bridge system : The visual system shall present the outside world by a horizontal view of at least 210 degrees.

-No 2 bridge system : The visual system shall present the outside world by a horizontal view of at least 120 degrees and to be interconnected with No 1 bridge system

.5 Bridge system shall be constructed on Mock-up Bridge with realistic console panel used. In addition, a navigation equipment such as Radar, Gyro compass, Echo sounder, ROT indicator, Rudder angle indicator, ECDIS, Steering stand, Controls of main propulsion machine and aux. machines (Telegraph and control of Thruster) etc, according to STCW or Class rules. These equipment shall be interconnected.

.6 Debriefing System shall be able to provide any method to evaluate process of simulation and result of performance

.7 Simulator used for assessment of marine traffic shall be able to analyze the marine traffic density and current with AIS basis on ECDIS and Radar. In addition, it shall provide capacity to analyze ship's route by date, time, type and size of ship .

. 8 In addition to the above requirements, simulator shall comply with standards of STCW Code Part A -I 112 and when training and assessment are carried out according to STCW Code Table A -II11,2,3,5, simulator shall provide required perfonnance with these codes and be capable to conduct related functions

4.3 Field assessment

.1 After completion of the document review according to 4.2, the field assessment is to be carried out in accordance with the approved performance test procedure in the presence of surveyor.

.2 In principle, the field assessment is to be carried out at the manufacturing site or the centre where simulator is installed .

.3 The field assessment may be partly or wholly waived subject to the approval by this Society, in case where the manufacturer has been approved by other Classification Society or any inspection organization recognized by this Society.

.4 After completion of the field assessment, the manufacturer to submit two copies of the test reports to this society.

5. Approval

5.1 Upon completion of the assessment for Bridge Operation Simulator System, the general manager of materials and equipment team shall approve the Bridge Operation Simulator System and issue Statement of Compliance (Annex 2).

5.2 Simulator Category according to the kinds of competencies shall be specified in Statement of Compliance as follows;

.1 Category F : Full Mission simulator including navigation in restrict area, it can simulate comprehensive bridge operation.

.2 Category M : Multi task simulator without navigation in restrict area, it can simulate comprehensive bridge operation.

.3 Category S : Special task simulator, it can operation and lor maintenance of particular bridge instruments, and/or defined navigation/manoeuvring scenarios

6. Validity and renewal of certificate

6.1 The Statement of Compliance will be valid for five years from the date of issue.

6.2 The manufacturer or applicant shall report any change of S/W and H/W of approved ship handling simulator, when the unreported change is discovered, this Society may cancel existing certificated regardless the valid date of certificate.

6.3 When the manufacturer wish to renew the Statement of Compliance as expiration date is coming, the filed assessment is to be carried out according to 4.3. The required data and approval/renewal process can be partially reduced upon agreement with this Society.

7. Change in the approved contents

When the approved simulator such as software or hardware is changed, the manufacturer is to submit the application of change of certificate to this Society together with the detailed documents of the alteration. This Society may request an occasional field assessment where deemed necessary upon review of the contents of alteration.

8. Others

The fee for approval of the Bridge Operation Simulator System will be determined separately from this guideline. It can be determined according to the mutual contract with manufacturer if necessary.

Executive Vice President Survey Division

Annex 1. Requirement for detailed design and funtion of Ship Handling Simulator

2. Copy of Statement of Compliance for Ship Handling Simulator.

Annex 1.

Requirement for detailed design and funtion of Ship Handling Simulator

1. Requirement for detailed design of hip handling simulator

No	Category	Criteria for Class survey and approval for ship handling simulator	F	M	S
1	Software requirement	1. The simulator shall be based on mathematical model for 6 degree of freedom motion.			
		2. The simulator shall include exercise areas including correct data for landmass, depth, buoys, tidal streams and visuals as appropriate to the nautical charts and publications used for the relevant training objectives.			
		3. The simulator shall include mathematical models of at least the types of own ship relevant to the training objectives.			
		4. The simulator shall be able to present at least 100 target ships at the same time, where the instructor shall be able to programme voyage routes for 200 target ships.			
		5. The targets shall be equipped with navigational and signal - lights, shapes and sound signals, according to “rules of the road”. The signals shall be individually controlled by the instructor, and the sound signals shall be directional and fade with range. Each ship shall have an aspect recognisable at a distance of 6 nautical miles in clear weather. A ship under way shall provide relevant bow- and stern wave.			
		6. The model shall realistically simulate own ship hydrodynamics in restricted waterways, including shallow water and bank effects, interaction with other ships and direct, counter and sheer currents.			
		7. The visual system shall provide a realistic set of flue gas emission and “Waving Flag Effect” in accordance with ships power output, speed and weather conditions.			
		8. The visual system shall present all navigational marks according to charts used.			
		9. The simulator shall provide at least two different wave spectra, variable in direction height and period.			
		10. Stern wave derived from ongoing ship shall be different in size according to depth of sea (deep water and shallow water)			
2	Bridge design requirement	1. Equipment, consoles and workstations are to be installed, mounted, and arranged in a ship-like manner.			
		2. The simulator shall provide an own ship engine sound, reflecting the power output.			
		3. The simulator shall be capable of providing environmental sound according to conditions simulated.			

No	Category	Criteria for Class survey and approval for ship handling simulator	F	M	S
		4. The view of the sea surface from the conning position is not to be obscured by more than two ship lengths or 500 m, whichever is less, forward of the bow to 10° on either side irrespective of the ship's draught, trim and deck cargo(e.g. containers).			
		5. The helmsman's field of vision from the workstation for manual steering is to extend over an arc from dead ahead to at least 60° on each side.			
		6. Evacuation path shall be provided for trainer and trainee to escape from the facility even when the front is not visible in emergency situation.			
3	Requirement for Briefing/ Debriefing	1. It shall provide a room for briefing and debriefing.			
		2. It shall be possible to replay an exercise recorded by each scenario and also to set up a scoring and grading method.			
4	Hardware design requirement	1. If the equipment is not approved by this Society or used in ships, it should follow applicable IMO standards. If there is no standards, it shall be same as the equipment in use on board.			
		2. Manuals for equipment shall be kept in the bridge for trainee to read.			
		3. Each Alarm, Buzzer, Siren shall be similar to real sound.			
		4. When the equipment control console based on computer is installed, it shall satisfy followings; - The equipment shall be turned on automatically when the simulation is started. - Other programs not related to simulator shall not be usable. - Short cut key (e.g Alt + Tab, F4, etc.) shall not be permitted. - Desktop window shall not be appeaed - Trainee shall not be allowed to access the system files.			
		5. The simulator shall provide a realistic visual scenario by day, dusk or by night, including variable meteorological visibility, changing in time.			
		6. The Visual system shall visualize target ship and surface object to be seen in the bridge, binoculars mode shall also be provided.			
		8. When the projector is used as a visual system, the projectors shall be installed with appropriate distance and manner from bridge window and an accurate bearing shall be displayed in the screen.			
		9. The visual system shall present the outside world by a view around the horizon (360 degrees). The horizontal field of view may be obtained by a view of at least 210 degrees and where the rest of the horizon may be seen by appropriate manner.			
		10. Multi task simulator shall provide at least 120 degrees horizontal view.			

No	Category	Criteria for Class survey and approval for ship handling simulator	F	M	S
		11. The visual system shall provide vertical vision according to ship's rolling and pitching, it shall also be reflected to see the surface object.			
		12. The sight from wing bridge shall be provided by whichever means during sailing or mooring operation.			
5	Design requirement for instructor station.	1. Tracks of own/target ship, calculation of ship's movement, drift by current, wave and wind, and rudder angle shall be displayed and controlled by trainer.			
		2. Starting, pause, reset, and restarting of scenario shall be possible.			
		3. Environmental change of scenario shall be possible during exercise.			
		4. Communication between trainee and trainer shall be possible and the communication audio shall be able to be recorded.			
		5. Exercise shall be saved by scenario, the visual and audio od CCTV shall be able to recorded, and the saved exercise shall be replayed with the speed set by trainer.			
		6. When the equipment is stopped by malfunction, it shall be restarted.			
		7. Instruction guidance or relevant documents shall be furnished in the instructor station (room).			

2. Detailed functional requirement of ship handling simulator

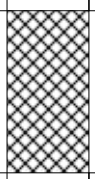
Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
1.1	Plan and conduct a passage and determine position	1. Determination of position shall be able by following equipment; ① GPS ② Radar ③ Gyro Compass (error within 1 degree is permitted) ④ Magnetic Compass			
		2. Following equipment shall be able to use, the performance of each equipment shall be comply with relevant IMO performace stand or this Society's rule; ① Echo sounder ② Anemometer ③ Speed Log (speed through water shall be indicated in the ship below 5000 ton, speed over ground as well as speed through water shall be indicated in the ship over 50000 ton) ④ Auto Pilot (Auto, Manual, NFU) ⑤ Steering Handle with compass ⑥ GPS ⑦ Gyro ⑧ Radar ⑨ AIS			
		3. Bearing shall be measured by gyro compass and magnetic compass information, it is so accurate to be compared with RADAR and visual information.			
		4. Weather observation system or weather Fax shall be facilitated. * The facility described above can be substituted by relevant facility or measures according to the purpose of training.			
1.2	Maintain a safe navigational watch	1. Following equipment shall be used in exercise; ① Navigation light panel ② Daylight signalling lamp ③ Equipment for sound signal equipment according to COLREG (Whistle, general alarm including automatic fog signal emitter) ④ Shapes and signalling lamps including Morse lamp ⑤ Communication system according to GMDSS standard ⑥ VHF or equivalent communication equipment			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
		⑦ Lighting control system for manual control of stern red lamp. ⑧ Propulsion control equipment such as engine telegraph, pitch control, thruster control ⑨ Intercom ⑩ It shall display following information;: - RPM - Pitch - Rudder Angle - ROT - Inclinometer - Anemometer			
		2. Exercise image in 360 degrees shall be seen by trainee with main visual station or other manner, the limit of visibility shall be relevantly realized according to the distance from ship.			
		3. The record regarding ship's navigation shall be recorded in appropriate manner and trainer shall be able to see the record in real time .			
	Additional requirements for simulators intended for training with Integrated Navigation System.	1. Navigation and Manoeuvre console shall inculde following equipments. ① Radar/ARPA ② ECDIS ③ GPS ④ AIS ⑤ Telegraph ⑥ Controller of Thruster (Bow and Stern) ⑦ Controller of Azimuth Thruster 2. Navigation and Manoeuvre console shall include following indicators. ① RPM ② Pitch ③ Starting Air ④ Thruster control ⑤ Speed (possibly longitudinal and lateral) ⑥ Rudder angle ⑦ ROT ⑧ Heading (Gyro/Magnetic) ⑨ Depth ⑩ Time ⑪ Anemometer ⑫ Temperature (Air/Water) ⑬ Various Alarms			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
		3. Navigation and Manoeuvre console shall include following signals ① Whistle ② Automatic fog signals ③ General Alarm ④ Morse Signal light			
1.3	Use of radar and ARPA to maintain safety of navigation	1. The Radar/ARPA shall be complied to the requirements of IMO Performance Standard and the simulator shall be equipped with each X-Band and S-Band or one radar can operate both X-Band and S-Band radar..			
		2. The simulated 3D view on the main screen shall be interacted with the map of the ECDIS.			
		3. The Radar shall realistically display the objects of Racon, Sea clutter and etc.			
		4. The X-Band Radar shall be capable of displying for the SART target.			
		5. The simulator shall be capable of providing the Radar which is used on marine vessels or similar with real Radar for their appearance and function including followings; ① True and relative vector ② Target's Speed, position, CPA, TCPA, BCR, BCT and other information for ship's manoeuvring ③ Control panel ④ PI function ⑤ EBL and VRM ⑥ Gain and Tuning control ⑦ FTC(Rain Clutter Control) and STC (Sea Clutter Control) ⑧ North up, Head up, Course up display ⑨ Alarms for Lost target, GPS/Gyro/AIS fail and etc. ⑩ Trial			
1.4	Use of ECDIS to maintain the safety of navigation.	1. The simulator shall be capable of providing the ECDIS which is used on marine vessels or similar with real ECDIS for their appearance and function.			
		2. The ECDIS shall be operated with ENC Chart and Raster Chart separately.			
		3. The simulated 3D view on the main screen shall be interacted with the map of the ECDIS.			
		4. The displayed view of the RADAR/ARPA shall be interacted with map of the ECDIS and the depth of echo sodunder also to be interacted with ECDIS.			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
		5. The accurate GPS position shall be displayed on the ECDIS and ship's position is to be identical with GPS signal.			
		6. The ECDIS shall show the other ship's information of the AIS or Radar/ARPA if the ECDIS and AIS/RADAR/ARPA are interfaced.			
		7. The ECIDS shall include the route monitoring, user-created information layers and radar overlay functions.			
		8. The ECDIS shall be capable of providing following alarms; ① GPS/Gyro/AIS Failure ② Collision Warning ③ Aground Warning			
1.5	Respond to emergencies	1. The simulator shall be capable of providing following equipments and to be operated in accordance with each emergency situation. ① Fire Detection system ② Lifeboat alarm/control system			
1.6	Respond to a distress signal at sea.	1. The simulator shall show following objects on the screen. ① Rescue Boat ② Life Boat/Raft ③ Man overboard ④ Buoyant Smoke signal ⑤ Flame signal ⑥ Rocket parachute signal ⑦ Rescue helicopter and air plane ⑧ EPIRP and SART			
1.8	Transmit and receive information by visual signalling	1. The simulator shall present the morse signal light, visual distress signal and all navigation mark on the screen.			
1.9	Manoeuvre the ship	1. The simulator shall be capable of providing the steering wheel to operate manual and automatic steering system with visual indication. * The steering system shall be complied to the requirements of IMO Performance Standard including followings ① Rudder angle indicator ② ROT ③ Steering compass ④ Automatic steering panel ⑤ NFU			
		2. All ships model for simulation shall be complied to the requirements of ships manoeuvrability in accordance with IMO Res MSC 137(76).			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
		3. The simulator shall realistically simulate the changes of wave height in accordance with Beaufort scale.			
2.1	Plan a voyage and conduct navigation	1. The simulator shall be complied to Code 1.1 on this check list and following requirements			
		2. The simulator shall include weather observation system or weather chart plotter (Ice information also to be observed) * Weather observation system or Weather chart plotter can be replaced by any other equipment or method for training purpose.			
2.2	Determine position and the accuracy of resultant position fix by any means.	1. The bridge mock-up shall provide the chart table, necessary tools for measuring ship's position and relevant chart for training.			
		2. The simulator shall be capable of measuring ship's position with following methods ① Cross bearings ② Bearing and distance ③ Horizontal distances to two objects or more ④ Two transit line			
2.3	Determine and allow for compass errors.	1. The magnetic compass information shall have the errors taking into account variation and at least 001 degree of deviation comparing with Gyro Compass information.			
2.4	Co-ordinate search and rescue operations	1. The simulator shall show following objects on the screen. ① Rescue Boat ② Life Boat/Raft ③ Man overboard ④ Buoyant Smoke signal ⑤ Flame signal ⑥ Rocket parachute signal ⑦ Rescue helicopter and air plane ⑧ EPIRP and SART			
		2. The bridge mock-up shall be capable of providing appropriately the communication equipment in accordance with GMDSS requirements and it has at least one VHF with DSC function.			
		3. The bridge mock-up shall provide the chart table, necessary tools for measuring ship's position and relevant chart for training.			
2.5	Establish watchkeeping arrangements and procedures.	1. The simulator shall be operated for at least 12 hours continuously.			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
2.6	Maintain safe navigation through the use of information from navigation equipment and systems to assist command decision-making	1. The simulator shall be capable of providing two or more equipment to operate both X-Band and S-Band radar.			
		2. Each radar to be complied to Code 1.3 on this check list and integrated function with AIS.			
2.7	Maintain the safety of navigation through the use of ECDIS and associated navigation systems to assist command decision making	1. The simulator shall be complied to Code 1.4 on this check list and following requirements ① The procedure for updating electric map and relevant tool ② ECDIS log and recording function ③ simulation track function			
2.10	Manoeuvre and handle a ship in all conditions	1. The simulator shall be complied to Code 1.6, 1.9 5.2 on this check list and following requirements.			
		2. The mathematical model of the simulator shall realistically simulate the ship's hydrodynamic motion affected by wind force, wave force, tidal stream and current in open water.			
		3. The mathematical model of the simulator shall realistically simulate the ship's hydrodynamic motion affected by shoaling effect, wall effect, ship to ship effect, ship to ice effect, and counter and sheer currents in restricted water.			
		4. The simulator shall simulate the diverse type of ordinary ships with mathematical models for each type of ships.			
		5. The simulator shall include at least one tug model that can realistically simulate tug assistance during manoeuvring and escort operation by any method. It must be possible to simulate pull, push and escort.			
		6. The simulator shall be capable of providing the pattern of tidal stream, tide change and depth with tidal change.			
		7. The simulator shall simulate the changes of airworthiness in accordance with type of ice, ice concentration, ice thickness including ice accretion.			

Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
2.11	Operate remote controls of propulsion plant and engineering systems and servieces	1. The simulator shall have the method or equipment to show the status of main engine and auxiliary equipment (boiler, generator and etc.) and the controller for these plant in accordance with each type of ships.			
3.1	Plan and conduct a coastal passage and determine position	1. The simulator shall be complied with the requirements of Code 1.1, 1.4, 2.1 and 2.7 on this check list.			
3.2	Maintain a safe navigational watch	1. The simulator shall be complied with the requirements of Code 1.2 and 2.5 on this check list.			
3.3	Respond to emergency	1. The simulator shall be complied with the requirements of Code 1.5, 1.6 and 2.4 on this check list.			
3.4	Respond to a distress signal at sea	1. The simulator shall be complied with the requirements of Code 1.5, 1.6 and 2.4 on this check list.			
3.5	Manoeuvre the ship and operate small ship power plant	1. The simulator shall have the method or equipment to show the status of main engine and auxiliary equipment (boiler, generator and etc.) and the controller for these plant in accordance with each type of ships.			
5.2	Contribute to berthing, anchoring and other mooring operations	1. The simulator shall be capable of providing both starboard and port side view on a screen or any other visual system for mooring works using telegraph and thruster controller.			
		2. The simulator shall be capable of providing any method to use ordinary winch and windlass then these means are to be available for checking the appropriate position of anchor or mooring line according to each type of ships.			
		3. The simulator shall be capable of providing any method to show the load of mooring line or anchor chain in accordance with the ship's movement and maneuvering.			
		4. The simulator shall provide any method or equipment to inform to trainee of mooring works when the each type of mooring line taking into account breaking load get the load more than safety working load. * Mooring works means that all works about towing and berthing and etc. using mooring lines.			

STATEMENT OF COMPLIANCE

Statement No. : HDO001/130402 **Initial Approval :** 2th Apr, 2016.

Product : Ship Operation Simulator

Manufacturer : Sample Co., Ltd.
36, Myeongji ocean city 9-ro, Gangseo-gu, Busan, SEOUL 618-814
Rep. of KOREA

Product Description : Bridge Operation Simulator

- Type : KRS-001
- Category : 1 (Full Mission Simulator)

" See Appendix 1 "

Approval Condition : " See Appendix 1 "

THIS IS TO CERTIFY that the above-mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and / or of the recognized standards as follows.

Guideline for Certification of Ship Operation Simulator, Circular No. 2013-xx-E
STCW Convention, Regulation I/12 & STCW Code STCW Code Part A-II/1,2,3,5

This Statement is valid until 1st Apr, 2018.
Issued at Busan, Korea on 2th Apr, 2013.

KOREAN REGISTER OF SHIPPING

General Manager of
Materials and Equipment Team

Note : *1 : The Statement will be automatically suspended and the Statement become invalid from the expiry date of the Statement in the event that the extension has not been granted or the renewal of the Statement is not underway.*

2 : The manufacturer should notify this Society of any modification or changes that may affect the validity of this Statement.

Appendix 1

Product Description and/or Approval Condition

Statemenet No : HDO001-130402 **Date of Issue :** 2th Apr, 2016.

Product Descriptions ;

Full Mission Bridge Operation Simulator (Type : KRS-001)

1. This Simulator consists of the following systems ;

1) Full Mission Bridge
- Image Projection System
- Bridge Mockup
  Engine Control Console, Radar Reparter, Steering Wheel, ECDIS, Overhead Data Display, Gyro Reapeater, Magnetic Compass Indicator etc.

2) Instructor Operation System
- Control Console
- Network Hub
- Multimedia Switching Hub

3) Briefing Room
- Large Briefing Room
- Small Briefing Room

4) Equipment Room
5) Research and Development Room

2. Software

1) 3D Imgage Replay System : Ver. 1.0
2) Navigation System : Ver. 2.0

3. Approved Documents

1) Simulator Specification no. abcd-001 rev.0
2) Test Program no. abcd-002 rev.0
3) Installation Manual no. abcd-003 rev.0
4) Instrunction Manual no. abcd-004 rev.0

Approval Conditions ;

1. This statement is granted on the basis of the approved documents and test reports.

2. This statement is valid on condition that an annual surveillance audit is carried out and found to be satisfactory by this Society.

3. The manufacturer should inform this Society of all kinds of revisions of the approved softwares. If the changes are recognized to affect functionality of the approved product, Function Test to confirm the reliability of the revised software may be performed in the presence of our surveyor.

< The End >

CIRCULAR

36 Myeongji ocean city 9-ro,
Gangseo-gu, Busan, 618-814
Republic of Korea

Phone :+82-70-8799-8251
Fax :+82-70-8799-8269
E-mail : bcgu@krs.co.kr
Person in charge : Gu Bon-Cheol

No : 2016-~~3~~-E 4 Cor

To : KR surveyors and other relevant parties

Date : 2016.05.01

Subject	8.56 Guideline for the Type Approval of Anti-Fouling System
Application	2016. 05. 01

This Guideline is related to type approval of paints complying with the requirements of the International Convention (AFS 2001) regarding the regulation of harmful anti-fouling systems on ships (hereinafter referred to as "anti-fouling paints"). All surveyors are requested to be informed this guideline for type approval of anti-fouling paints.

1. Application

(1) This guideline applies to the type approval of Anti-Fouling paints complying with the requirements of the International Convention (AFS 2001).

(2) The other requirements that these are to be in accordance with the Guidance for Approval of Manufacturing Process and Type Approval, etc.

2. Type Approval Application

The manufacturer wishing to obtain a type approval is to submit data according to Ch.3 Sec.1 102. of Guidance for Approval of Manufacturing Process and Type Approval, etc. to the society, and the data for approval and reference to be as followings;

(1) Data for Approval

(a) Type test program

(b) Technical data sheet, including;

- Kind of the product (name, grade, type, components, color and characteristic)
- Max. and Min Dry film thickness
- Application method, tools and/or machines

- Condition of surface to be coated (de-rusting grade, cleanness, profile, etc.)
- Environmental limitations (temperature and humidity)
- Viscosity, Flash point, Dry time, and etc.

(c) Combination format, components and CAS number

(d) Material Safety Data Sheet or equivalent data

(e) Marking methods

(2) Data for Reference

(a) The documents according to Ch 3, Sec 1, 102. 3(2) of the Guidance for Approval of Manufacturing Process and Type Approval, etc.

(b) Repair methods, requirements or methods for recoat

(c) Batch Test report

(d) Service records (if any)

(e) Other data deemed necessary by the Society

3. Review of the Data for Type approval

(1) The Society examines the type test program, data and etc. that are submitted from Manufacturers and where deemed appropriate, those are to be approved and returned to the manufacturers.

(2) In the case that a manufacturer wishes to have products which are manufactured in different locations under the same name, then Chemical Composition Table and CAS No. shall be used to demonstrate that they are the same coating, or individual approval tests will be required for the paint manufactured in each location.

4. Type Test

(1) The surveyor takes an appropriate amount of sample (Min. 0.25 Liter) from anti-fouling paints then seals that at manufacturing factory. The test about the sample shall be requested to the certified testing institute with the cooperation of applicant and the test report shall be submitted to Marine & Ocean Equipment Team.

(2) The test to be conducted in accordance with any one of the following test method, and to be analyzed the content of the total Tin (Sn) only.

(a) Inductively Coupled Plasma, ICP,

(b) Atomic Absorption Spectrometry, AAS,

(c) X-ray Fluorescence Spectrometry, XRF,

(d) Or an equivalent method

(3) Acceptance Criteria

(a) The organotin compound should not be present above 2,500 mg total tin per kilogram of dry paint.

(b) The organotin compound could be approved even though the content of the total Tin (Sn) is more than 2,500mg per 1Kg of dry paint, when it is proved that the anti-fouling paint does not act as a biocide.

5. Marking of the products

(1) The label presenting following contents shall be clearly attached to the product which has been approved according to this circular.

- **"IMO AFS 협약에 적합함 (AFS/CONF/26)" or**
- **"IMO Anti-fouling System Convention Compliant (AFS/CONF/26)"**

(2) The label of the products shall include following information.

(a) Product name, Manufacturer / Brand name

(b) Type of Anti-fouling paint

(c) Data for storage

(d) Batch number

6. Plant audit and type approval general procedure shall be complied with Ch.3 Sec.1 and Ch.6 of the Guidance for Approval of Manufacturing Process and Type Approval, Etc.

Executive Vice President

Survey Division

CIRCULAR

36 Myeongji ocean city 9-ro,
Gangseo-gu, Busan, 46762
Republic of Korea

Phone : +82-70-8799-8262
Fax : +82-70-8799-8269
E-mail : whlee@krs.co.kr
Person in charge : LEE Woonho

No : 2020 - 4 - E
Date : 25 June 2020

To : All Surveyors and whom it may concern

Subject	**8.61 Guidance of European Union Recognized Organisations Mutual Recognition (EU RO MR) for Type Approval**
Application	**1st July, 2020** (Date of which the application of Certification is submitted)

1. Application

As the REGULATION (EC) No 391/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on common rules and standards for ship inspection and survey organisations came into effect on 17 June 2009, EU ROs have agreed on the technical and procedural conditions under which, in appropriate cases, they will mutually recognize the class certificates for materials, equipment and components based on equivalent standards, taking the most demanding and rigorous standards as the reference in accordance with Article 10 of the Regulation.

In this context, this Society issues this Circular for MR for type approval of the products used on board ships as defined in Article 2 of the Regulation (EC) No 391/2009. The products eligible for MR are limited to the products listed in the attachment 1 and application limitations defined in the relevant Technical Requirements are to be evaluated at the individual application case with due regard to the specific context.

2. Implementation

Once every Technical Requirement has been adopted, the application date within 6 months period from the date of adoption should be set, and from the application date the Technical Requirements shall enter into force. Therefore, it shall be taken into account the application date in order to apply the Technical Requirement for MR of a specific product.

Furthermore, due to the reason that the procedural and technical requirements are to be uniformly implemented by the EU ROs, the Guidance has been issued in identical text and format of the agreed procedural and technical requirements and no Korean version is available. In order to get controlled copies of the agreed Technical Requirements, it is requested to visit EU RO MR Group's website, **http://www.euromr.org**

Meanwhile, the acceptance of MR certificates remains at the discretion of relevant non-EU flag States in the exercise of their exclusive jurisdiction, notably under the United Nations Convention on the Law of the Sea (UNCLOS). In this context, this Society must follow the instructions of the non-EU flag State of the relevant ship.

3. Remarks

This Circular supersedes the previous Circular No. 2019-5-E on 17 June 2019.

For further information of type approval for EU RO Mutual Recognition, Marine & Ocean Equipment Team (equipmenf@krs.co.kr, Tel. +82 70 8799 8262) would be your contact point.

Attachments

1. List of products eligible for MR
2. Application for EU RO MR Type Approval
3. Guidance of European Union Recognized Organizations Mutual Recognition (EU RO MR) for Type Approval

KIM Yeontae

Executive Vice President, Technical Division

<Attachment 1. List of Products eligible for MR>

Tiers	Name of product
Tier 1	1. Circuit Breakers (without electronic devices)
	2. Contactors (without electronic devices)
	3. Display Monitors, Video Screens, Terminals
	4. Electric Driven Motors < 20 kW
	5. Fuses
	6. LV Enclosures & Boxes
	7. LV Transformers
	8. Mechanical Joints
	9. Resin Chocks
	10. Sensors
	11. Switches
Tier 2	12. Accumulator Battery
	13. Air Pipe Automatic Closing Device
	14. Cable Ties
	15. Class III Pipes Fittings (DY≤500 mm)
	16. Computers and Programmable Logic Controllers (PLCs)
	17. Electrical/Electronic Relays
	18. Electric Cables - Heating Cables
	19. Expansion Joints
	20. Flameproof Luminaire (Lighting Fixture)
	21. Plastic Piping Systems (Components)
	22. Spark Arresters
Tier 3	23. Adjustable Steel Chocks
	24. Air Compressor
	25. Battery Chargers
	26. Boiler Remote Level Indicator
	27. Cable Trays & Ducts (Glass Reinforced Plastic/GRP)
	28. Cable Trays & Ducts (Metallic)
	29. Connecting Systems for Cable Repair (Cable Splices)
	30. Electrical Actuator for Valves
	31. Insulation Panels for Provision Rooms & Chambers
	32. Pneumatic Actuators for Valves
	33. Solenoid Valve Assembly
	34. Stationary Lighting Fixtures/Flood Light Projectors

Tiers	Name of product
Tier 4	35. Circuit Breakers with Electronic Devices
	36. Contactors with Electronic Devices
	37. Tachometer
	38. Temperature Gauges and Transmitters
	39. Thermal Insulation of Organic Foams for Piping
	40. Valves for Bilge Systems
	41. Valves for Freshwater Systems
	42. Valves for Lubricating Oil & Hydraulic Oil Systems
	43. Valves for Sanitary Systems
	44. Valves for Seawater Systems
Tier 5	45. AC Semiconductor Controllers
	46. Control and Protection Switching Devices
	47. Electronic Power Units for Valve Control
	48. Electro-pneumatic Level Transmitters (EPLT)
	49. Flow Gauges/Transmitters
	50. Level Gauges/Transmitters
	51. LV Soft Starters
	52. Pilot Devices
	53. Pressure Gauges - Transmitters
	54. Valves for Cargo Systems
	55. Valves for Fuel Oil Systems
Tier 6	56. Anti-acid Paints (Batteries' Storage Rooms)
	57. Electrical Insulation Mats
	58. Gasket and Seals for Piping Systems
	59. Non-metallic Gratings
	60. Touch Screen
	61. Valves for Boiler Water Systems
	62. Valves for Steam Systems
Tier 7	63. Differential Pressure Switches
	64. Dual Temperature and Pressure Switches
	65. Flow Switches
	66. Level Switches
	67. Position Switches
	68. Pressure Relief Valve in Class III Piping System
	69. Pressure Switches
	70. Temperature Switches
Tier 8	71. Insulation Monitoring Devices (IMD)

<Attachment 2. Application EU RO MR Type Approval>

한 국 선 급
Korean Register

EU RO MR 형식승인 신청서
(Application for EU RO MR Type Approval)
□신규/Initial □갱신/Renewal □연차/Annual □ 변경/Change

Content of Application 신청내용					
Name of Product 제품명					
Model(Brand) or Grade 모델명 또는 등급					
Approval Range 승인범위					
Company Name 회사명					
Address of Factory 공장주소					
Tel. No. 전화번호		Fax. No. 팩스번호		E-mail 전자우편	
Date of Approval Test 승인시험 예정일			Date to be Approval 승인희망일		
Attachments 첨부자료	승인시험방안 및 적용규격/Approval Test Program and applicable Standards 도면 및 사양 등/Drawings and Specification, etc. 기타 첨부자료에 대하여는 한국선급의 인터넷 홈페이지 참조(http://www.krs.co.kr) Other Data to be submitted (details can be found on KR Website, http://www.krs.co.kr)				

아래에 서명한 신청자는 한국선급의 "EU RO 상호인정을 위한 형식승인 지침"을 이해하고 상기의 제품에 대한 승인을 받고자 요청하며, 다음 장의 "General Conditions"를 수락합니다. 또한 상기의 승인과 관련하여 발생되는 모든 경비와 승인검사수수료를 지불하는 것에 동의합니다. General Conditions 에 따르면, KR 의 과실로 인하여 고객이 입은 손해 또는 손실에 대해서 KR 은 손해배상을 합니다. 이때 손해배상액은 실제 지불된 수수료의 10 배로 제한됩니다.

The undersigned acknowledges the provisions of the "Guidance for EU RO MR for Type Approval", requests Korean Register to carry out the Approval process for the above mentioned products, accept the "General Conditions" given on the next page, and also agrees to pay all approval fees and expenses which will be incurred in the aforesaid approval. Under the General Conditions, KR is to be responsible for damage or loss incurred by the Client arising from a negligence of KR. The liability will be limited to 10 times the sum actually paid for the services.

Date 신청일 ( ) YY 년 ( ) MM 월 ( ) DD 일

Applicant 신청자 (Signature or stamp 서명 또는 날인)

Address of Applicant
신청자 주소

Tel. No.
전화번호

Fax. No.
팩스번호

E-mail
전자우편

Person in Charge
수검담당자

Mobile No.
휴대전화

Review for Service Request 승인신청 검토 (for KR's use only)				**JOB ID No.**	
Receipt No. 접수번호		**Received Date 접수일**		**PIC 담당자**	
Check Items 신청검토 내용				**PIC(HDO) 담당자(본부)**	
				Reviewed by 검토자 (Signature 서명)	

General Conditions

1. Definitions

1.1 In this application: i) "KR" means Korean Register, Korean Register's surveyors and employees; ii) "services" means any and all services provided by KR including approval of manufacturing process, type approval, survey for materials, equipment and components, etc. in general; iii) "products" means objects of the services including materials, equipment and components in general; iv) “the Client" means the stakeholders related to the product such as designers, manufacturers, suppliers, etc.

1.1 이 신청서에서 i) KR은 한국선급, 한국선급의 검사원 및 직원을 의미한다. ii) 서비스는 KR이 제공하는 모든 서비스를 의미하며, 일반적으로 제조법승인, 형식승인, 재료 및 기자재에 대한 검사 등을 포함한다. iii) 제품은 일반적으로 재료, 기자재 및 구성품을 포함한 서비스의 대상을 의미한다. iv) 고객은 제품에 관계된 설계자, 제조자, 공급자 등의 이해관계자를 의미한다.

2. Duties of the Client

2.1 The Client is to ensure all necessary measures for inspections in accordance with the requirements of the Rules under its responsibility.

2.1 고객은 고객의 책임하에 규칙의 요구사항에 따른 검사를 위해 모든 필요한 조치하여야 한다.

2.2 Any information, drawings, etc. required for the performance of the services must be made available by the Client in due time.

2.2 서비스 수행을 위해 필요한 모든 정보, 도면 등은 적시에 제공되어야 한다.

2.3 The Client has a duty to provide a safe place of work for KR in accordance with its HSE instructions. This duty relates to places of work which are under the control of the Client that may include factories and offices.

2.3 고객의 HSE 지침에 따라 KR에게 안전한 장소를 제공할 의무가 있다. 이는 고객 통제 하에 있는 작업장이며, 공장 및 사무실을 포함할 수 있다.

2.4 It is incumbent upon the Client to maintain conditions of the products after services and to inform KR without delay of circumstances which may affect results of the services.

2.4 서비스 후 제품의 상태를 유지하는 것은 고객의 책임이며, 고객은 서비스 결과에 영향을 미칠 수 있는 상황이 발생한 경우 지체 없이 KR에 알려야 한다.

2.5 The Client shall comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption.

2.5 고객은 뇌물 수수 방지 및 반부패와 관련된 모든 법률, 법규 또는 규정을 준수하여야 한다.

3. Duties of KR

3.1 KR shall not be affected by the designers, manufacturers, suppliers and any other individuals of any item in the services and shall perform its works for the Clients fairly from independent position.

3.1 KR은 그 서비스에 속한 항목이 설계자, 제조자, 공급자 및 기타 어떠한 사람으로부터 영향을 받지 않고 독립된 입장에서 고객에게 제공하는 업무를 공정하게 수행하여야 한다.

3.2 KR shall comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption.

3.2 KR은 뇌물 수수 방지 및 반부패와 관련된 모든 법률, 법규 또는 규정을 준수하여야 한다.

3.3 KR shall comply with the Client's HSE instructions.

3.2 KR은 고객의 HSE 지침을 준수하여야 한다.

4. Competence of KR

4.1 KR can provide services at all reasonable times despite the time requested by the Client.

4.1 KR은 고객의 요청시간에도 불구하고 합리적인 시간에 서비스를 제공할 수 있다.

4.2 KR may refuse the request for the services and nullify the services already provided, if KR in its sole discretion considers that the Client does not fulfill its duty.

4.2 KR은 고객이 의무를 다하지 않았다고 판단하는 경우, 서비스 요청을 거절하거나 이미 제공된 서비스를 무효화할 수 있다.

4.3 KR may confirm specific items in addition to the requirements of the Rules, if deemed necessary by the condition of the product.

4.3 KR은 제품의 상태에 따라 필요하다고 판단할 때, 해당 규칙 요구사항 외의 항목을 추가 확인할 수 있다.

5. Service Execution

5.1 KR assesses only compliance with the applicable KR Rules, international conventions and/or flag administration requirements and other standards, to the extent agreed in writing.

5.1 KR은 업무 수행 시 서면으로 동의한 범위 내의 해당 KR 규칙 국제 협약 또는 기국 관리 요구사항 및 기타 표준에 한하여 적합성을 평가한다.

5.2 KR only is qualified to apply its Rules and to interpret them. Any reference to them has no effect unless it involves KR's intervention.

5.2 KR 규칙의 적용 및 해석은 KR에서 하며, KR을 배제한 상태에서 규칙에 대한 어떤 언급도 유효하지 않다.

5.3 The Services of KR are carried out by qualified Surveyors according to the applicable Rules and the Code of Ethics of KR. Surveyors have authority to decide matters related to suitability of the services, in their sole discretion, unless otherwise specified in the Rules.

5.3 KR의 업무는 자격 있는 검사원이 관련 규칙 및 KR 윤리강령에 따라 시행한다. 검사원은 규칙에서 별도로 규정하지 않는 한, 서비스의 적합성 여부를 독자적으로 결정할 권한이 있다.

5.4 Unless otherwise agreed, KR may at any time substitute surveyors assigned to the Work, provided that any replaced surveyors are suitably qualified.

5.4 별도 합의가 없는 한, KR은 언제든지 적절한 자격을 갖춘 검사원을 해당 업무에 대체할 수 있다.

6. Liability of KR

6.1 KR is to be responsible for damage or loss incurred by the Client arising from a negligence of KR. The liability will be limited to 10 times the sum actually paid for the services.

6.1 KR의 과실로 인하여 고객이 입은 손해 또는 손실에 대해서 KR은 손해배상을 하여야 한다. 이때 손해배상액은 실제 지불된 수수료의 10배로 제한한다.

6.2 The limitation on liability specified in Par 6.1 does not apply in case of a willful act or imprudent feasance despite being cognizant of the fact that there is a concern for damage, or nonfeasance.

6.2 6.1항의 손해배상액의 제한은 고의 또는 손해가 발생할 염려가 있음을 인식하면서 무모하게 행한 작위 또는 부작위로 인한 경우에는 적용하지 아니한다.

6.3 Rights of claims against the services provided by KR are to become nullified after 6 months from the date when the Client had notice of the damage.

6.3 KR이 제공한 검사, 용역 또는 기타 관련업무로 발생한 손해에 대한 손해배상 청구권은 그 손해를 안 날로부터 6개월이 지나면 소멸한다.

6.4 All disputes which may arise from the services provided by KR are to be subject to the exclusive jurisdiction of court of Republic of Korea and be governed by the Laws of Republic of Korea.

6.4 KR이 제공한 검사, 용역 또는 기타 관련업무로 인하여 발생한 다툼은 대한민국의 법원이 전속적인 관할을 가지고 대한민국의 법률을 준거법으로 한다.

6.5 Personal liability of the organs of KR or persons to whom KR resorts to perform its obligations is excluded except in case of their wilful misconduct or gross negligence.

6.5 KR 또는 KR의 업무를 수행하는 검사원 개인의 책임은 의도적인 위법행위 또는 중과실을 제외하고는 면책된다.

6.6 KR is only responsible for the services it has performed directly.

6.6 KR은 직접 수행한 작업에 대해서만 책임을 진다.

6.7 The Client shall indemnify and hold harmless KR from and against any Claims in respect of:

(i) Client's breach of Obligations

(ii) Any abuse of the Deliverable issued under this Contract.

6.7 고객은 다음과 관련하여, 어떠한 손해 배상 청구에 대해서도 KR의 손해를 배상하고, 책임을 면제해야 한다.

(i) 고객이 일반 의무를 위반한 경우;

(ii) 본 계약에 따라 발행된 결과물의 악용.

7. Use of information

7.1 KR may release specific information related to the approval status. This information may be published on KR's web-site or other media and may include the information related to kinds of all services performed by KR, dates and places, the expiration date of all certificates issued by KR.

7.1 KR은 서비스의 결과와 관련된 특정 정보를 공개할 수 있다. 이 정보는 KR의 웹사이트 또는 다른 미디어에 발표될 수 있으며, KR이 수행한 모든 서비스의 종류, 일자 및 장소, KR이 발행한 모든 증서의 만료일자 등에 관한 정보를 포함할 수 있다.

7.2 KR may provide the copy of the submitted plans and documents when considered necessary by KR at the request of the Client.

7.2 KR에 제출된 도면 및 서류는 고객의 사본교부 신청이 있고 KR이 필요하다고 인정하는 경우 제공할 수 있다.

8. Fees

8.1 KR reserves the right to charge fees for the services provided and for any work that is additional to that originally quoted.

8.1 KR은 추가 발생된 업무에 대해서 처음의 견적보다 추가된 수수료를 청구할 권리를 가진다.

8.2 If the services are terminated by KR or the Client before the services are completed, fees will be calculated on a pro rata basis up to the date of termination.

8.2 서비스가 완료되기 전에 고객 또는 KR이 계약을 해지하는 경우, 수수료는 해지일자에 비례하여 계산된다.

8.3 In the event of non-payment of fees, the services provided may be suspended or withdrawn.

8.3 수수료가 미지급되는 경우, 제공된 서비스는 중지되거나 철회될 수 있다.

8.4 KR may charge overdue interest on any amount remaining unpaid beyond the due date as described in the concerned invoice.

8.4 KR은 고객이 수수료 기한을 초과하여 지불하지 않는 경우, 연체이자를 부가할 수 있다.

9. Force Majeure

9.1 Neither party shall be in breach of this Contract, nor liable for any failure or delay in performance hereunder if the cause of such failure or delay is attributable to events beyond the reasonable control of the affected party, including but not limited to armed conflict, terrorist attack, civil war, riots, toxic hazards, epidemics, natural disasters, extreme weather, fire, explosion, failure of utility service, labour disputes, breakdown of infrastructure, transport delays, or any public restrictions following any of the incidents above, or any other force majeure occurrence.

9.1 무력충돌, 테러공격, 내전, 폭동, 독성 위험, 전염병, 자연재해, 기상이변, 화재, 폭발, 급전시설의 고장, 노동쟁의, 기반시설의 고장, 운송지연, 이러한 사건에 따른 공공규제 또는 기타 불가항력 발생과 같이 합리적인 통제를 벗어난 사건이 본 계약의 실패 또는 지연에 기인하는 경우, 어느 당사자도 본 계약을 위반한 것이 아니며, 실패나 지연에 대해 책임을 지지 않는다.

9.2 In the event of a force majeure occurrence, the affected party shall notify the other party without undue delay of the particulars of the situation and the estimated duration. Either party shall be entitled to terminate the Contract with immediate effect should the force majeure occurrence endure for more than thirty (30) days.

9.2 불가항력 사태가 발생한 경우, 해당 당사자는 세부 상황 및 예상 기간을 부당하게 지체하지 않고 상대방에게 통보하여야 한다. 불가항력 발생이 30 일 이상 지속되는 경우 어느 일방도 계약을 즉시 해지할 수 있다.

< Attachment 3. Guidance of EU RO MR for Type Approval >

Guidance of EU RO Mutual Recognition for Type Approval

Common Procedural and Technical Requirements for Mutual Recognition of Type Approval Certificates

July 2020

Guidance of
EU RO Mutual Recognition for Type Approval

Common Procedural & Technical Requirements for Mutual Recognition of Type Approval Certificates

< Come into force on 1 July 2020>

SECTION 1 GENERAL

This Guidance contains Common Procedural and Technical Requirements for Mutual Recognition of Type Approval Certificates in accordance with the provisions of article 10 of the REGULATION (EC) No 391/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on common rules and standards for ship inspection and survey organisations.

Where not specified in this Guidance, the respective requirements of the "Guidance for Approval of Manufacturing Process and Type Approval, etc." will be applied in addition to the requirements of this Guidance.

SECTION 2 EU RO FRAMEWORK DOCUMENT FOR THE MUTUAL RECOGNITION OF TYPE APPROVAL[1)]

Terms and Conditions for Mutual Recognition of Type Approval

General Information

Appendix I EU MR Type Approval Certificate Information

Appendix II Flow chart technical and procedural conditions for EU RO Mutual Recognition of Type Approval Certificates

Appendix III List of Products included in EU RO MR

Appendix IV List of EU Recognised Orgarnisations (EU ROs)

Appendix V EU RO MR Design Evaluation Scheme

Appendix VI EU RO MR Production Evaluation Assurance (PQA)

Appendix VII Link to Agreed Technical Requirements

Appendix VIII EU RO MR Maintenance Process

Appendix IX EU RO MR Request for Clarification (RfC) Process

Appendix X EU RO MR Material, Equipment & Component Non-Compliance ('Alert System')

Note 1: See the following original document for further details.

EU RO Framework Document for the Mutual Recognition of Type Approval

Document Issue Date	1 July 2020
Version	11.0
Status	Controlled
Issued by	EU RO MR Group Secretariat
Distribution	All EU RO Type Approval Departments
Purpose of Document	The document has been designed to help ensure consistency in the EU RO Mutual Recognition Type Approval process. The EU RO MR Type Approval Process consists of three main processes: 1. The **EU RO MR Design Evaluation** involving Engineering evaluation and Witnessing of manufacturing and testing processes; 2. The **EU RO MR Production Quality Assurance (PQA)** which aims to ensure the consistency of production with the approved design and manufacturing process; 3. The **EU RO MR Maintenance Process** which aims to ensure all changes to EU RO MR Documentation go through the appropriate review and approval process; consulting with industry where necessary. This document supersedes the following referenced documents and appendices within the 'Mutual Recognition within ship classification' First Report to the European Commission and the Member States, Oct 2012: • 12.2 EU Recognised Organisations (EU ROs); • 12.5 EU RO Mutual Recognition for Type Approval Terms and Conditions; • 12.6 EU RO Mutual Recognition Procedure for Type Approval (including appendices). **-End -**

Document Administration

1. **Content**
   The EU RO MR Group Secretariat is responsible for maintaining the content of this document. Members of the EU RO MR group are responsible for reviewing and approving the content;

2. **Changes**
   Anyone wishing to propose changes to this document should contact their EU RO MR Steering Committee or Technical Committee representative. Significant changes will be reviewed by the EU RO MR Steering Committee. Review and approval of document change Requests shall follow the EU RO MR Maintenance Process detailed in this document (see Appendix VIII);

3. **Controlled Issue**
   This document and related appendices are subject to controlled issue and can be found here: https://www.euromr.org/technical-requirements

4. **Revision History:**

Revision No.	Details of Change	Date Issued
1.0	Document issued	2014-01-31
2.0	• Revised Terms & Conditions; • Updated List of Products included in EU RO MR (Appendix IV); • New 'Request for Clarification' process (Appendix IX); • New 'Alert' Process (Appendix X); • Plus other minor editorial changes.	2014-07-01
3.0	• Revised Terms & Conditions; • Revised General Information; • Revised EU RO MR Type Approval Certificate Information (Appendix I); • General editorial updates.	2015-04-17
4.0	• Updated RO List to reflect Official Journal of the European Union No. 2015/C 162/06 'List of organisations recognised on the basis of Regulation (EC) No 391/2009…' • Revised Terms & Conditions; • Revised General Information; • Revised EU RO MR Type Approval Certificate Information (Appendix I); • Updated List of Products included in EU RO MR (Appendix IV);	2015-07-01

..Continued

4. Revision History (continued):

5.0	• Revised General Information - addition of clause 13 (application period); • Revision to EU RO MR Design Evaluation Scheme (Appendix V); • Revised 'Request for Clarification' process (Appendix IX); • General editorial updates	2016-05-05
6.0	• New address Document Owner • Updated List of Products (Appendix III) • General editorial updates	2016-08-15
7.0	• Definition 'Nationally Accredited Laboratory' added under General Information • Inserting of IRS • Group Logo (incl. IRS) updated • Renaming of Advisory Board (AB) to Steering Committee (SC) • Table Revision History: Column 'Document Date' deleted	2017-03-15
8.0	• 'General Information' revised • Logos of CRS and KR updated	2017-11-10
9.0	• Members' logos updated • General editorial updates • APPENDIX I ○ Generic sentence included ○ Mention of EU RO MUTUAL RECOGNITION ○ Exact reference to the legislation ○ Generic statement included ○ Footnote 6 included • APPENDIX III – Tier 6 TRs added • APPENDIX VIII - Figure 1 - EU RO MR Maintenance Process updated	2018-07-01
10.0	• Terms and Conditions for Mutual Recognition of Type Approval, para 12 amended • APPENDIX I ○ Rules and Standards amended ○ Generic statement amended • APPENDIX III – Tier 7 TRs added • APPENDIX V - EU RO MR Design Evaluation Scheme – amended • PRS logo updated	2019-07-01
11.0	• APPENDIX III –TR 2019 added • Amend Testing requirements	

5. Document Owner

EU RO MR Secretariat
c/o DNV GL Maritime
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20457 Hamburg
Germany
Email: secretariat@euromr.org

- End -

Contents

Terms and Conditions for
Mutual Recognition of Type Approval

Note: These terms and conditions form an integral part of the agreement to be established between the certifying EU RO and its client for the provision of mutual recognition type approval services. The terms and conditions are required to enable the uniform application and acceptance of products that are subject to mutual recognition certification and to allow EU ROs access to information that would not normally be available to them where they are not in a direct contractual relationship with the manufacturer.

1. This document establishes a common set of requirements that will be applied to manufacturers of marine equipment or components (product[s]) where such products are to benefit from the Mutual Recognition of Type Approval by the European Union recognised classification societies (hereafter described as EU ROs) under EU regulations.

2. The European Union Recognised Organisation (EU RO) Mutual Recognition Type Approval Certificate (MR TAC) is issued in pursuance of Article 10 of the Regulation (EC) No 391/2009 of the European Parliament and of the Council from 23 April 2009 on Common Rules and Standards for Ship Inspection and Survey Organisations. Technical Requirements applicable to products under MR are adopted by the EU ROs pursuant to same Article 10. These Technical Requirements may be amended from time to time (see Appendix VIII EU RO MR Maintenance Process).

3. The MR TAC is intended to enable Mutual Recognition (MR) of certain type-approved products, through the uniform application of MR Technical Requirements, to enable those products to be installed on board ships for which MR TACs are issued by one or more of the EU ROs.

4. The EU ROs currently are:

- American Bureau of Shipping (ABS);
- Bureau Veritas (BV);
- China Classification Society (CCS);
- Croatian Register of Shipping (CRS);
- DNV GL;
- Indian Register of Shipping (IRS)
- Korean Register (KR);
- Lloyd's Register Group Ltd. (LR);
- Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK);
- Polish Register of Shipping (PRS);
- RINA Services S.p.A. (RINA);
- Russian Maritime Register of Shipping (RS).

…continued

5. The MR TAC applies to certain type approved products (see Appendix III) to be installed on board a ship as defined in Article 2 (a) of the Regulation (EC) No. 391/2009, and which is classed by one or more of the EU ROs listed in paragraph 4 (above).

For products intended to be installed on board a ship that does not fall within the above scope, the requirements of relevant class societies shall apply.

6. The manufacturer will be required to sign a contract with the EU RO providing the MR TAC service and certificate; such contracts will include terms, whereby the manufacturer accepts expressly that:

a. When a product is intended to be installed on board as an element or sub-element of a piece of equipment, part or system of the ship, the EU RO classing the ship that is not the certifying EU RO for the MR TAC of the product may ask for information in addition to that provided in the MR TAC;

b. The manufacturer is explicitly required to provide immediately, when so requested, all information, documentation and/or evidence required by the certifying EU RO of the ship as detailed in the relevant MR Technical Requirement(s)(TR). The language to be used for all requested information, documentation and evidence shall be English;

c. The MR TAC may be suspended or withdrawn by the certifying EU RO, issuing it (see 11d below); and

d. Flag national authorities may have their own requirements for the approval of products to be installed aboard ships flying their flag. Both the requirements of national authorities and those of the classification Rules must be complied with by the manufacturers of the products to be installed aboard such ships.

7. The manufacturer must ensure and certify that the product(s) supplied for an individual ship under a MR TAC is (are) marked with suitable identification to ensure traceability.

8. The manufacturer is required to operate and maintain a quality management system certified by an accredited certifying body to the ISO 9001 standard or equivalent and that this certified quality management system is applied in the production of the product(s) for which MR TAC is sought.

9. The manufacturer will be required to agree that it will:

a. Follow the requirements of the certified quality management system and the quality assurance scheme as approved during production;

b. Keep the accrediting body and the certifying EU RO that issued the

MR TAC duly informed, in writing, of any intended design change or updating of the production quality assurance scheme for its consideration with regard to the validity of the MR TAC; and,

c. Apply annually for periodical assessment by the EU RO to demonstrate that the production under the MR TAC and the quality assurance scheme are being satisfactorily maintained.

10. Upon satisfactory completion of the conformity assessment procedure of the manufacturer's product(s), the EU RO may issue a MR TAC for the concerned product(s) with a maximum validity of 5 years.

11. The MR TAC of an existing product remains valid until:

a. Its expiry date; or

b. Such time as any material modification of the design or construction is made, without the written approval of the certifying EU RO; or

c. Such time as the manufacturer has not fulfilled its obligations of annual assessment; or

d. Such time as the MR TAC is suspended or withdrawn by the certifying EU RO.

Validity may be extended in case of b, c, or d above, following further review by the EU RO providing the MR TAC according to the MR TAC requirements.

Any changes of MR Technical Requirements (including those resulting from updates and changes to nationally or internationally recognised standards) may be implemented based only on the amended rules of individual ROs.

12. The MR TAC retains its validity, and remains acceptable for installation on vessels, based on the actual Edition of the Rules applicable to such vessels. If the applicable Rules' edition year for a given vessel is subsequent to the year of issuance of the latest update of referenced MR technical requirements (MR TRs), then a revalidation of the MR TAC may be needed, for compliance with latest update of MR TRs in order to enable acceptance of product for installation on that vessel. Similarly, if the applicable version of a technical standard for a given vessel is posterior to the version referred to in the MR TAC, then a revalidation of the MR TAC may be needed for verification of compliance of the product with the applicable version of the technical standard in order to enable acceptance of product for installation on that vessel.

13. The manufacturer of a MR TAC product, its heirs and designees are responsible for the archiving and retention of:

a. all records of the design and construction approved by the EU RO;
b. the records of type testing; and
c. the quality records of the production under the MR TAC

for seven years after the validity of the relevant MR TAC has expired.

-End-

General Information

1. The purpose of this Agreed Procedure is to provide a Framework Document setting out the minimum steps necessary to enable mutual recognition (MR) of certain type approved products, through the uniform application of agreed technical requirements relating to equipment listed in Appendix III to be placed on board ships for which MR TACs are issued by one or more of the EU ROs listed in Appendix IV.

2. For the purpose of this Agreed Procedure the following definitions shall apply:

a. **Agreed MR Technical Requirements (MR TR)** - a mutually agreed document or documents that prescribe technical requirements to be fulfilled by a design, product, process or service (see Appendix VII);

b. **Assessment** - is the process of evaluating a design, product service or process. It involves generating and collecting evidence of the design, product service or process and judging that evidence against defined standards;

c. **Certification** - a procedure whereby a design, product, service or process is assessed for compliance with agreed technical requirements;

d. **Classification** - that specific type of certification, for which the technical requirements are the Rules of the relevant Classification Society;

e. **Design Evaluation** – Two-step process involving Engineering evaluation and Witnessing the manufacturing and testing processes;

f. **Engineering evaluation** - Evaluation of a design of a type of the product to determine compliance with the agreed technical requirements;

g. **Installed on Board a Ship** - the assembling and final placement of components, equipment and subsystems to permit operation of the system on board of the ship;

h. **Manufacturer** - a company producing and/or assembling final products and is responsible for such products;

i. **Nationally Accredited Laboratory** - Laboratory holding an accreditation certificate to ISO/IEC 17025 covering the applicable testing standards which is issued by a national accreditation body operating in accordance with ISO/IEC 17011, unless otherwise defined in the applicable Technical Requirement.

j. **Product** – is material, equipment and component (ME&C);

k. **Testing Process** - a technical operation to determine if one or more characteristic(s) or performance of a product or process satisfies agreed technical requirements;

l. **Type Approval** - see IMO Circular MSC.1/Circ.1221 here;

m. **Witness** - to be physically present at a test in accordance with the agreed technical requirements and be able to give evidence about its outcome;

n. **Witnessing the manufacturing and testing processes** - witnessing manufacture as applicable and testing of a type of the product to determine compliance with the agreed MR TRs.

3. This Agreed Procedure shall apply to ships as defined in Article 2 of the Regulation (EC) No 391/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 (as amended) on common rules and standards for ship inspection and survey organisations.

4. The conformity-assessment procedure for products listed under the EU RO Agreed Procedure for Mutual Recognition of Type Approval, details of which are listed in Appendix II, shall be subject to:

a. EU RO Design Evaluation (DE) (see Appendix V); and

b. Production Quality Assurance (PQA) Assessment (see Appendix VI).

For those products, which do not fall within the scope of the EU RO Agreed Procedure for Mutual Recognition of Type Approval the individual EU RO Requirements will apply.

A flow chart of the conformity assessment procedures provided for EU RO Mutual Recognition and individual EU RO requirements is provided at Appendix II.

5. The EU RO MR Type Approval Certificate (MR TAC) shall contain:

a. The information as specified in Appendix I of this document as a minimum; and

b. Only the logo of the EU RO issuing the MR TAC; and

c. Each MR TAC is to be issued with a specific number to ensure traceability using the numbering system defined by the EU RO issuing the MR TAC.

6. Each EU RO shall maintain an up-to-date list of EU RO MR TACs that have been issued by that EU RO. EU ROs lists may be viewed online via links displayed on: http://www.euromr.org.

7. Individual ROs are responsible for:

a. Giving detailed reasons to a manufacturer when an MR TAC is refused; and

b. Making available information when an MR TAC is withdrawn.

8. Manufacturer's responsibility

a. Where a manufacturer reapplies for type-approval for products for which an MR TAC has been refused, his submission to the EU RO must include all relevant documentation, including the original test reports, the detailed reasons for the previous refusal and details of all modifications made to the product or manufacturing process;

b. The manufacturer shall provide other ROs, on request, with relevant information on Design Evaluation documentation that has been amended or superseded.

9. In cases where the EU RO classing the ship refuses material, equipment or components, issued with an EU MR TAC, the EU RO classing this ship is to inform, without delay, the EU RO Steering Committee Chairman, Secretary and Members. Such information is to include, in writing:

- the type of product;

- the references of the EU RO MR TAC;

- the reason(s) for refusal.

The EU RO MR Steering Committee Chairman shall, in turn, inform the EU RO MR Technical Committee Chairman and Technical Committee Members. See also Appendix X - EU RO MR Material, Equipment & Component Non-compliance ('Alert System').

10. The EU RO MR Technical Committee shall meet on an annual basis, or as required, to review the Agreed Technical Requirements of existing products identified in Appendix III and to consider new products for inclusion in the Appendix as required.

11. New and revised existing MR Technical Requirements shall enter into force 6 months after the adoption date to allow for their implementation by the EU ROs.

- End -

APPENDIX I

EU RO MR Type Approval Certificate Information

The EU RO MR Type Approval Certificate (MR TAC), issued by the certifying EU RO using its own certificate format, logo and numbering system, shall contain the following information as a minimum *(see notes 1, 2 & 6 below):*

Certificate Heading

European Union Recognised Organisation (EU RO) Mutual Recognition Type Approval Certificate in accordance with Article 10.1 of EU Regulation 391/2009.

Certificate number

Each EU RO MR Type Approval Certificate is to be issued with the certifying EU RO's specific number to ensure traceability

Company Information

Manufacturers Name

Street Address, City, State, Postal Code, Country

Product Information

Product

Model

Intended Service

Description

Ratings

Restrictions (limitations as outlined by the Technical requirements)

Test reports with identification number and date

Manufacturer's documentation/identification number for product or series with date

Term of Validity *(see notes 3- 5 below)*

Place of Issue

Issue Date

Expiration Date

Rules & Standards

Technical requirement reference

Other standards as applicable (with identification of the version used for the conformity assessment)

Note: if the standard(s) is(are) used in a version which is(are) not the latest available at the date of MR TAC issuance, following sentence is to be added in the MR TAC:
Standard XXXX:YYYY (Standard AAAA:BBBB, if applicable) used for the conformity assessment process resulting in the issuance of this certificate, was(were) not the latest available version of this(the) standard(s) at the time of certificate issuance.

Generic Sentence

"This is to certify to the Manufacturer named below, that the Product referred to herein has been inspected for the Manufacturer, pursuant to the relevant requirements of the European Union Recognised Organisation Mutual Recognition procedure, required by Article 10.1 of EU Regulation 391/2009, and has been found in accordance with those requirements. "

APPENDIX I

Generic Statement

When a product is presented with this EU RO MR Type Approval Certificate for given application, its acceptability with regards to the limitations stated in the certificate conditions defined in 1b, 1c and 1d of the applied Technical Requirement will be evaluated by the EU RO in charge of classing the ship or being in charge of the unit/system certification.

In accordance with Article 10 of Regulation (EC) No 391/2009 of the European Parliament and of the Council of 23 April 2009 "on common rules and standards for ship inspection and survey organizations", the following organizations, recognized by the EU on this date, have agreed on the technical and procedural conditions under which they will mutually recognize this certificate:

- *American Bureau of Shipping (ABS);*
- *Bureau Veritas (BV);*
- *China Classification Society (CCS);*
- *Croatian Register of Shipping (CRS);*
- *DNV GL;*
- *Indian Register of Shipping (IRS);*
- *Korean Register (KR);*
- *Lloyd's Register Group Ltd. (LR);*
- *Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK);*
- *Polish Register of Shipping (PRS);*
- *RINA Services S.p.A. (RINA);*
- *Russian Maritime Register of Shipping (RS).*

The scheme for the mutual recognition of class certificates for materials, equipment and components laid down by Article 10(1) of Regulation (EC) No 391/2009 is only enforceable within the Union in respect of ships flying the flag of a Member State. As far as foreign vessels are concerned, the acceptance of relevant certificates remains at the discretion of relevant non-EU flag States in the exercise of their exclusive jurisdiction, notably under the United Nations Convention on the Law of the Sea (UNCLOS). (In accordance with COMMISSION IMPLEMENTING REGULATION (EU) No 1355/2014 amending Regulation (EC) No 391/2009 - recital (25)).

Notes:

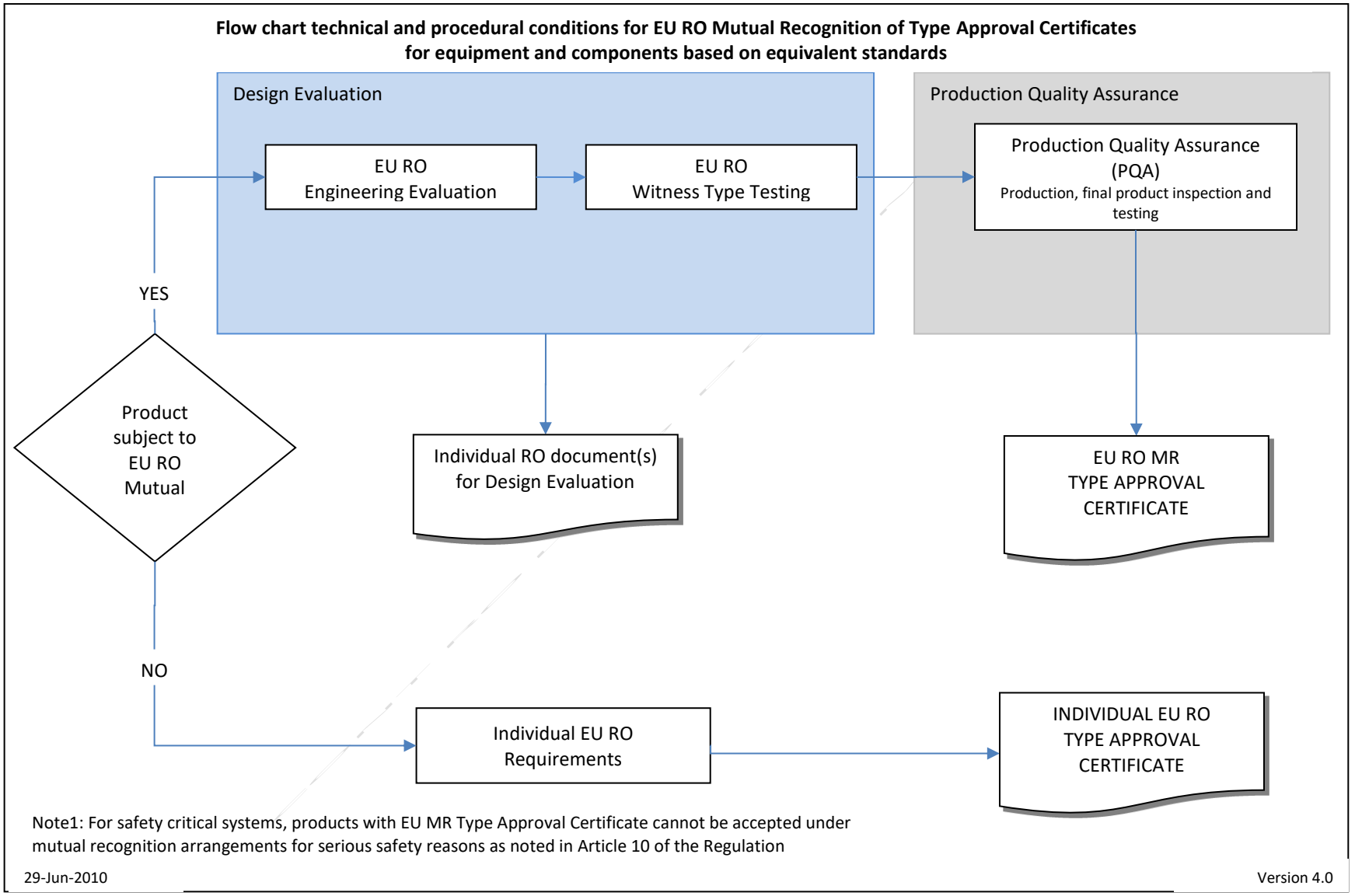
1) *Refer to the agreed MR Technical Requirements for additional MR TAC information that may be specifically applicable to certain products* - https://www.euromr.org/technical-requirements;
2) *List of MR TACs issued by the EU ROs can be found by https://www.euromr.org/links-to-mr-certificates.*
3) *As per clause 9 of the Terms & Conditions for Mutual Recognition of Type Approval, the manufacturer will be required to agree that it will fulfil the obligations arising out of its quality assurance scheme as approved during production. The manufacturer certifies it has kept the accredited certification body and the EU RO that issued the MR TAC duly informed of any intended design changes or updating of the production quality assurance scheme for its consideration with*

regard to the validity of the MR TAC. The manufacturer will apply annually for periodical assessment by the EU RO to show that the production under the MR TAC and the quality assurance scheme are being satisfactory maintained;

4) *MR TACs are valid for a maximum of 5 years as per clause 10 of the Terms & Conditions for Mutual Recognition of Type Approval;*
5) *For more information on the factors affecting the validity of MR TACs, see clause 11, 12 and 13 of the Terms & Conditions of Mutual Recognition of Type Approval.*
6) *For implementation of the amendments to Appendix I of Version 10.0 of the Framework Document by the EU ROs into their internal procedures and MR TAC templates, an application period of 6 months as from 1 July 2019 applies*.

- End -

APPENDIX II


Flow chart technical and procedural conditions for EU RO Mutual Recognition of Type Approval Certificates for equipment and components based on equivalent standards
Design Evaluation
EU RO Engineering Evaluation
EU RO Witness Type Testing
Production Quality Assurance
Production Quality Assurance (PQA)
Production, final product inspection and testing
YES
Product subject to EU RO Mutual
Individual RO document(s) for Design Evaluation
EU RO MR TYPE APPROVAL CERTIFICATE
NO
Individual EU RO Requirements
INDIVIDUAL EU RO TYPE APPROVAL CERTIFICATE
Note1: For safety critical systems, products with EU MR Type Approval Certificate cannot be accepted under mutual recognition arrangements for serious safety reasons as noted in Article 10 of the Regulation
29-Jun-2010
Version 4.0

APPENDIX III

List of Products included in EU RO MR

Tier 1 (Original release date January 2013)

1. Circuit Breakers
2. Contactors
3. Electric Driven Motors < 20 kW
4. Fuses
5. Display Monitors, Video Screens, Terminals
6. LV Enclosures & Boxes
7. LV Transformers
8. Mechanical Joints
9. Resin Chocks
10. Switches
11. Sensors

Tier 2 (Original release date July 2013)

12. Accumulator Battery
13. Air Pipe Automatic Closing Device
14. Cable Ties
15. Class III Pipe Fittings
16. Computers and PLCs
17. Electrical/Electronic Relays
18. Electric Cables - Heating Cables
19. Expansion Joints
20. Flameproof Luminaire (Lighting Fixture)
21. Plastic Piping Systems (Components)
22. Spark Arresters

Tier 3 (Original release date July 2014)

23. Adjustable Steel Chock
24. Air Compressor
25. Battery Chargers
26. Boiler Remote Level Indicator
27. Cable Trays & Ducts (Glass Reinforced Plastic)
28. Cable Trays & Ducts (Metallic)
29. Connecting Systems for Cable Repair (Cable Splices)
30. Electrical Actuators for Valves
31. Insulation Panels for Provision Rooms & Chambers
32. Pneumatic Actuators for Valves
33. Solenoid Valve Assembly
34. Stationary Lighting Fixtures/Flood Light Projectors

Tier 4 (Original release date July 2015)

35. Circuit Breakers with Electronic Devices
36. Contactors with Electronic Devices
37. Tachometer
38. Temperature Gauges and Transmitters
39. Thermal Insulation of Organic Foams for Piping
40. Valves for Bilge Systems
41. Valves for Freshwater Systems
42. Valves for Lubricating Oil & Hydraulic Oil Systems
43. Valves for Sanitary Systems
44. Valves for Seawater Systems

APPENDIX III

Tier 5 (Original release date July 2016)

45. AC Semiconductor Controllers
46. Control and Protective Switching Devices
47. Electronic Power Units for Valve Control
48. Electro-Pneumatic Level Transmitters (EPLT)
49. Flow Gauges/Transmitters
50. Level Gauges/Transmitters
51. LV Soft Starters
52. Pilot Devices
53. Pressure Gauges - Transmitters
54. Valves for Fuel Oil Systems
55. Valves for Cargo Systems

Tier 6 (Original release date January 2018)

56. Anti-Acid Paints (Batteries' Storage Rooms)
57. Electrical Insulation Mats
58. Gaskets and Seals for Piping Systems
59. Non-Metallic Gratings
60. Touch Screen
61. Valves – Boiler Water Systems (Class III)
62. Valves – Steam Systems (Class III, Non-Essential Systems)

Tier 7 (Original release date January 2019)

63. Differential Pressure Switches
64. Dual Temperature and Pressure Switches
65. Flow Switches
66. Level Switches
67. Position Switches
68. Pressure Relief Valve in Class III Piping System
69. Pressure Switches
70. Temperature Switches

2019 (Original release date January 2020)

71. Insulation Monitoring Device (IMD)

For a list of MR Technical Requirements under development, see www.euromr.org/technical-requirements

- End -

APPENDIX IV

List of EU Recognised Organisations (EU ROs)

American Bureau of Shipping (ABS) - www.eagle.org

Bureau Veritas (BV) - www.veristar.com

China Classification Society (CCS) - www.ccs.org.cn/ccswzen/

Croatian Register of Shipping (CRS) – www.crs.hr

DNV GL – www.dnvgl.com

Indian Register of Shipping – www.irclass.org

Korean Register (KR) - www.krs.co.kr

Lloyd's Register Group Ltd. (LR) - www.lr.org

Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK) - www.classnk.or.jp

Polish Register of Shipping (PRS) - www.prs.pl

RINA Services S.p.A. (RINA) - www.rina.org/en

Russian Maritime Register of Shipping (RS) - www.rs-class.org/en

- End -

APPENDIX V

EU RO MR Design Evaluation Scheme

Procedure:

1. An application for the Design Evaluation must be submitted by the manufacturer or product designer (hereinafter 'applicant') to the EU RO and shall include:

   a) the name and address of the manufacturer or product designer; and
   b) the technical documentation as described in point 2 below.
   c) applicable Technical requirements, along with a list of applicable standards and their version*

   *: It is strongly recommended to use the latest available version of applicable standards as use of a superseded standard may prevent acceptance of the product onboard some vessels (see article 12 of the Terms and Conditions for Mutual Recognition of Type Approval enclosed in this Framework document)."

2. The technical documentation shall make it possible to assess the product's compliance with the agreed technical requirements.

3. The EU RO will review the submitted technical documentation to confirm compliance with the agreed technical requirements. The language to be used for all documentation shall be English. The technical documentation includes (but is not limited to) type test reports, product descriptions, operation manuals, assembly drawings, dimension drawings, etc.

4. The applicant shall issue a statement verifying that the product to be tested has been manufactured in accordance with the technical documentation.

5. Where required, the EU RO will agree the location where the examinations and necessary tests will be carried out with the applicant.

6. Type tests shall always be witnessed by the EU RO's surveyor. However, in cases where the tests are conducted at a Nationally Accredited Laboratory[1], the presence of the EU RO's surveyor may be omitted.

7. The type tests shall be conducted on the test specimen(s) selected from production line or at random from stock in the presence of an EU RO surveyor in accordance with the agreed type test program.

8. Where the type tests are conducted at a Nationally Accredited Laboratory without the presence of the EU RO surveyor, the applicant shall provide assurance to the EU RO surveyor selecting the test specimen(s), that the test specimen(s) to be sent to and tested at the Laboratory shall be verified in accordance with an agreed procedure.

9. For electrical, electronic and programmable products, where applicable Technical Requirements define type testing to be performed according to IACS UR E10 standard or to equivalent international standards, all type tests shall normally to be carried out on the same unit. Using different units for the different type tests is acceptable provided that all EMC tests are carried out on the same unit (1), and all environmental and mechanical tests

[1] *"The scope must be accredited for the relevant applicable standards as specified in the individual MR Technical Requirements (see www.euromr.org/technical-requirements)"*

are carried out on the same unit (2).

10. Where the product meets the relevant agreed technical requirements, the EU RO will issue an individual Design Evaluation document to the applicant. The document must give the name and address of the applicant, details of the product, the conclusions of the examination, the conditions of its validity and the necessary data for identification of the approved product.

11. The applicant must inform the EU RO that issued the MR Type Approval Certificate (MR TAC) and which holds the technical documentation of any modification of the design, which must receive additional approval, where such changes may affect compliance with the agreed TR or the prescribed conditions for use of the product. Such additional approval, if given, must be in the form of an addition to the original EU RO MR TAC.

12. The applicant must provide, upon request, the Design Evaluation documents to each EU RO.

- End -

APPENDIX VI

EU RO Production Quality Assurance (PQA)

Procedure:

1. A manufacturer who satisfies the obligations of point 2 below must ensure that the product(s) concerned conform to type as described in valid EU RO Design Evaluation documents. The documents must be issued by the EU RO responsible for the whole EU RO Type Approval process (hereinafter called "the EU RO"), i.e. both Design Evaluation and Production Quality Assurance. The manufacturer must ensure that the product(s) supplied for an individual ship under a MR TAC is (are) marked with suitable identification to ensure traceability.

2. The manufacturer must operate a quality management system certified by an accredited certifying body as meeting the requirements of ISO 9001 or industry equivalent. The Production Quality Assurance scheme must be approved by the EU RO for production, final-product inspection and testing of the product(s) subject to EU RO MR Type Approval as specified in point 3 below and must be subject to surveillance as specified in point 4 below. The approval shall only be valid as long as the Quality Management System certificate is valid. The manufacturer has to inform the EU RO if the Quality Management System certificate is suspended, withdrawn or not renewed.

3. Production Quality Assurance scheme

3.1. The manufacturer must submit an application for assessment of his Production Quality Assurance scheme according to point 2 above with the EU RO. The application must include:

- a) all relevant information for the product(s) envisaged
- b) full list of all manufacturing/production sites
- c) the documentation concerning the quality management system and its certification at all manufacturing sites, including:
  - i. the quality management system certificate issued by the certifying body,
  - ii. the manufacturing, quality-control and quality-assurance techniques, processes and systematic actions that will be used;
  - iii. the examinations and tests that will be carried out before, during and after manufacture, and the frequency with which they will be carried out;
  - iv. the quality records, such as inspection reports and test data, calibration data, damage and claim records, qualification reports of the personnel concerned, etc.;
  - v. the means of monitoring the achievement of the required product quality and the effective operation of the quality system.

3.2. The EU RO shall assess the documented Production Quality Assurance scheme to determine whether it gives reasonable confidence that the concerned product(s) can be consistently produced in compliance with the product(s) covered by the Design Evaluation document(s). The assessment procedure must also include a review of the quality management system documentation and a visit to the manufacturer's premises and all manufacturing/production sites. A report of the audit assessment is provided to the manufacturer.

3.3. The manufacturer must undertake to fulfill the obligations arising out of the Production Quality Assurance scheme as approved and to uphold it so that it remains adequate and efficient. The manufacturer must keep the EU RO that has evaluated the Production Quality Assurance scheme informed of any intended updating of that Production Quality Assurance scheme for its consideration with regard to the validity of the EU MR Type Approval Certificate. The manufacturer is to apply for periodical assessment to the EU RO at an annual frequency to enable the EU RO that issued the TAC to verify that the Production Quality Assurance is maintained and applied. Audit reports are to be provided to the manufacturer.

4. Periodical Assessment by the EU RO

4.1. The purpose of surveillance is to make sure that the manufacturer duly fulfils the obligations arising out of the approved Production Quality Assurance scheme.

4.2. The manufacturer must allow the EU RO access for inspection purposes to the locations of manufacture, inspection and testing and storage and must provide it with all necessary information, in particular:

a) the Production Quality Assurance scheme documentation and the design evaluation documentation;
b) the quality records, such as inspection reports and test data, calibration data, damage and claims records, qualification reports of the personnel concerned, etc.;
c) additional testing as per the Technical Requirements may be required by the EU RO.

5. Upon satisfactory completion of the Design Evaluation and Production Quality Assurance evaluation, the EU RO may issue an EU MR TA C for the concerned product(s) with a maximum validity of 5 years. The document must give the name and address of the manufacturer and all manufacturing sites, any conditions of the TAC's validity and the necessary data for identification of the approved product(s).

- End -

APPENDIX VII

Agreed Technical Requirements

Controlled copies of the Agreed Technical Requirements are available from:
www.euromr.org/technical-requirements

- End -

APPENDIX VIII

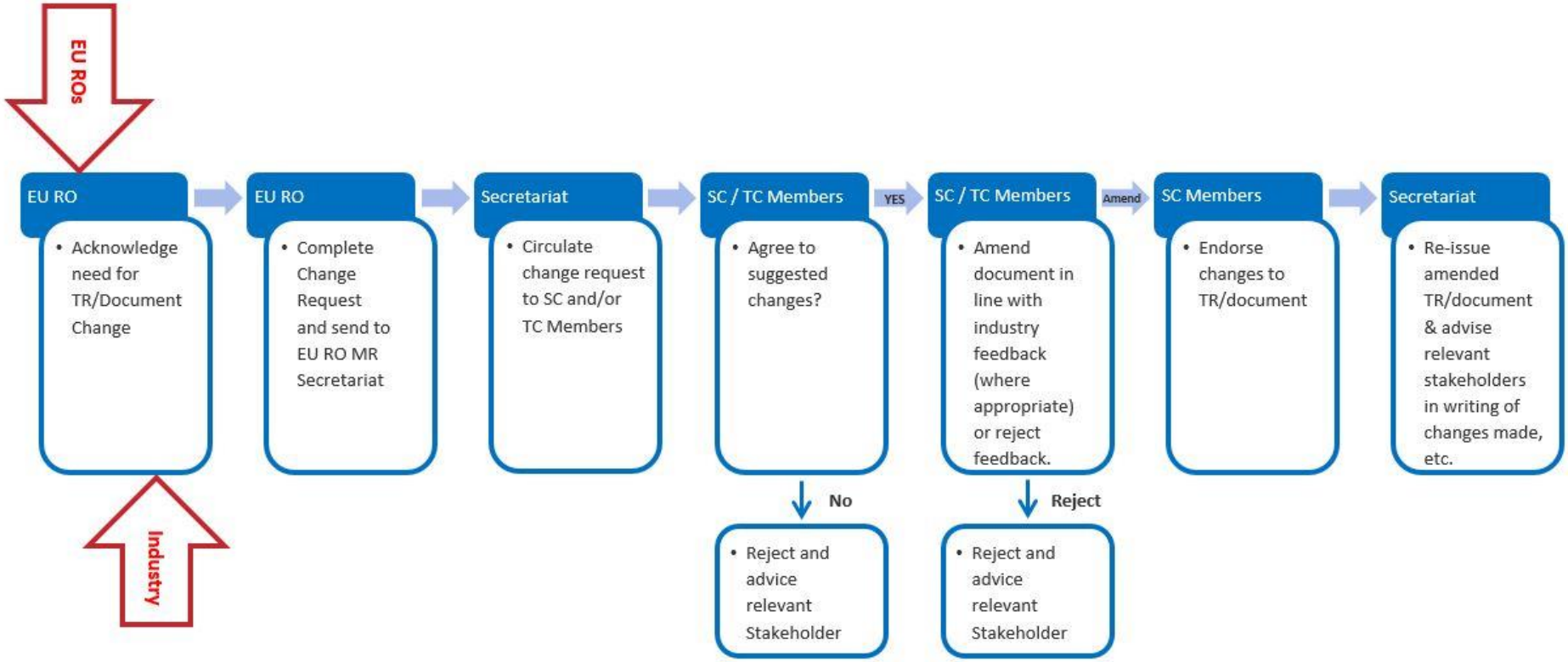
EU RO MR Maintenance Process

1. Change Requests and/or feedback for the Agreed Technical Requirements (Appendix VII) and/or any EU RO MR Document (including procedures) shall be made in writing to the relevant EU RO (Appendix IV) marked for the attention of their EU RO MR Technical Committee Representative. The EU RO MR Technical Committee and Steering Committee follow the process in **figure 1 below**.

2. Change Requests include (but are not limited to) procedural updates, test requirement updates, rule changes or industry feedback and can vary in significance from a simple editorial change to a technical parameter or test change that may require industry consultation.

3. Amendments and revisions to documents including the Agreed Technical Requirements are endorsed (where appropriate) by the EU RO MR Steering Committee.

APPENDIX VIII

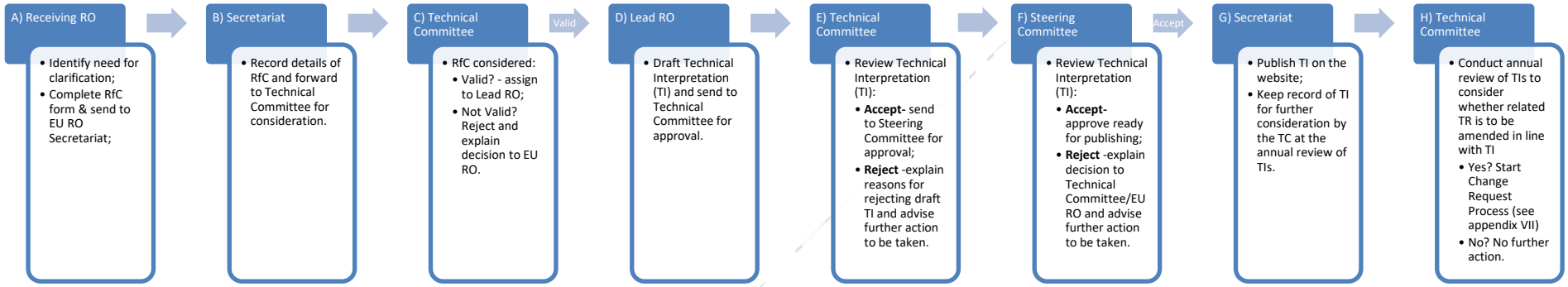


- End -

Figure 2 - EU RO MR Maintenance Process

APPENDIX IX

EU RO MR Request for Clarification (RfC) Process



1. A Request for Clarification (RfC) for the purpose of unique understanding of the Agreed Technical Requirements (Appendix VII) and/or any EU RO MR Document (including procedures) shall be made in writing by the requesting entity to the relevant EU RO (Appendix IV), marked for the attention of their 'EU RO MR Technical Committee Representative'. The EU RO MR Technical Committee Representative (hereinafter referred to as the Receiving RO) will then follow the process above.

2. A Request for Clarification (RfC) requires the requesting entity to provide sufficient information on the subject for which clarification is being sought, along with the related technical background, a clear definition of the problem to enable the Receiving RO to create a distinct proposal for how to achieve clarification [2] - see step A) in the process above.

3. The proposed Request for Clarification (RfC) shall be verified by the EU RO MR Technical Committee (and EU RO MR Steering Committee where necessary) to ensure that the proposal does not conflict with basic provisions of the Design Evaluation (DE) (Appendix V), the Product Quality Assurance (PQA) regime (Appendix VI) and the EU RO MR 'Simplified Risk Based Model' see step C) in the process above.

[2] The receiving RO shall provide the TC with their expert's view together with the RfC form (available from the Secretariat) in order to help facilitate the creation of a Technical Interpretation.

APPENDIX IX

4. If the proposed Request for Clarification (RfC) is verified and accepted, the EU RO MR Technical Committee will assign a lead RO to draft a Technical Intrepration (TI) – see step D) in the process above. The draft TI will be reviewed and approved by the EU RO MR Technical Committee and then forwarded to the EU RO MR Steering Committee for agreement – steps E) and F). Once agreed, it will then be published as a final version on www.euromr.org/technical-requirements for information and notification of publication will be sent to the requesting entity. All TIs will be kept as a record and searchable resource by the EU RO MR Secretariat. The Secretary will ensure that the following information is gathered in respect for each TI:

   a) Date received by Secretariat
   b) Date referred to TC
   c) TI Number
   d) Date sent from TC to Lead RO
   e) Name & contact details of Lead RO
   f) Date of TI submission from Lead RO to TC
   g) Date of TI approval by TC
   h) Date TI referred to SC;
   i) Date of SC agreement of TI;
   j) Date TI Published;
   k) Applicable TR(s) to be amended YES/NO;
   l) Any relevent comments;
   m) CRF No (s) (if applicable).

5. In cases where the Request for Clarification (RfC) (or subsquent TI) is rejected by the EU RO MR Technical Committee and/or EU RO MR Steering Committee, the Receiving RO shall advise the requesting entity accordingly. All record of rejected RfC (including reasons) will be kept as a record and searchable resource by the EU RO MR Secretariat.

APPENDIX IX

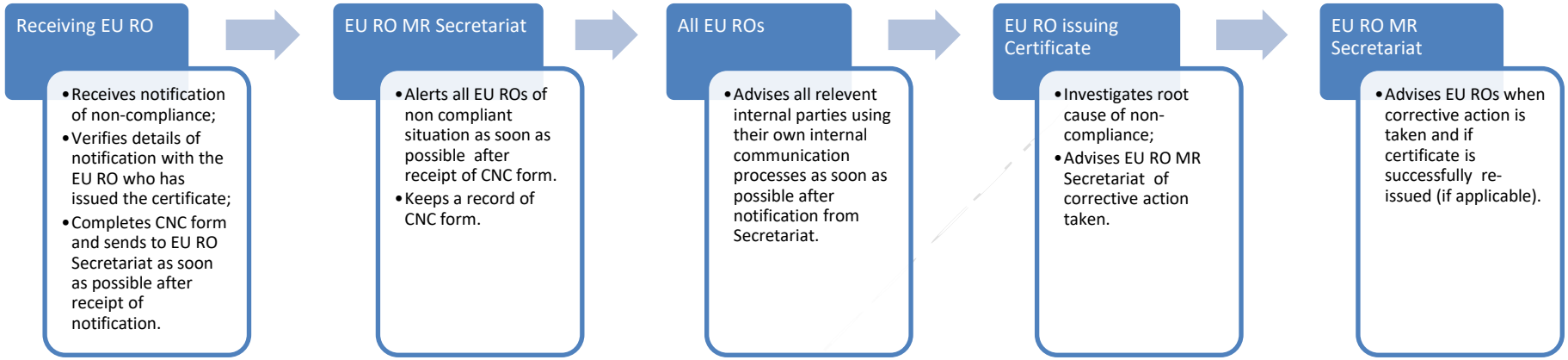
6. An annual review of TIs will be conducted by the EU RO MR Technical Committee in September each year to ensure ongoing relevance and a decision will be taken on each TI to as to whether the related Agreed Technical Requirement should be amended to incorporate the outcome of the TI – see step H) in the process above. Where a TI is considered to be out of date or no longer relavant the necessary actions will be taken to update or rescind the document.

7. If it is agreed that the Agreed Technical Requirement should be amended, the EU RO MR Technical Committee will assign a lead RO to complete the EU RO MR Maintenance Process (see Appendix VIII).

- End -

APPENDIX X

EU RO MR Material, Equipment & Component Non-Compliance ('Alert System')



1. The purpose of the 'Alert System' is to ensure that all EU ROs are informed when a mutually recognised product is not in compliance with its MR TAC. Regulation (EC) 391/2009 article 10.1 paragraph 3 states:

   Where a recognised organisation ascertains by inspection or otherwise that material, a piece of equipment or a component is not in compliance with its certificate, that organisation may refuse to authorise the placing on board of that material, piece of equipment or component. The EU RO shall immediately inform the other EU ROs, stating the reasons for its refusal.

2. The EU RO that receives the notification of a potential non-compliance situation (hereinafter referred to as the Receiving EU RO) shall first verify the details with the EU RO that has issued the certificate (hereinafter referred to as the Issuing EU RO) before completing the Certificate Non-Compliance (CNC) Form and sending it, by email, to the EU RO MR Secretariat as soon as possible after receipt of notification.

APPENDIX X

3. The EU RO MR Secretariat shall advise all EU ROs, by email, of the non-compliant situation as soon as possible after receipt. The EU RO MR Secretariat will keep a record of:

   a. Date received by Secretariat;

   b. Date referred to all EU ROs;

   c. Date Certificate EU ROs advised of corrective action and/or new certificate.

4. All EU ROs shall advise their relevant internal stakeholders using their own internal communication processes as soon as possible after notification from the EU RO MR Secretariat.

5. The Issuing EU RO shall investigate the root cause of the non-compliant situation and advise EU RO MR Secretariat of any corrective actions taken and whether the certificate is re-issued or not.

6. The EU RO MR Secretariat shall advise all EU ROs when corrective action is taken by the Issuing EU RO and whether the certificate is successfully re-issued or not.

- End –

SECTION 3 TECHNICAL REQUIREMENTS

In order to uniform implementation of the Technical Requirements, this guidance does not provide the hard copy version of the TRs, however the controlled copies of the Agreed Technical Requirements are available from the EU RO MR Group's website, https://www.euromr.org/technical-requirements

KOREAN REGISTER OF SHIPPING

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Phone : +82-42-869-9254
Fax : +82-42-862-6019-
E-mail : choiws@krs.co.kr
Person in charge : Choi W.S

CIRCULAR

No : 2012-02-E
Date : 2012. 03. 01

To : All Surveyors

Subject : 9.41 Requirements of additional installations notation for slurry water dewatering system

Pleased be informed that the additional installations notation for ships provided with slurry water dewatering system to load ore in slurry form and related requirements are to be applied as following.

For ships loaded with ore in slurry form, the additional installations notation(Machinery items) **"SWDS"** for slurry water dewatering systems will be given where ships satisfy the following additional requirements.

(1) During the initial stages of loading, slurry water are to be decanted via an overflow weir and overflow ports. Once the supernatant water has been removed, dewatering slurry water is to be continued by pumps via in-hold filters.
(2) Where decanting supernatant water, slurry water is to be decanted at a rate greater than loading flow rate via overflow weir on bulkhead and two or more pumps having sufficient capacity for dewatering are to be installed.
(3) Slurry water dewatered via in-hold filters is to be dewatered by main bilge pumps or equivalent means.
(4) Cargo holds are to have emergency decanting ports on bulkhead for use in emergency situation.
(5) Level switches are to be installed in overflow recess and give audible and visual alarms in loading office when water level reaches the height.
(6) Means for measuring cargo in holds and flow of slurry in pipelines are to be provided.

-The end-

Executive Vice President
Technical Division

KOREAN REGISTER OF SHIPPING

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Person in charge :
Yeom Cheolwung

CIRCULAR

No : 2013-16-E
Date : 2013.12.09

To : All Surveyors and whom it may concern

Subject : 9.66 Notice for Establishment of "Guidance of human element for structural design of lighting, ventilation, vibration, noise, access & egress arrangements"

Please be informed of Establishment of **"Guidance of human element for structural design of lighting, ventilation, vibration, noise, access and egress arrangements"**. In this regard, the entry-into-force date of this guidance will be 1st, July, 2016 or the same as entry-into-force date of CSR-H for bulker and oil tanker, However, this guidance can be applied immediately if owner requests.

Attachment: Guidance of human element for structural design of lighting, ventilation, vibration, noise, access & egress arrangements. 1 Copy. <The end>

Kim Chang-wook
Executive Vice President
Technical Division

KOREAN REGISTER

Guidance of Human Element for structural design of lighting, ventilation, vibration, noise, access & egress arrangements

KOREAN REGISTER OF SHIPPING

Table of Contents

Section 1 – Introduction

1.1 Scope and objectives

The objectives of this Guidance are to summarise information for human element and ergonomics during the structural design and arrangement of ships, including:

a) Stairs, vertical ladders, ramps, walkways and work platforms used for permanent means of access and/or for inspection and maintenance operations according to 9.2.1.1 and 9.3.1 of IMO Resolution MSC.296(87).
b) Structural arrangements to facilitate the provision of adequate lighting, ventilation, and to reduce noise and vibration in manned spaces according to 9.2.1.2, 9.3.2, and 9.3.3 of IMO Resolution MSC.296(87).
c) Structural arrangements to facilitate the provisions of adequate lighting and ventilation in tanks or closed spaces for the purpose of inspection, survey and maintenance according to 9.2.1.3 and 9.3.4 of IMO Resolution MSC.296(87).
d) Structural arrangements to facilitate emergency egress of inspection personnel or ships' crew from tanks, holds, voids according to 9.2.1.4 and 9.3.5 of IMO Resolution MSC.296(87).

1.2 Application

This document is based on IACS non mandatory recommendation 132 on human element considerations during the structural design and arrangement of ships under the scope and objectives specified in 1.1 above. In addition, this document also provides informative information for industry best practices regarding human element considerations for design of lighting, ventilation, vibration, noise, access & egress.

1.3 Definitions

Ergonomics : 'Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance.' [Source: International Ergonomics Association, 2013]

Human element : 'A complex multi-dimensional issue that affects maritime safety, security and marine environmental protection. It involves the entire spectrum of human activities performed by ships' crews, shore-based management, regulatory bodies, recognised organizations, shipyards, legislators, and other relevant parties, all of whom need to co-operate to address human element issues effectively.' [Source: IMO Resolution A.947(23)]

1.4 Guidance overview

This document is laid out in a number of sections and annexes with the purpose of presenting clear guidance on applying good ergonomic practice for structural designers and those for arrangements of ships, in connection with the human element considerations for design for lighting, ventilation, vibration, noise, access & egress, for which informative information are also included.

- Section 2 – This purpose of this section is to explain why the human element is increasingly seen as an important topic and how the regulations that govern shipping are increasingly putting more emphasis on the human element.
- Section 3 – The purpose of this section is to present a rationale for why the human element should be considered for the Guidance criteria – lighting, ventilation, vibration, noise, access and egress arrangements – and how this will have an implication for structures.

- Section 4 – The purpose of this section is to present more detailed structural arrangement guidance for each of the criteria – lighting, ventilation, vibration, noise, access and egress arrangements.
- Annex A – The Annex provides designers with measurement values for some of the criteria that can aid designers when applying design guidance. They provide the designer with additional information that can assist in making design judgements.
- Annex B – The Annex presents a list of relevant standards that bear some relation to good ergonomic practice.

Section 2 – The Human Element

2.1 Regulatory expectations

The regulations that govern the marine industry are gradually putting more emphasis on the human element. In general, the interest in the 'people aspects' of regulation is increasing due to the many rapid changes in the marine environment.

IMO Resolution A.947(23): Human Element Vision, Principles and Goals for the Organization

The IMO (according to Resolution A.947(23)) refers to the human element as:

“A complex multi-dimensional issue that affects maritime safety, security and marine environmental protection. It involves the entire spectrum of human activities performed by ships' crews, shore-based management, regulatory bodies, recognized organizations, shipyards, legislators, and other relevant parties, all of whom need to co-operate to address human element issues effectively.”

In other words, anything that influences the interaction between a human and any other human, system or machine onboard ship, while accounting for the capabilities and limitations of the human, the system, and the environment.

IMO Resolution A.947(23) further states “the need for increased focus on human-related activities in the safe operation of ships, and the need to achieve and maintain high standards of safety, security and environmental protection for the purpose of significantly reducing maritime casualties”; and that “human element issues have been assigned high priority in the work program of the Organization because of the prominent role of the human element in the prevention of maritime casualties.

ILO Maritime Labour Convention
The ILO’s Maritime Labour Convention (MLC), 2006, provides comprehensive rights and protection at work for the world's seafarer population. It sets out new requirements specifically relating to the quality of life on board ships.
Aimed at seafarer health, personal safety and welfare in particular, the new MLC has specific requirements for the built environment of the ship, especially in relation to living accommodation, washroom facilities, lighting, noise and temperature levels.

2.2 Human Element Considerations

The human element in a maritime sense can be thought of as including the following;

a) Design and Layout Considerations

Design and layout considers the integration of personnel with equipment, systems and interfaces. Examples of interfaces include: controls, displays, alarms, video-display units, computer workstations, labels, ladders, stairs, and overall workspace arrangement.

It is important for designers and engineers to consider personnel’s social, psychological, and physio-

logical capabilities, limitations and needs that may impact work performance. Hardware and software design, arrangement, and orientation should be compatible with personnel capabilities, limitations, and needs. Workplace design includes the physical design and arrangement of the workplace and its effect on safety and performance of personnel.

In addition, designers and engineers should be aware of the cultural and regional influences on personnel's behavioural patterns and expectations. This includes, for example, understanding that different cultural meanings with regard to colour exist, or that bulky clothing is needed when using equipment in cold weather. Awareness of potential physical differences (e.g., male/female, tall/short, North American versus South-East Asian) is needed so that the design, arrangement, and orientation of the work environment reflects the full range of personnel.

If these factors are not considered, the workplace design may increase the likelihood of human error. Additional training, operations, and maintenance manuals, and more detailed written procedures cannot adequately compensate for human errors induced by poor design.

b) Ambient Environmental Considerations

This addresses the habitability and occupational health characteristics related to human whole-body vi bration, noise, indoor climate and lighting. Substandard physical working conditions undermine effective performance of duties, causing stress and fatigue. Examples of poor working conditions include poor voice communications due to high noise workplaces or physical exhaustion induced by high temperatures. Ambient environmental considerations also include appropriate design of living spaces that assist in avoidance of, and recovery from, fatigue.

c) Considerations Related to Human Capabilities and Limitations

Personnel readiness and fitness-for-duty are essential for vessel safety. This is particularly so as tasks and equipment increase in complexity, requiring ever-greater vigilance, skills, competency and experience. The following factors should be considered when selecting personnel for a task:

- Knowledge, skills, and abilities that stem from an individual's basic knowledge, general training, and experience
- Maritime-specific or craft-specific training and abilities (certifications and licenses) and vessel specific skills and abilities
- Bodily dimensions and characteristics of personnel such as stature, shoulder breadth, eye height, functional reach, overhead reach, weight, and strength
- Physical stamina; capabilities, and limitations, such as resistance to and freedom from fatigue; visual acuity; physical fitness and endurance; acute or chronic illness; and substance dependency
- Psychological characteristics, such as individual tendencies for risk taking, risk tolerance, and resistance to psychological stress

d) Management and Organizational Considerations

This factor considers management and organizational considerations that impact safety throughout a system lifecycle. The effective implementation of a well-designed safety policy, that includes ergonomics, creates an environment that minimizes risks. Commitment of top management is essential if a safety policy is to succeed. Management's commitment can be demonstrated by:

- Uniformly enforced management rules for employee conduct
- Easy-to-read and clear management policies
- Allocation of sufficient funds in the owner/operator's budget for operations and for safety programs, including ergonomics, to be properly integrated and implemented
- Work schedules arranged to minimize employee fatigue
- Creation of a high-level management safety position which includes the authority to enforce a safety policy that includes ergonomics

- Positive reinforcement of employees who follow company safety regulations
- Company commitment to vessel installation maintenance.

Section 3 – Rationale for considering the Human Element in the design of lighting, ventilation, vibration, noise, access and egress arrangements

3.1 General

3.1.1

The design of the on board working environment for the ship's crew should consider environmental factors such as lighting, ventilation, vibration and noise. Insufficient attention paid to the physical working conditions can have an effect on task performance, health and safety and well-being.

3.1.2

The design of stairs, vertical ladders, ramps, walkways and work platforms used for permanent means of access should facilitate safe movement within or among working or habitability areas. Insufficient attention paid to access arrangements can have an effect on task performance and safety. Insufficient attention paid to egress arrangements can have an effect on safe evacuation during an emergency.

3.1.3

The following headings are applied to each of the criteria addressed in this Guidance to give the rationale for what needs to be considered from a human element perspective;

- Task requirements
- Ergonomic design principles
- Conditions
- Implications for structures

3.2 Lighting

3.2.1 Task requirements

The lighting of crew spaces should facilitate visual task performance as well as the movement of crew members within or between working or habitability areas. It should also aid in the creation of an appropriate aesthetic visual environment. Lighting design involves integrating these aspects to provide adequate illumination for the safety and well-being of crew as well as affording suitable task performance n order to facilitate operation, inspection, and maintenance tasks in normally occupied spaces and inspection, survey and maintenance tasks in closed spaces, the design of lighting should promote

- task performance, by providing adequate illumination for the performance of the range of tasks asso ciated with the space
- safety, by allowing people enough light to detect hazards or potential hazards
- visual comfort and freedom from eye strain.

3.2.2 Ergonomic design principles

In order to facilitate the task requirements identified above, the following design principles are identified as needing to be achieved for lighting design. These design principles are based on good ergonomic practice and will form the basis for the development of the structural arrangement guidance.

The design of lighting should :

- provide adequate illumination for the performance of the range of tasks associated with the space
- be suitable for normal conditions and any additional emergency conditions
- provide uniform illumination as far as practicable
- avoid glare and reflections
- avoid bright spots and shadows
- be free of perceived flicker
- be easily maintained and operated
- be durable under the expected area of deployment

3.2.3 Conditions

The provision of lighting requirements is dependent on several factors which need to be taken into account.
These include;

- Time of day and external light characteristics
- Differing proximity to deadlights, windows, doors

3.2.4 Implications for structure

In order to address the design principles outlined above, there are several implications for the development of the structural arrangements. These implications with regard to structures will address;

- Positioning of luminaires
- Overhead arrangements (stringers, pipes and ductwork, cable trays)
- Positioning of switches and controls
- Provision and position of windows providing natural light
- Control of natural and artificial sources of glare
- Supply of power
- Constrained space lighting (permanent or intrinsically safe portable lighting)

3.3 Ventilation

3.3.1 Task requirements

In order to facilitate operation, inspection and maintenance tasks in manned spaces, the ventilation system is to be suitable to maintain operator vigilance, comfort, provide thermal protection (from heat and cold) and to aid safe and efficient operations.
In order to facilitate periodic inspections, survey and maintenance in tanks or closed spaces the means of ventilation is to ensure the safety of personnel in enclosed spaces from poor or dangerous air quality.

3.3.2 Ergonomic design principles

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In order to facilitate the task requirements identified above, the following design principles are identified as needing to be achieved for ventilation / indoor climate design. These design principles are based on accepted ergonomic practice and will form the basis for the development of the structural arrangement guidance.
Indoor climate should be designed to;

- provide adequate heating and/or cooling for onboard personnel
- provide uniform temperatures (gradients)
- maintain comfortable zones of relative humidity
- provide fresh air (air exchange) as part of heated or cooled return air
- provide clean filtered air, free of fumes, particles or airborne pathogens
- monitor gas concentration (CO, CO2, O2 etc)

- be easily adjustable by onboard personnel
- minimise contribution of ventilation noise to living and work spaces
- provide sufficient velocity to maintain exchange rates whilst not being noisy or annoying
- provide means to use natural ventilation
- provide/assess safe air quality while working in enclosed spaces

Additionally, the design of the ventilation system should give consideration to keep the structural integrity for purposes of fire insulation.

3.3.3 Conditions

Ventilation provisions should accommodate and take into account the following factors;

- extremes of external environmental conditions (highs and lows of temperature and humidity)
- expected human occupancy of work and living spaces
- operating components that contribute heat to a living or working space
- entry into confined spaces for the purpose of inspection

3.3.4 Implications for structures

In order to address the design principles outlined above, there are several implications for the structural arrangement. These implications with regard to structures will include;

- exterior ambient conditions (sizing the HVAC system)
- indoor air quality (particulate, smoke, O2, CO2, other gases)
- Ventilation capacity and air flow
- Water stagnation
- Bio-organisms and toxins
- Pipe and ductwork condensate
- Inspection access, maintenance access
- Noise and vibration control
- Energy efficiency

3.4 Vibration

3.4.1 Task requirements

In order to facilitate operation, inspection and maintenance tasks in manned spaces, the level of vibration is to be such that it does not introduce injury or health risks to shipboard personnel.

Additionally, consideration will be made for the impact of vessel motion on human comfort.

These considerations extend to living and work tasks occurring in habitability and work spaces as well as infrequently occupied spaces such as tanks and small holds entered for the purpose of maintenance or inspection.

3.4.2 Ergonomic design principles

In order to facilitate the task requirements identified above, the following design principles were identified as needing to be considered in vibration control. Vessel design should;

- protect onboard personnel from harmful levels of vibration
- protect onboard personnel from levels of vibration impairing job performance

- protect onboard personnel from levels of vibration that interferes with sleep or comfort
- provide protection from both continuous exposure and shock (high peak values)

3.4.3 Conditions

Vibration control provisions should accommodate and take into account the following factors;

- Continuous service output of prime mover(s)
- Equipment operation (such as thrusters, air compressors and auxiliary generators)
- Course, speed and water depth
- Rudder condition
- Sea conditions
- Loading conditions

3.4.4 Implications for structures

In order to meet the design principles outlined above, there are several implications for the structural arrangements to reduce vibration. The implications with regard to structures will address;

- Machinery excitation (main mover)
- Rotating components (turbines)
- Pumps
- Refrigeration
- Air compressors
- Shafting excitation
- Propeller blade tip/hull separation
- Cavitation
- Thrusters and azipods
- Hull and structure response to vibration.
- Resonance of structures
- Location of safety rails, hand holds, seating devices, means to secure loose stock or rolling stock in relation to ship motion

3.5 Noise

3.5.1 Task requirement

Depending on the level and other considerations, noise can contribute to hearing loss, interfere with speech communications, mask audio signals, interfere with thought processes, disrupt sleep, distract from productive task performance, and induce or increase human fatigue.
In order to facilitate operation, inspection and maintenance tasks in manned spaces, the level of noise should to be such that it;

- does not impair hearing either permanently or temporarily,
- is not at levels which interfere with verbal communication
- is not at levels which interfere with the hearing of alarms and signals
- is not at levels that will cause stress, distract from task performance or increase the risk of errors
- does not interfere with the ability to sleep
- does not increase or induce fatigue
- does not reduce habitability or sense of comfort

3.5.2 Ergonomic design principles

Noise control provisions should accommodate and take into account the following conditions. Vessel design should;

- ensure that onboard personnel are protected from harmful levels of noise (health hazards, hearing loss,

cochlear damage)
- ensure that onboard personnel are protected from levels of noise impairing job performance
- ensure that onboard personnel are protected from levels of noise impairing verbal communication and the hearing of signals (such as alarms, bells, whistles, etc.)
- ensure that onboard personnel are protected from levels of noise that interfere with sleep or comfort

3.5.3 Conditions

The development of provisions to reduce noise is dependent under several factors which need to be taken into account. These include;
- Equipment Operation
- Sea Conditions
- Loading Conditions and cargo operations
- Performance of maintenance or inspection tasks, including infrequently accessed areas.

3.5.4 Implications for structures

In order to meet the design principles outlined above, there are implications for the structural arrangements to reduce noise, these include;
- Machinery excitation (main mover)
- Hull protrusions
- Rotating components (turbines)
- Pumps
- Refrigeration
- Air compressors, fans, ventilation ductwork, exhaust systems
- Shafting excitation
- Propeller blade tip/hull separation
- Cavitation
- Thrusters and azipods
- Noise abatement / shielding

3.6 Access & Egress

3.6.1 Task requirements

The design of accesses and access structures of crew spaces should facilitate the safe movement of crew members within or among working or habitability areas. These include access structures such as passageways, ladders, ramps, stairs, work platforms, hatches, and doors. Also included are handrails, guard rails, and fall protection devices.
In order to facilitate operation, inspection, and maintenance tasks in normally occupied spaces and inspection, survey and maintenance tasks in closed spaces, the design of accesses and access structures should promote;
- task performance, by providing adequate configurations and dimensions facilitating human access.
- safety, by providing barriers to falls or other types of injury.

3.6.2 Ergonomic design principles

In order to facilitate the task requirements identified above, the following design principles are identified as needing to be achieved for access design. These design principles are based on good ergonomic practice and will form the basis for the development of the structural arrangement guidance.
The design of access and egress arrangements should;
- provide adequate access for the performance of the range of tasks associated (general access, accommodations access, maintenance and other work access) with the space

- be suitable for normal and emergency conditions
- be sized according to the access (or related) task required
- be sized according to the expected user population
- be easily maintained and operated
- be durable under the expected area of deployment
- accommodate ship motions

3.6.3 Conditions

The identification of access requirements is dependent on several factors which need to be taken into account when developing guidance. These include;

- Expected extent of vessel motion and potential interference with walking, standing, or climbing due to instability
- Exposure to external areas that may experience rain, snow, ice, spray, wind or other environmental conditions that may influence the usability and safety of accesses or access aids
- Potential for slips, trips, or falls and provision and design of accesses and access aids preventing their occurrence.

3.6.4 Implications for structures

In order to address the design principles outlined above, there are several implications for the structural arrangements. These implications with regard to structures will address;

- Provision and size of access structures (based on frequency of use and numbers of crew)
- Locations of accesses
- Exposure to the external elements
- Safety in access to, and use of, access structures

Section 4 - Ergonomic Structural Arrangement Guidance

4.1 General

4.1.1

The guidance presented in this section provides detailed structural arrangement guidance for each of the criteria – lighting, ventilation, vibration and noise, access and egress arrangements.

4.2 Lighting Design

4.2.1 Aims

Following a review of IMO Res. MSC.296(87), the structural arrangements to facilitate the provision of adequate lighting in spaces normally occupied or manned by shipboard personnel should be considered.

A space may be considered as being ‘normally occupied’ or ‘manned’ when it is routinely occupied for a period of 20 minutes or more.

Following a review of IMO Res. MSC.296(87), the structural arrangements to facilitate the provision of adequate lighting in areas infrequently manned such tanks or closed spaces for periodic inspections, survey and maintenance should be considered.

4.2.2 Application

The guidance presented in this section are applicable to vessels covered in SOLAS Regulation II-3/3-10.

4.2.3 Locations

Locations for lighting in manned spaces should be provided permanently and include the following;

- Living quarters (accommodation, recreation, offices, dining)
- Work Areas (control rooms, bridge, machinery spaces, workshops, offices, and spaces entered on a daily basis)
- Access Areas (corridors, stairways, ramps and the like)

Lighting in infrequently manned spaces may be temporary and include the following;

- Tanks, small holds, infrequently occupied closed spaces

Where required, emergency lighting, effective in the event of a failure of the main lighting should be provided.

4.2.4 Structural Arrangements

Allowance should be made for the following ergonomic guidance during structural design and construction as appropriate.

A) Positioning of Lighting

- Natural lighting through the use of windows and doors should be provided as far as practicable.
- Lights should be positioned, as far as practicable, in the same horizontal plane and arranged symmetrically to produce a uniform level of illumination.
- Lights should be positioned taking account of air conditioning vents or fans, fire detectors, water sprinklers etc. so the lighting is not blocked by these items.
- Lights should be positioned so as to reduce as far as possible bright spots and shadows.
- Fluorescent tubes should be positioned at right angles to an operator's line of sight while the operator is located at their typical duty station as far as practicable.
- Any physical hazards that provide a risk to operator safety should be appropriately illuminated.
- Lights should be positioned to consider the transfer of heat to adjacent surfaces.
- Lights should not to be positioned in locations which would result in a significant reduction in illumination.
- Lights should not to be positioned in locations that are difficult to reach for bulb replacement or maintenance.

B) Illuminance distribution

- Illumination of the operator task area should be adequate for the type of task, i.e. it should consider the variation in the working plane.
- Sharp contrasts in illumination across an operator task area or working plane should be reduced, as far as possible.
- Sharp contrasts in illumination between an operator task area and the immediate surround and general background should be reduced, as far as possible.
- Where necessary for operational tasks, local illumination should be provided in addition to general lighting.
- Lights should not flicker or produce stroboscopic effects.

C) Obstruction and glare:

- Lights should be positioned so as to reduce as far as possible glare or high brightness reflections from working and display surfaces.

- Where necessary, suitable blinds and shading devices may be used to prevent glare.
- Lighting should not to be obstructed by structures such as beams and columns.
- The placement of controls, displays and indicators should consider the position of the lights relative to the operator in their normal working position, with respect to reflections and evenness of lighting.
- Surfaces should have a non-reflective or matt finish in order to reduce the likelihood of indirect glare.

D) Location and installation of lighting controls

- Light switches should be fitted in convenient and safe positions for operators.
- The mounting height of switches should be such that personnel can reach switches with ease.

E) Location and installation of electrical outlets:

- Outlets should be installed where local lighting is provided, for e.g. in accommodation areas, work spaces and internal and external walkways.
- Provision is to be made for temporary lighting where necessary for inspection, survey and maintenance.

4.3 Ventilation Design

4.3.1 Aims

Following a review of IMO Res. MSC.296(87), the structural arrangements to facilitate the provision of adequate ventilation in spaces normally occupied or manned by shipboard personnel should be considered.

A space may be considered as being ‘normally occupied’ or ‘manned’ when it is routinely occupied for a period of 20 minutes or more.

Following a review of IMO Res. MSC.296(87), the structural arrangements to facilitate the provision of adequate ventilation in areas infrequently manned such tanks or closed spaces for periodic inspections, survey and maintenance should be considered.

4.3.2 Application

The guidance presented in this section are applicable to vessels covered in SOLAS Regulation II-3/3-10

4.3.3 Locations

Locations for ventilation in manned spaces should be provided permanently and include the following;

- Living quarters (accommodation, recreation, offices, dining)
- Work Areas (control rooms, bridge, machinery spaces, offices, spaces and voids entered)

Locations for ventilation in infrequently manned spaces should be temporary and include the following;

- Tanks, small holds, infrequently occupied closed/enclosed spaces

4.3.4 Structural Arrangements

Allowance should be made for the following ergonomic guidance during structural design and construction as appropriate.

A) Ship ventilation design

- Natural ventilation design should be established by consideration of compartment layouts and specifications. Typical natural ventilation devices include mushroom ventilators, gooseneck ventilators, ventilators with weather proof covers etc.
- In general, HVAC (heating, ventilation and air conditioning) systems should be provided in space-snormally occupied during operation.

- For areas infrequently occupied (such as tanks or holds) means of air quality sampling (such as portable CO2 densitometer) should be provided.
- Means to ventilate prior to entry of infrequently visited places should be provided.
- Adequate ventilation should be provided for inspection, survey, maintenance and repair within the voids of double-bottom and double-sided hulls.

B) Location and installation of ventilation

- The design of air ducts should facilitate reduced wind resistance and noise. Ductwork (particularly elbows and vents) should not contribute excess noise to a work or living space.
- Ductwork should not to interfere with the use of means of access such as stairs, ladders, walkways or platforms.
- Ductwork and vents should not be positioned to discharge directly on people occupying the room in their nominal working or living locations, for example, directed at a berth, work console, or work bench.
- Manholes and other accesses should be provided for accessibility and ventilation to points within.
- Fire dampers should be applied to contain the spread of fire, per statutory requirements.
- Ventilation penetrations through watertight subdivision bulkheads are not recommended unless accepted per statutory requirements. Ventilation dampers are to be visible (via inspection ports or other means).
- Ventilation fans for cargo spaces should have feeders separate from those for accommodations and machinery spaces.
- It is recommended that air Intakes for ventilation systems are located to minimise the introduction of contaminated air from sources such as for example, exhaust pipes and incinerators.
- Extractor grilles should be located to avoid short-circuits between inlets and outlets and to support even distribution of air throughout a work space

4.4 Vibration Design

4.4.1 Aims

Following a review of IMO Res. MSC.296(87), the structural arrangements to minimize vibration in spaces normally occupied or manned by shipboard personnel should be considered.

A space may be considered as being ‘normally occupied’ or ‘manned’ when it is routinely occupied for a period of 20 minutes or more.

4.4.2 Application

The guidance presented in this section are applicable to vessels covered in SOLAS Regulation II-3/3-10.

4.4.3 Locations

Locations in which vibration should be minimized include the following;

- Living quarters (accommodation, recreation, offices, dining)
- Work Areas (control rooms, bridge, machinery spaces, offices, spaces and voids entered)

4.4.4 Structural Arrangements

Allowance should be made for the following ergonomic guidance during structural design and construction as appropriate.

A) General

- Vibration levels should be at or below the acceptable ergonomic standards for spaces normally occupied by the crew. In general, ISO 6954:2000 may be used as a guideline to evaluate the vibration

performance in the spaces normally occupied by the crew.

• Generally, many alternative measures are applicable to reduce vibration, including but not limited to:

1. Resonance avoidance with a combination of appropriate selection of main engine and its revolution, number of propeller blades and structural natural frequencies;
2. To avoid resonance, addition of mass or reduction in scantlings to achieve lower structural natural frequencies. Or conversely, reduction of mass or structural reinforcement to increase natural frequencies;
3. Reduction of exciting force by for e.g. application of various kinds of dampers, compensators and balancers; and
4. Structural reinforcement to increase rigidity and reduce structural response, or conversely, where structural rigidity is reduced specifically to reduce structural responses.

• Due to the variety of effective measures that can be taken and the complex nature of vibration phenomena, it is not possible to apply simple prescriptive formulae for scantling calculation.
• Structural measures are mainly prescribed in the following sections, but other measures as stated in 1-4 above may be considered as effective alternatives.

B) Vibration reduction design

• Vibration level in the spaces normally occupied during operation should be estimated by an appropriate method, such as estimation based on empirical statistics and/or application of analytical tools. When a vibration level exceeding the acceptable ergonomic standards is envisaged, suitable countermeasure should be taken.
• In general, natural frequencies should be calculated using theoretical formulae in way of local panels and stiffeners in the spaces close to the main exciting sources, i.e. propeller and main engine. These local scantlings should be decided so that the estimated natural frequencies are apart from the exciting frequencies adequately to avoid resonance.
• For heavy equipment or machinery in the spaces close to the main exciting sources, suitable measures should be taken at the deck structure underneath the equipment or machinery to reduce vibration

C) Anti-vibration design in structural arrangements

• Vibration should be controlled at the source as far as possible.
• To prevent hull girder vibration, the following measures are recommended for consideration;

  - selection of hull forms, girders and other ship structures with consideration to vibration control
  - selection of main machinery with inertia force and moment equilibrated;
  - adjusting natural frequency (the natural frequency of hull girder increases with the number of bulkheads increases).

• To prevent vibration of the local structure, the following measures are recommended for consideration;

  - line (mainly the ship tail shape) and propeller design modification;
  - adjustment of general arrangements, such as cabin arrangement, weight distribution, location of-main machinery;
  - adjustment and modification of local structures, such as superstructure, aft structures, bottom frame structure in engine room;
  - other damping measures, such as vibration isolators, nozzle propeller.

D) Anti-vibration design of engine room, engine, propeller and thrusters

• Consideration should be paid to vibration response of main machinery base and shafting.
• Consideration of control of vibration from the engine room should include installing bracings at the top and front of diesel engines and increasing the stiffness and natural frequency of the machine base

to reduce the vibration of the base.

- Bow thruster induced vibration should be minimized by following good acoustic design practices relative to the design of the propeller and the location and placement of the thruster itself. Supply of resilient supported tunnels (tunnel within a tunnel), bubbly air injectors, and tunnels coated with a decoupling material can be considered.
- Propeller induced vibration should be minimized by following good acoustic design practices relative to the design of the propeller and the location and placement in relation to the hull. Stern shape should be optimized and considered through theoretical calculation and model testing so as to improve the wake. The gap between the shell and the propeller should be appropriate to reduce the exciting force. Damping treatments can be applied to shell plates with severe vibration.

E) Anti-vibration design of superstructure

- Preventing vibration along the longitudinal area of the superstructure should be considered by increasing the shear and strut stiffness of the superstructure. To achieve this, the following measures are recommended;
  - Superstructure side wall can be aligned vertically,
  - The internal longitudinal bulkhead can be set up with more than four (4) tiers of superstructure,
  - Strong girders or other strong elements can be provided under the main deck,
  - The transverse bulkhead and the front bulkhead of superstructure can be vertically aligned as much as possible, otherwise large connection brackets should be provided,
  - The superstructure aft bulkhead of each layer can be aligned vertically with the main hull transverse bulkheads as far as possible, otherwise strong beams under the main deck should be provided.
  - To control vibration of outfitting, dimensions and the means of fixing and strengthening at the point of mounting can be considered.
  - To prevent vibration of high web girder, the following should be considered;
    . Increase dimension of longitudinals and face plate,
    . Increase the stiffness of face plate stiffeners.
    . Add horizontal stiffener.

F) Anti-vibration installation design

- Sources of vibration (engines, fans, rotating equipment), to the extent possible, should be isolated from work and living spaces (use of isolation mounts or other means can be considered).
- Hull borne vibration in living and work areas can be attenuated by the provision of vibration absorbing deck coverings or by other means.

4.5 Noise Design

4.5.1 Aims

Following a review of IMO Res. MSC.296(87), Code on Noise Levels On Board Ships, the structural arrangements to minimize noise in spaces normally occupied or manned by shipboard personnel should be considered.
A space may be considered as being ‘normally occupied’ or ‘manned’ when it is routinely occupied for a period of 20 minutes or more.

4.5.2 Application

The guidance presented in this section are applicable to vessels covered in SOLAS Regulation II-3/3-10.

4.5.3 Locations

Locations in which noise should be minimized include the following;

- Living quarters (accommodation, recreation, offices, dining)
- Work Areas (such as control rooms, bridge, machinery spaces, living quarters and offices)

4.5.4 Structural Arrangements

Allowance should be made for the following ergonomic guidance during structural design and construction as appropriate.

A) General

- Sources of noise (engines, fans, rotating equipment), to the extent possible, should be isolated and located away from work and living spaces (through use of isolation mounts or other means).
- If necessary hull borne noise transmitted through the steel structure may be attenuated by the provision of noise absorbing deck coverings.
- Noise for typical underway conditions should be specified for the following areas:
  - In living quarters
  - In open engineering and mechanical spaces
  - In offices, the bridge, engineering offices
- Noise on the hull from the propeller tips, athwart thrusters, or azipods should be designed to minimize structure borne noise to accommodations and work areas.
- Specific noise levels are to be extracted from the revised IMO Code on Noise Aboard ships (Resolution MSC.337(91)).
- To reduce noise transmitted to accommodation cabins, the crew accommodations areas are usually arranged in the middle or rear of the superstructure or on the poop deck and above.

B) Noise sources and propagation

- Ship noise can be divided into airborne noise and structure borne noise according to the nature of the sound source. It consists of main machinery noise, auxiliary machinery noise, propeller noise, hull vibration noise and ventilation system noise.
- There are three main routes of transmission of ship noise;
  - airborne noise radiated directly to the air by main or auxiliary machinery system;
  - structure borne noise spread along the hull structure through mechanical vibration and radiated out ward;
  - fan noise and air-flow noise transmitted through the pipeline of the ventilation system.

C) Mechanical vibration induced noise control

- Mechanical vibrations are the largest source of noise. Methods relating to anti-vibration design in the structural arrangements are also useful for vibration induced noise control, including the following,
  - Reducing the noise level of the various noise sources;
  - Using vibration isolator for main and auxiliary machinery to reduce the noise;
  - Improving the machine's static and dynamic balance;
  - Installing soundproof cover with sound-absorbing lining for machines.

D) Noise control of ventilation system

- Fans with relative low pressure may be used to reduce noise when the flow resistance of ventilation ducts is low. Low flow resistance can be achieved by rational division of the ventilation system, reasonable determination of ability of ventilation and the ducts layout, adoption of reasonable duct type and provision of suitable materials.
- Fans and central air conditioners may be installed in a separate acoustic room or the damper elastomeric gasket or silencer box.
- Ventilation ducts can be encased in damping material if necessary. Penetration of compartments with a low-noise requirement by main air tubes may be avoided.

- Ventilation inlet, outlet, and diffuser elements can be provided that are designed for noise abatement to reduce ventilation terminal noise.
- If needed, an appropriate muffler can be used based on the estimated frequency range of the noise.

E) Noise Prevention/Mitigation

- The statements that follow should be considered in the context of the prevention and mitigation of human whole body vibration, which also have a noise reducing effect.
- Different treatments may be needed to reduce airborne sources, structureborne sources, airborne paths, structureborne paths, HVAC induced noise, etc. Each treatment type depends on an understanding of the prevailing airborne or structureborne noise components (e.g., low frequency or high frequency). A thorough understanding of the source, amount of noise, the noise's components, and the noise's path(s) is essential for cost effective noise abatement/treatment. Listed below, are summarized some of the more common noise control treatment methods,
  - Selection of equipment that by its design or quality are lower noise and/or vibration
  - Reduction of vibration by mechanically isolating machinery from supporting structure.
  - Use of two layers of vibration isolation mounts under machinery with seismic based mounts between the machinery and the ship's structure.
  - Reduce vibration energy in structures. Pumpable material used as ballast can also be used as damping in voids and tanks.
  - An air bubble curtain can be considered to shield vessel's hull from water borne noise
  - A decoupling material can be applied to the exterior (wet side) plating in order to reduce the radition efficiency of the structure.
- The airborne source level and airborne path are the most critical factors affecting noise within a machinery space itself and in the compartments directly adjacent to the machinery space. Structureborne sources and the structureborne path carry acoustical energy everywhere else on the vessel.
- Depending on the level of treatment, secondary structureborne noise (a combination of the airborne source level and the response of the structure inside the machinery space itself) may also be important in spaces remote from the machinery itself.

F) Noise modelling

- A technique becoming more common among designers is noise or acoustical modelling. In these models, it is essential that the factors related to the source-path-receiver be very well understood.
- Noise/acoustical models should include the following components:
  - Source, acoustic path, and receiver space description
  - Sources - machinery source descriptions (e.g., noise and vibration levels, size and mass, location, and foundation parameters)
  - Sources - propulsor source description (e.g., number of propellers (impellers), number of blades, RPM, clearance between hull and tips of propeller, vessel design speed)
  - Sources – HVAC source description (e.g., fan parameters (flow rate, power, and pressure), duct parameter, louver geometry, and receiver room sound absorption quality)
- Path - Essential parameters for sound path description include hull structure sizes and materials, (damping) loss factors, insulation and joiner panel parameters.
- Receiver - Receiver space modelling is characterized by the hull structure forming the compartment of interest, insulation/coatings, and joiner panels.

4.6 Access & Egress Design

4.6.1 Aims

Following a review of IMO Resolution MSC.296(87), the design of stairs, vertical ladders, ramps, walkways and work platforms used for permanent means of access and/or for inspection and maintenance op-

erations should be considered.
Following a review of IMO Resolution MSC.296(87), the structural arrangements to facilitate emergency egress of inspection personnel or ships' crew from tanks, holds, voids etc. is to be considered.

4.6.2 Application

The guidance presented in this section are applicable to vessels covered in SOLAS Regulation II-1/3-10.

4.6.3 Locations

Locations for provision of access aids in manned spaces should be provided permanently and include the following;

- Living quarters (accommodation, recreation, offices, dining)
- Work Areas (control rooms, bridge, machinery spaces, offices, spaces and voids entered)
- Access to deck areas, muster stations, work platforms associated to periodic inspection, operation, or maintenance

Locations for access in infrequently manned spaces may be temporary and include the following;

- Tanks, small holds, infrequently occupied closed spaces

4.6.4 Structural Arrangements

A) Stairs

General Principles

The following are general guidance to consider for stairs design:

- Stairs are appropriate means for changing from one walking surface to another when the change in vertical elevation is greater than 600 mm (23.5 in.).
- Stairs should be provided in lieu of ladders or ramps in accommodations spaces, office spaces, or to the navigation bridge.
- The angle of inclination should be sufficient to provide the riser height and tread depth that follows, a minimum angle of 38 degrees and maximum angle of 45 degrees is recommended.
- Stairs exposed to the elements should have additional slip resistance due to potential exposure to water and ice.
- Stairs should be used in living quarters instead of inclined ladders.
- No impediments or tripping hazards should intrude into the climbing spaces of stairs (for example, electrical boxes, valves, actuators, or piping).
- No impediments or tripping hazards should impede access to stair landings (for example, piping runs over the landing or coamings/retention barriers).
- Stairs running fore and aft in a ship are preferable but athwartship stairs are allowed.

Stair Landings

The following are guidance to consider during the design of stair landings:

- A clear landing at least as wide as the tread width and a minimum of 915 mm (36 in.) long should be provided at the top and bottom of each stairway.
- An intermediate landing should be provided at each deck level serviced by a stair, or a maximum of every 3500 mm (140 in.) of vertical travel for stairs with a vertical rise of 6100 mm (240 in.).
- Any change of direction in a stairway should be accomplished by means of an intermediate landing at least as wide as the tread width and a minimum of 915 mm (36 in.) long.
- Stairways should have a maximum angle of inclination from the horizontal of 45 degrees.
- Where stairs change directions, intermediate landings along paths for evacuating personnel on stretchers should be 1525 mm (60 in.) or greater in length to accommodate rotating the stretcher.

Stair Risers and Treads

The following are guidance to consider during the design of stair risers and treads:

- A riser height should be no more than 230 mm (9 in.) and a tread depth of 280 mm (11 in.), including a 25 mm (1 in.) tread nosing (step overhang).
- For stairs the depth of the tread and the height of riser should be consistent
- Minimum tread width on one-way (where there is expected to be only one person transiting, ascending or descending stairway) stairs should be at least 700mm(27.5in.)
- Minimum tread width on two-way (where there may be two persons, ascending and descending, or passing in opposite directions) stairs should be at least 900mm(35.5in.)
- Once a minimum tread width has been established at any deck in that stair run, it should not decrease in the direction of egress
- Nosings should have a non-slip/skid surface that should have a coefficient of friction (COF) of 0.6 or greater measured when wet.

Headroom

- Clear headroom (free height) maintained in all stairs is recommended to be at least 2130 mm (84 in.).

Design Load

- It is recommended that stairways should be built to carry five times the normal anticipated live load, but less than a 544-kg (1000-lb) moving concentrated load.

Stair Handrails

The following are guidance to consider during the design of stair handrails:

- Stairs with three or more steps should be provided with handrails.
- A single-tier handrail to maintain balance while going up or down the stairs should be installed on the bulkhead side(s) of stairs.
- A two-tier handrail to maintain balance and prevent falls from stairs should be installed on non-enclosed sides of stairs.
- Handrails should be constructed with a circular cross section with a diameter of 40 mm (1.5 in.) to 50 mm (2.0 in.).
- Square or rectangular handrails should not be fitted to stairs.
- The height of single tier handrails should be 915 mm (36 in.) to 1000 mm (39 in.) from the top of the top rail to the surface of the tread.
- Two-tier handrails should be two equally-spaced courses of rail with the vertical height of the top of the top rail 915 mm (36 in.) to 1000 mm (39 in.) above the tread at its nosing.
- A minimum clearance of 75 mm (3 in.) should be provided between the handrail and bulkhead or other obstruction.

B) Walkways and Ramps

General Principles

The following are general guidance to consider for walkways and ramps:

- Guard rails should be provided at the exposed side of any walking or standing surface that is 600 mm (23.5 in.) or higher above the adjacent surface and where a person could fall from the upper to the lower surface.
- Ramps should be used with changes in vertical elevations of less than 600 mm (23.5 in.).
- Ramps should be provided with a non-skid surface that should have a coefficient of friction (COF) of 0.6 or greater measured when wet.
- Headroom in all walkways should be $\geq$ 2130 mm (84 in.).
- Toeboards should be provided on elevated walkways, platforms, and ramps. No impediments or tripping hazards should intrude into the transit space (for example, electrical boxes, valves, actuators, or piping).
- No impediments or tripping hazards should impede use of a walkway or ramp (for example, piping runs, hatch covers, deck impediments (e.g., through bolts) or combings/retention barriers).
- Toeboards should have a height of 100 mm (4.0 in.) and have no more than a 6 mm (0.25 in.)

clearance between the bottom edge of the toeboard and the walking surface

C) Vertical Ladders

General Principles

The following are general guidance to consider for the design of vertical ladders:

- Vertical ladders should be provided whenever operators or maintainers must change elevation abruptly by more than 300 mm (12.0 in.).
- Vertical ladders should not be located within 1.83 m (6 ft.) of other nearby potential fall points (including the deck edge, cargo holds and lower decks) without additional fall protection, such as guardrails.
- Vertical ladders should be provided with skid/slip resistant on the rungs that should have a coefficient of friction (COF) of 0.6 or greater measured when wet.
- There should be between 175 mm (7.0 in.) to 200 mm (8.0 in.) clearance behind the ladder (toe space).
- A means of access to a cellular cargo space should be provided using staggered lengths of ladder. No single length is to exceed 6.0 m (91.5 ft) in length.

Rung Design

- Rungs should be equally spaced along the entire hlight of the ladder.
- If square bar is used for the rung, it should be fitted to form a horizontal step with the edges pointing upward.
- Rungs should also be carried through the side stringers and attached by double continuous welding.
- Ladder rungs should be arranged so a rung is aligned with any platform or deck that an operator or maintainer will be stepping to or from.
- Ladder rungs should be slip resistant or of grid/mesh construction.

Provision of Platforms

- When the height of a vertical ladder exceeds 6.0 m (19.5 ft), an intermediate or linking platform should be used
- If a work task requires the use of two hands, working from a vertical ladder is not appropriate. The work area should be provided with a work platform that provides a flat, stable standing surface.

Vertical ladders as Means of Access

- Where vertical ladders lead to manholes or passageways, horizontal or vertical handles or grab bars should be provided. Handrails or grab bars should extend at least 1070 mm (42.0 in.) above the landing platform or access/egress level served by the ladder.

Safety Cages

- Safety cages should be used on vertical ladders over 4.5 m (15.0 ft) in height.
- Climber safety rails or cables should be used on vertical ladders in excess of 6.1 m (20.0 ft).

D) Work Platforms

General Principles

- Work platforms should be provided at locations where personnel must perform tasks that cannot be easily accomplished by reaching from an existing standing surface.
- Work platforms exposed to the elements should have additional slip resistance due to potential exposure to water and ice.
- Work platforms more than 600 mm (23.5 in.) above the surrounding surface should be provided with guard rails and hand rails.
- Work platforms should be of sufficient size to accommodate the task and allow for placement of any required tools, spare parts or equipment.

E) Egress

- Doors, hatches, or scuttles used as a means of escape should be capable of being operated by one person, from either side, in both light and dark conditions. Doors should be designed to prevent opening and closing due to vessel motion and should be operable with one hand.
- Doors (other than emergency exit) used solely by crew members should have a clear opening width of at least 710 mm (28 in.) The distance from the deck to the top of the door should be at least 1980 mm (78 in.).
- The method of opening a means of escape should not require the use of keys or tools. Doors in accommodation spaces (with the exception of staterooms), stairways, stair towers, passageways, or control spaces, should open in the direction of escape or exit.
- The means of escape should be marked from both the inside and outside.
- Deck scuttles that serve as a means of escape should be fitted with a release mechanism that does not require use of a key or a tool, and should have a holdback device to hold the scuttle in an open position.Deck scuttles that serve as a means of escape should have the following dimensions:
  i) Round − 670 mm (26.5 in.) or greater in diameter
  ii) Rectangular − 670 mm (26.5 in.) by 330 mm (13 in.) or greater

Annex A – Recommended Measurement Values

1.1 General

The recommendations in the following section outline measurement values for lighting, ventilation, vibration and access from a best practice ergonomics perspective. The information provided would assist designers when applying structural arrangement guidance. See the IMO Code on Noise Aboard ships (IMO Resolution MSC.337(91)) for recommended shipboard noise levels guidance.

1.2 Lighting

The following tables give details of recommended illuminance levels in Lux which support task performance, safety and visual comfort for the operator. Emergency lighting is covered in SOLAS and IMO Resolutions and has not been considered in the below table. Lighting measurements should be made with the probe approximately 800 mm (32 inches).

Table 1 Lighting Criteria for Crew Accommodations Spaces

Space	Illuminance Level in Lux	Space	Illuminance Level in Lux
Entrances and Passageways			
Interior Walkways, Passageways, Stairways and Access Ways	100	Exterior Walkways, Passageways, Stairways and AccessWays(night)	100
Corridors in Living quarters and work areas	100	Stairs, escalators	150
		Muster Area	200
Cabins, Staterooms, Berthing and Sanitary Spaces*			
General Lighting	150	Bath/Showers (General Lighting)	200
Reading and Writing (Desk or Bunk Light)	500	All other Areas within Sanitary Space (e.g., Toilets, Change Room)	200
Mirrors (Personal Grooming)	500	Light during sleep periods	<30
Dining Spaces			
Mess Room and Cafeteria	300	Snack or Coffee Area	150
Recreation Spaces			
Lounges	200	Gymnasiums	300
Library	500	Bulletin Boards/Display Areas	150
Multimedia ResourceCenter	300	All other Recreation Spaces (e.g., Game Rooms)	200
TV Room	150	Training/Transit Room Office/Meetingrooms	500
Medical, Dental and FirstAidCenter			
Dispensary Hospital/ward	500	Wards - General Lighting - Critical Examination - Reading Hospital/ward	 150 500 300 500
Medical and Dental Treatment/ Examination Room Hospital/ward	500		
Medical Waiting Areas	200		
Laboratories	500	Other Medical & Dental Spaces	300
* Note : If there is any opportunity for light to enter cabins or staterooms at the times of day or night when people sleep (e.g., portlights, transoms, etc.), the maximum lighting levels shall be 30 Lux.			

Table 2 Lighting Criteria for Navigation and Control Spaces

Space	Illuminance Level in Lux	Space	Illuminance Level in Lux
Wheelhouse, Pilothouse, Bridge	300		
Chart Room - General Lighting - On Chart Table	 150 500	Offices - General Lighting - Computer Work - ServiceCounters	 300 300 300
Other Control Rooms (e.g., Cargo Transfer etc.) - General Lighting - Computer Work Central Control Room	 300 300 500	Control Stations - General Lighting - Control Consoles and Boards, Panels, Instruments - Switchboards - Log Desk Local Instrument room	 300 300 500 500 400
Radar Room	200		
Radio Room	300	Gyro Room	200

Table 3 Lighting Criteria for Service Spaces

Space	Illuminance Level in Lux	Space	Illuminance Level in Lux
Food Preparation - General Lighting - Galley - Pantry - Butcher Shop - Thaw Room - Working Surfaces, Food Preparation Counter and Range Tops - Food Serving Lines - Scullery (Dishwashing) - Extract Hood Store rooms Package handling/cutting	 500 500 300 500 300 750 300 300 500 100 300	Laundries - General Lighting - Machine, Pressing, Finishing and Sorting	 300 300
		Chemical Storage	300
		Storerooms - Large Parts - Small Parts - Issue Counters	 200 300 300
		Elevators	150
		Food Storage - Non-refrigerated - Refrigerated	 200 100
Mail Sorting	500		

Table 4 Lighting Criteria for Operating and Maintenance Spaces/Areas

Space	Illuminance Level in Lux	Space	Illuminance Level in Lux
Machinery Spaces (General) Unmanned Machinery spaces	200 200	Cargo Holds (Portable Lighting) - General Lighting - During Cargo Handling - Passageways and Trunks	30 300 80
Engine Room	300		
Generator and Switchboard Room Switchboard, transformer room Main generator room/switch gear	300 500 200		
Fan Room HVAC room	200 200	Inspection and Repair Tasks - Rough - Medium - Fine - Extra Fine	300 500 750 1000
Motor Room	300		
Motor-Generator Room (Cargo Handling)	150		
Pump Room, Fire pump room Steering Gear Room Windlass Rooms Battery Room Emergency Generator Room Boiler Rooms	200 200 200 200 200 100	Workshops Paint Shop Workshop office Mechanical workshop Inst/Electrical Workshop	300 750 500 500 500
Bilge/Void Spaces	75		
Muster/Embarkation Area	200	Unmanned Machinery Room	200
		Shaft Alley	100
Cargo Handling (Weather Decks) Lay Down Area General Process and Utility area Loading ramps/bays	200 200 200 200	Escape Trunks	50
		Crane Cabin.	400
Cargo Storage and Maneuvering areas	350	Hand signaling areas between crane shack and ship deck	300

Table 5 Lighting for Red or Low-level White Illuminance

Area	Illuminance Level in Lux
Where seeing is essential for charts and instruments	1 to 20
Interiors or Spaces	5 to 20
Bridge Areas (including chart tables, obstacles and adjacent corridors and spaces)	0 to 20 (ContinuouslyVariable)
Stairways	5 to 20
Corridors	5 to 20
Repair Work (with smaller to larger size detail)	5 to 55

Brightness (Adopted from DOT/FAA/CT-96/1—Human Factors Design Guide).
The following table recommends the brightness ratio between the lightest and darkest areas or between a task area and its surroundings.

Table 6 Maximum Brightness Ratios

Environmntal Classification			
Comparison	A	B	C
Between lighter surfaces and darker surfaces within the task	5 to 1	5 to 1	5 to 1
Between tasks and adjacent darker surroundings	3 to 1	3 to 1	5 to 1
Between tasks and adjacent lighter surroundings	1 to 3	1 to 3	1 to 5
Between tasks and more remote darker surfaces	10 to 1	20 to 1	b
Between tasks and more remote lighter surfaces	1 to 10	1 to 20	b
Between luminaries and adjacent surfaces	20 to 1	b	b
Between the immediate work area and the rest of the environment	40 to 1	b	b

Environmental Classification Notes :
A : Interior areas where reflectances of entire space can be controlled for optimum visual conditions.
B : Areas where reflectances of nearby work can be controlled, but there is only limited control over remote surroundings.
C : Areas (indoor and outdoor) where it is completely impractical to control reflectances and difficult to alter environmental conditions.
b : Brightness ratio control is not practical.

1.3 Ventilation

Thermal comfort varies among individuals as it is determined by individual differences. Individually, perception of thermal comfort is largely determined by the interaction of thermal environmental factors such as air temperature, air velocity, relative humidity, and factors related to activity and clothing.
The Heating, Ventilation and Air-Conditioning (HVAC) systems onboard a vessel should be designed to effectively control the indoor thermal environmental factors to facilitate the comfort of the crew.
The following are a set of ergonomic recommendations that aim to achieve operator satisfaction from a thermal comfort perspective.

A) Recommended Air temperature

A Heating, Ventilation, and Air Conditioning (HVAC) system should be adjustable, and temperatures should be maintained by a temperature controller. The preferred means would be for each manned space to have its own individual thermostat for temperature regulation and dehumidification purpose.

International Standards recommend different bands for a HVAC system, but there is little difference in the minimum and maximum values they stipulate. A band width between 18°C (64°F) and 27°C (80°F) accommodates the optimum temperature range for indoor thermal comfort.

B) Recommended Relative humidity

A HVAC system should be capable of providing and maintaining a relative humidity within a range from 30% minimum to 70% maximum with 40 to 45% preferred.

C) Enclosed space vertical gradient recommendation

The difference in temperature at 100 mm (4 in.) above the deck and 1700 mm (67 in.) above the deck should be maintained with 3°C (6°F).

D) Recommended Air velocity

Air velocities should not exceed 30 metres-per-minute or 100 feet-per-minute (0.5 m/s or 1.7 ft/s) at the measurement position in the space.

E) Berthing Horizontal Temperature Gradient

In berthing areas, the difference between the inside bulkhead surface temperature adjacent to the berthing and the average air temperature within the space should be less than 10°C (18°F).

F) Air exchange rate

The rate of air exchange for enclosed spaces should be at least six (6) complete changes-per-hour.

Summary of Indoor Climate Requirements

Item	Requirement or Criterion
Air Temperature	18 to 27°C (68 to 77°F)
Relative Humidity	The HVAC system shall be capable of providing and maintaining a relative humidity within a range from 30% minimum to 70% maximum
Vertical Gradient	The acceptable range is 0 − 3°C (0 − 6°F)
Air Velocity	Not exceed 30 meters-per-minute or 100 feet-per-minute
Horizontal Gradient (Berthingareas)	The horizontal temperature gradient in berthing areas shall be <10°C (18°F)
Air Exchange Rate	The rate of air change for enclosed spaces shall be at least six (6) complete changes-per-hour.

1.4 Vibration

Vibration comfort varies among individuals as it is determined by individual differences. Individually, perception of vibration comfort is determined by the magnitudes and frequencies of those vibrations.

The following are recommendations aiming to control levels of whole body vibration exposure that are generally not considered to be uncomfortable, and these are based on the recommendations of ISO 6954 (2000).

The following levels of whole body vibrations should not be exceeded when measured in three axes(x, y, and z)sing the w weighting scale (whole body, as discussed in ISO 6954:2000) with a band limitation in all axes limited from 1 to 80 hz.

Maximum RMS vibration levels	
Accommodations Areas	Workspaces
180 mm/second2 (5 mm/s)	215 mm/second2 (6 mm/s)

1.5 Access

The following provide further ergonomic guidance on access arrangements to support the recommendations given in Section 4.6 Access & Egress Design, with a view to covering wider scope than those covered by the mandatory requirements such as SOLAS Regulation II-1/3-6 and IACS UI SC191.
The measurements hereunder are based on one of recognised practices for ergonomic design with a view to providing general guidance to cover not only means of access for inspections but also means of ac-

cess for operation. Therefore, they are not necessarily identical to those specified in the mandatory requirements.

Stair Handrail

In addition to the recommendations for Stair Handrails presented in Section 4.6 Access & Egress Design, the following recommended dimensions relating to the design of Stair Handrails are presented in the following table. Stairs with three or more steps should be provided with handrails.

Stair Handrail Arrangements

Arrangement	Handrail Recommendation
1120 mm (44 in.) or wider stair with bulkhead on both sides	Single tier handrail on both sides
Less than 1120 mm (44 in.) stair width with bulkhead on both sides	Single tier handrail on one side, preferably on the right side descending
1120 mm (44 in.) or wider stair, one side exposed, one with bulkhead	Two tier handrail on exposed side, single tier on bulkhead side
Less than 1120 mm (44 in.) stair width, one side exposed, one with bulkhead	Two tier handrail on exposed side
All widths, both sides of stairs exposed	Two tier handrail on both sides

Walkway and Ramp Design

In addition to the recommendations for Walkway Design presented in Section 4.6 Access & Egress Design, the following recommended dimensions relating to the design of walkways and ramps are presented in figure 1'Walkway and Ramp Design'.

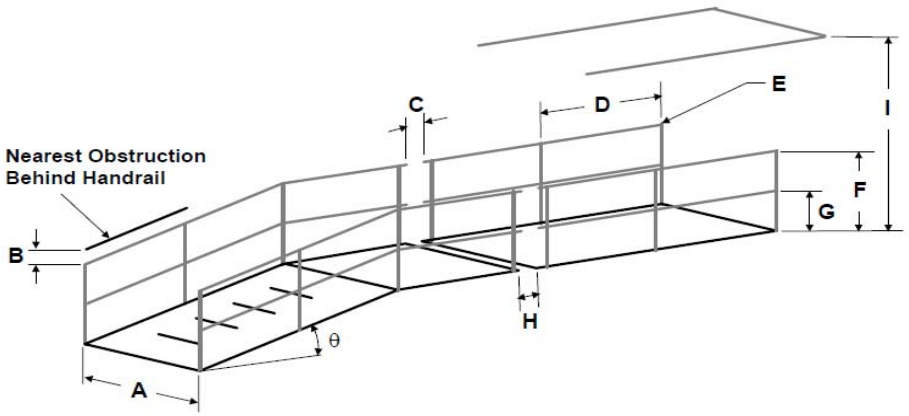
Figure 1 Walkway and Ramp Design

Dimension		Recommendations
A	Walkway width – one person[2]	≥ 710 mm (28 in.)
	Walkway width – two-way passage, or means of access or egress to an entrance	≥ 915 mm (36 in.)
	Walkway width – emergency egress, unobstructed width	≥ 1120 mm (44 in.)
B	Distance behind handrail and any obstruction	≥ 75 mm (3.0 in.)
C	Gaps between two handrail sections or other structural members	≤ 50 mm (2.0 in.)
D	Span between two handrail stanchions	≤ 2.4 m (8 ft)
E	Outside diameter of handrail	≥ 40 mm (1.5 in.) ≤ 50 mm (2.0 in.)
F	Height of handrail	1070 mm (42.0 in.)
G	Height of intermediate rail	500 mm (19.5 in.)
H	Maximum distance between the adjacent stanchions across handrail gaps	≤ 350 mm (14.0 in.)
I	Distance below any covered overhead structure or obstruction	≥ 2130 mm (84 in.)
È	Ramp angle of inclination – unaided materials handling	≤ 5 degrees
	Ramp angle of inclination – personnel walkway	≤ 15 degrees

Notes

1 Toeboard omitted for clarity

2 The walkway width may be diminished to ≥ 500 mm around a walkway structure web frames



Vertical Ladder Design and Dimensions

In addition to the recommendations for Vertical Ladders presented in Section 4.6 Access & Egress Design, the following recommended dimensions relating to the design of Ladders are presented in Figure 2 to Figure 5.

Figure 2 − Vertical Ladders (General Criteria)
Figure 3 − Staggered Vertical Ladders
Figure 4 − Vertical Ladders to Landings (Side Mount)
Figure 5 − Vertical Ladders to Landings (Ladder through Platform)

Figure 2 Vertical Ladders (General Criteria)

Dimension		Recommendation
A	Overhead Clearance	2130 mm (84.0 in.)
B	Ladder distance (gap accommodating toe space) from surface (at 90 degrees)	≥ 175 mm (7.0 in.) ≤ 200 mm (8.0 in.)
C	Horizontal Clearance (from ladder face and obstacles)	≥ 750 mm (29.5 in.) or ≥ 600 mm (23.5 in.) (in way of openings)
D	Distance between ladder attachments / securing devices	≤ 2.5 m (8.0 ft)
E	Ladder angle of inclination from the horizontal	80 to 90 degrees
F	Rung Design − (Can be round or square bar; where square bar is fitted, orientation should be edge up)	Square bar 25 mm (1.0 in.) x 25 mm (1.0 in.) Round bar 25 mm (1.0 in.) diameter
G	Distance between ladder rungs (rungs evenly spaced throughout the full run of the ladder)	≥ 275 mm (11.0 in.) ≤ 300 mm (12.0 in.)
H	Skew angle	≤ 2 degrees
I	Stringer separation	400 to 450 mm (16.0 to 18.0 in.)
J	Ladder height: Ladders over 6 m (19.7 ft) require intermediate/linking platforms)	≤ 6.0 m (19.5 ft)

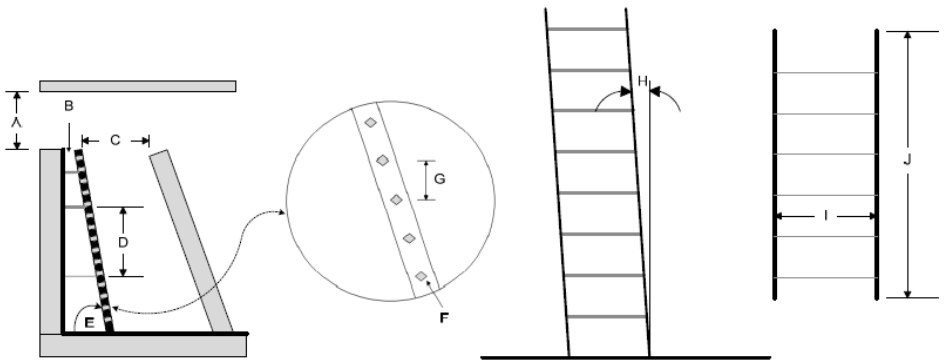


Figure 3 Staggered Vertical Ladder

Dimension		Recommendation
A	Stringer separation	400 to 450 mm (16.0 to 18.0 in.)
B	Horizontal separation between two vertical ladders, stringer to stringer	≥ 225 mm (9 in.) ≤ 450 mm (18 in.)
C	Distance between ladder rungs (rungs evenly spaced throughout the full run of the ladder)	≥ 275 mm (11.0 in.) ≤ 300 mm (12.0 in.)
D	Stringer height above landing or intermediate platform	≥ 1350 mm (53.0 in.)
E	Rung design – (Can be round or square bar; where square bar is fitted, orientation should be edge up)	Square bar 22 mm (0.9 in.) x 22 mm (0.9 in.) Round bar 25 mm (1.0 in.) diameter
F	Horizontal separation between ladder and platform	≥ 150 mm (6.0 in.) ≤ 300 mm (12.0 in.)
G	Landing or intermediate platform width	≥ 925 mm (36.5 in.)
H	Platform ladder to Platform ledge	≥ 75 mm (3.0 in.) ≤ 150 mm (6.0 in.)

*Note: Left side guardrail of platform omitted for clarity.

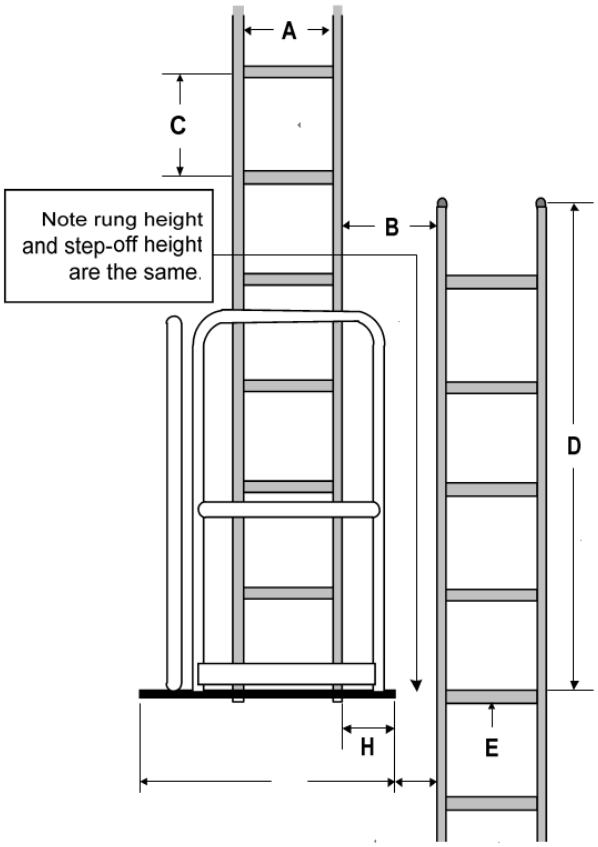


Figure 4 Vertical Ladders to Landings (Side Mount)*

Dimension		Recommendation
A	Platform depth	≥ 750 mm (29.5 in.)
B	Platform width	≥ 925 mm (36.5 in.)
C	Ladder distance from surface	≥ 175 mm (7.0 in.)
D	Horizontal separation between ladder and platform	≥ 150 mm (6.0 in.) and ≤ 300 mm (12.0 in.)

* Notes: Top view. Guardrails/Handrails not shown.

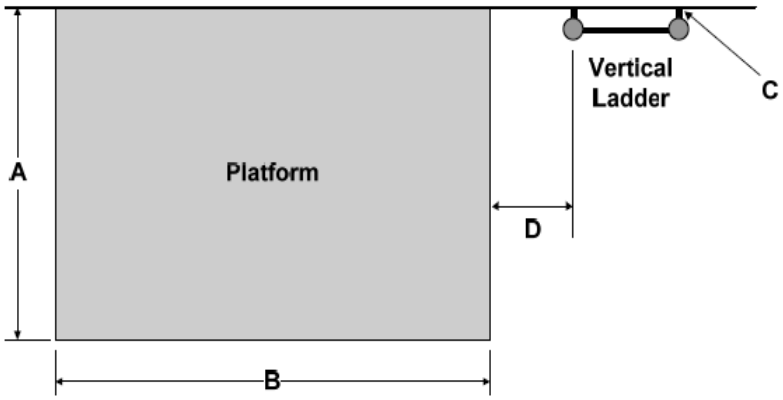
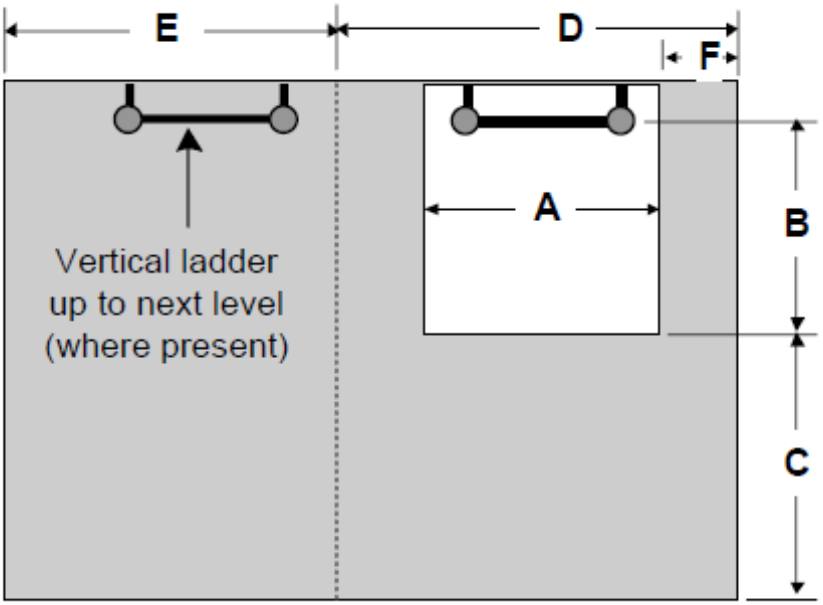


Figure 5 Vertical Ladders to Landings (Ladder through Platform)*

Dimension		Recommendation
A	Vertical ladder opening	≥ 750 mm (29.5 in.)
B	Distance from front of vertical ladder to back of platform opening	≥ 750 mm (29.5 in.)
C	Minimum clear standing area in front of ladder opening – Depth	≥ 750 mm (29.5 in.)
D	Minimum clear standing area in front of ladder opening – Width	≥ 925 mm (36.5 in.)
E	Additional platform width for intermediate landing (where present)	≥ 925 mm (36.5 in.)
F	Horizontal separation between ladder and platform	≥ 150 mm (6.0 in.) and ≤ 300 mm (12.0 in.)

*Notes: Top view. Guardrails/Handrails not shown

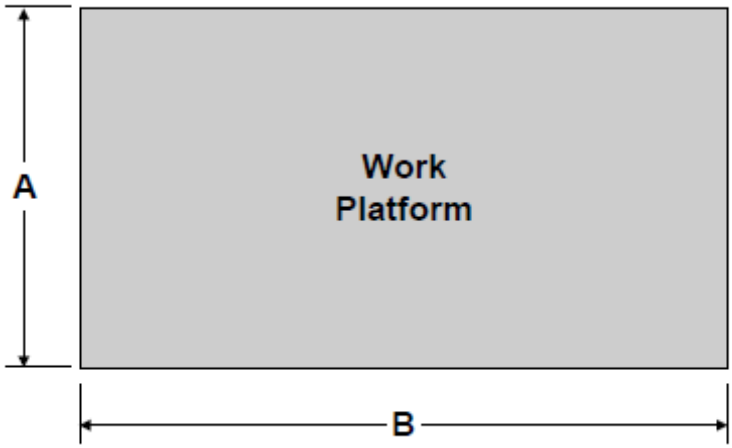


Work Platform

In addition to the recommendations for Work Platforms presented in Section 4.6 Access & Egress Design, the following recommended dimensions relating to the design of Work Platforms are presented in Figure 6 'Work Platform Dimensions'.

Figure 6 Work Platform Dimensions

Dimension		Recommendation
A	Work platform width	≥ 750 mm (29.5 in.)
	Work platform width (if used for standing only)	≥ 380 mm (15.0 in.)
B	Work platform length	≥ 925 mm (37.0 in.)
	Work platform length (if used for standing only)	≥ 450 mm (18.0 in.)



Annex B – Relevant Standards, Guidelines and Practices

This Annex presents a list of standards and guidance documents used by industry in relation to lighting, ventilation, vibration, noise and access in the context of their effects on human working onboard ships.

2.1 Lighting

- ASTM F1166 2007 Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities
- IESNA RP-12-97, Recommended Practice for Marine Lighting
- ISO 8995:2000 (CIES 008/E), Lighting of indoor work places
- ILO Maritime Labour Convention
- JIS F 8041: Recommended Levels of illumination and Methods of illumination Measurement for Marine Use

2.2 Ventilation

- ANSI/ASHRAE (15) (2010). Practices for Measuring, Testing, Adjusting, and Balancing Shipboard HVAC&R Systems
- ANSI/ASHRAE 55a, (2010). Thermal environmental conditions for human occupancy
- ANSI/ASHRAE 62.1 (2010) Ventilation for Acceptable Indoor Air Quality
- ISO 7547:2008 Ships and marine technology – Air-conditioing and ventilation of accommodation s paces – Design conditions and basis of calculations
- ISO 7726 (E), (1998), Ergonomics of the thermal environment – Instruments for measuring physical quantities

2.3 Vibration

- ISO 2631-1:1997, Mechanical Vibration and Shock – Evaluation of Human Exposure to Whole Body Vibration – Part 1: General Requirments
- ISO 2631-2:2003, Mechanical Vibration and Shock – Evaluation of Human Exposure to Whole Body Vibration – Part 2: Vibration in Buildings.
- ISO 6954:2000, Mechanical Vibration and Shock – Guidelines for the Measurement, Reporting and Evaluation of Vibration with Regard to Habitability on Passenger and Merchant Ships
- ISO 8041:2005, Human response to vibration – Measuring instrumentation.

2.4 Noise

- IMO Resolution A.337(91), Code on Noise Levels On Board Ships

2.5 Access

- American Society for Testing and Materials (ASTM) F1166 2007 Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities
- IACS (2002). Recommendation No. 78 – Safe Use of Portable Ladders for Close-up Surveys
- IACS (2005). Recommendation No. 90 – Ship Structure Access Manual
- IACS (1992). Recommendation No. 91 – Guidance for Approval/Acceptance of Alternative Means of

Access

- IACS, Unified Interpretations (UI) SC191 for the application of amended SOLAS regulation II-1/3-6 (IMO Resolution MSC.151 (78)) and revised Technical provisions for means of access for inspections (IMO Resolution MSC.158 (78))
- IMO Maritime Safety Committee Resolution MSC.133 (76) Adoption of Amendments to the Technical Provisions for Means of Access for Inspections
- IMO Maritime Safety Committee Resolution MSC.134 (76) Adoption of Amendments to the International Convention for the Safety of Life At Sea
- IMO Maritime Safety Committee Resolution MSC.158 (78) (adopted 20 May 2004), Amendments to the Technical Provisions for Means of Access for Inspections

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No : 2014-3-E
Date : 2014.05.26

To : All Surveyors and whom it may concern

Subject : 9.70 Notice for Amendments to the KR Technical Rules

1. Please be informed that the amendments have been made to the following KR Technical Rules 2014 as attached to reflect IACS UR Z3(Rev.6), UR Z16(Rev.4) and Technical Information Investigation Report which are to be applied on or after 1 July 2014. You are kindly requested to apply the amendments on the relevant works according to effective date.

(1) Rules/Guidance for the Classification of Steel Ships Pt 1 Classification and Surveys
(Effective date : the application date for survey on or after 1 July 2014)
(2) Rules for the Classification of Steel Ships Pt 4 Hull Equipment
(Effective date : a product which is applied for inspection on or after 1 July 2014)
(3) Rules for the Classification of Steel Ships Pt 7 Ships of Special Service
(Effective date : the contract date for construction on or after 1 July 2014)
(4) Rules for the Classification of Steel Ships Pt 10 Hull Structure and Equipment of Small Steel Ships
(Effective date : the contract date for construction on or after 1 July 2014)
(5) Guidance for Approval of Manufacturing Process and Type Approval, Etc
(Effective date : a product which is applied for approval on or after 1 July 2014)

2. Furthermore, please be informed that the amendments will be included in 2015 edition of KR Technical Rules which are published in the first half of 2015.

Attachment : KR Technical Rules amendment —— 1 Copy.<The end>

Kim Chang-wook
Executive Vice President
Technical Division

< Attachment >

KR Technical Rules amendment

Ⅰ. Rules/Guidance for the Classification of Steel Ships Pt 1 Classification and Surveys

Ⅱ. Rules for the Classification of Steel Ships Pt 4 Hull Equipment

Ⅲ. Rules for the Classification of Steel Ships Pt 7 Ships of Special Service

Ⅳ. Rules for the Classification of Steel Ships Pt 10 Hull Structure and Equipment of Small Steel Ships

Ⅴ. Guidance for Approval of Manufacturing Process and Type Approval, Etc.

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

◉ To reflect IACS UR Z16 (Rev.4 Oct 2013)
- Enter into force on 1 July 2014

◉ To reflect IACS UR Z3 (Rev.6 Dec 2013)
- Enter into force on 1 July 2014

Present	Amendment
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 5-2 Special Survey (Additional Requirements to Ship Types)	**Section 5-2 Special Survey (Additional Requirements to Ship Types)**
1. ~ 2. <same as the present Rules>	**1. ~ 2.** <same as the present Rules>
3. Liquefied gas carriers : (1) ~ (2) <same as the present Rules> (3) Membrane and semi-membrane tank (A) For membrane and semi-membrane tank system, inspection and testing are to be carried out in accordance with programmes specially prepared in accordance with an approved method for the actual tank system. (B) For membrane containment systems a tightness test of the secondary barrier shall be carried out in accordance with the system designers' procedures as approved by the Society. (C) For membrane containment systems with glued secondary barriers the values obtained shall be compared with previous results or results obtained at newbuilding stage. If significant differences are observed for each tank or between tanks, the Surveyor is to require an evaluation and additional testing as necessary.	**3. Liquefied gas carriers :** (1) ~ (2) <same as the present Rules> (3) Membrane and semi-membrane tank (A) For membrane and semi-membrane tanks systems, inspection and testing are to be carried out in accordance with programmes specially prepared in accordance with an approved method for the actual tank system. (B) For membrane containment systems, a tightness test of the primary and secondary barrier shall be carried out in accordance with the system designers' procedures and acceptance criteria as approved by the classification society. Low differential pressure tests may be used for monitoring the cargo containment system performance, but are not considered an acceptable test for the tightness of the secondary barrier. (C) For membrane containment systems with glued secondary barriers if the designer's threshold values are exceeded, an investigation is to be carried out and additional testing such as thermographic or acoustic emissions testing should be carried out. ~~the values obtained shall be compared with previous results or results obtained at newbuilding stage. If significant differences are observed for each tank or between tanks, the Surveyor is to require an evaluation and additional testing as necessary.~~
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Present	Amendment
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 6 Docking Survey	**Section 6 Docking Survey**
601. to 602. <same as the present Rules>	**601. to 602. <same as the present Rules>**
603. Requirements of survey	**603. Requirements of survey**
1. to 5. <same as the present Rules>	**1. to 5. <same as the present Rules>**
6. Visible parts of side thrusters and anti-rolling devices are to be examined.	**6.** Visible parts of side thrusters and anti-rolling devices are to be examined. Other propulsion systems which also have manoeuvring characteristics (such as waterjet propulsion systems, azimuth or rotatable thrusters/directional propellers, vertical axis propellers) are to be examined externally with focus on the condition of gear housing, propeller blades, bolt locking and other fastening arrangements and sealing arrangement of propeller blades, propeller shaft and steering column shall be verified. Furthermore the surveys are to be carried out in accordance with the Guidance relating to the Rules.
7. <same as the present Rules>	**7. <same as the present Rules>**
8. The surveys for water jet propulsion systems and azimuth or rotatable thruster are to be carried out in accordance with the Guidance relating to the Rules.	~~**8.** The surveys for water jet propulsion systems and azimuth or rotatable thruster are to be carried out in accordance with the Guidance relating to the Rules.~~
9. to 10. <same as the present Rules>	**8. to 9. <same as the present Rules>**
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Amended Guidance Relating to the Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

◉ To reflect IACS UR Z3 (Rev.6 Dec 2013)
- Enter into force on 1 July 2014

Present	Amendment
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 6 Docking Survey	**Section 6 Docking Survey**
603. Requirements of survey	**603. Requirements of survey**
1. to 3. <same as the present Rules>	**1. to 3. <same as the present Rules>**
4. In application to **603. 8** of the Rules, the Guidance means the requirements specified in **Annex 1-9** of the Guidance.	**4.** In application to **603. 6** of the Rules, the Guidance means the requirements specified in **Annex 1-9** of the Guidance.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Amended Rules for the Classification of Steel Ships

(Part 4 Hull Equipment)

◉ To reflect Internal Request from Class Equipment Team
- Enter into force on 1 July 2014

Present

CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT

Section 3 Anchors

309. Testing and certification

1. Test programme

(1) <Omitted>

(2) Applicable programmes for each product form are as belows.

Product test	Product form		
	Cast components	Forged components	Fabricated/Welded components
Programme A	O	X	X
Programme B	O(1)	O	O

Notes

(1) A. CVN impact tests are to be carried out to demonstrate at least 27 joules average at 0ºC.

B. The Drop test requirement in Programme B is intended for tankers applicable for Cast Components.

<hereafter, same as the present Rules>

Amendment

CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT

Section 3 Anchors

309. Testing and certification

1. Test programme

(1) <Omitted>

(2) Applicable programmes for each product form are as belows.

Product test	Product form		
	Cast components	Forged components	Fabricated/Welded components
Programme A	O	X	X
Programme B(1)	O(2)	O	O

Notes

(1) The Drop test requirement in Programme B is applicable for Cast Components.

(2) CVN impact tests are to be carried out to demonstrate at least 27 joules average at 0ºC

<hereafter, same as the present Rules>

Amended Rules for the Classification of Steel Ships

(Part 7 Ships of Special Service Ch. 1, Ch. 10)

◉ To reflect Internal Request from Hull Team II
- Enter into force on 1 July 2014

Present	Amendment
CHAPTER 1 OIL TANKERS	**CHAPTER 1 OIL TANKERS**
Section 1 General	**Section 1 General**
101. Application [See Guidance]	**101. Application [See Guidance]**
1. to 5. <same as the present Rules>	**1. to 5.** <same as the present Rules>
<newly added>	**6.** For ships not engaged in international voyages, the relevant requirements of flag administration may be applied in application of this Chapter.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Present	Amendment
CHAPTER 10 DOUBLE HULL TANKER	**CHAPTER 10 DOUBLE HULL TANKER**
Section 1 General	**Section 1 General**
101. Application [See Guidance]	**101. Application [See Guidance]**
1. to 6. <same as the present Rules>	**1. to 6.** <same as the present Rules>
<newly added>	**7.** For ships not engaged in international voyages, the relevant requirements of flag administration may be applied in application of this Chapter.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Amended Rules for the Classification of Steel Ships

(Part 10 Hull Structure and Equipment of Small Steel Ships)

◉ To reflect Internal Request from Hull Team II
- Enter into force on 1 July 2014

Present	Amendment
CHAPTER 1 GENERAL **Section 2 General** **201. to 206. <same as the present Rules>** **207. Carriage of oil or other flammable liquid substances** **1.** <same as the present Rules> **2.** The construction and arrangement for carriage of fuel oils having a flashpoint 60°C or below at a closed cup test, are to be in accordance with the requirements provided in Part, and to comply with the requirements in **Pt 8, Ch 1, Sec 4** in addition. <hereafter, same as the present Rules>	**CHAPTER 1 GENERAL** **Section 2 General** **201. to 206. <same as the present Rules>** **207. Carriage of oil or other flammable liquid substances** **1.** <same as the present Rules> **2.** The construction and arrangement for carriage of fuel oils having a flashpoint 60°C or below at a closed cup test, are to be in accordance with the requirements provided in Part, and to comply with the requirements in **Pt 8, Ch 2, 104.** in addition. <hereafter, same as the present Rules>
CHAPTER 22 EQUIPMENT NUMBER AND EQUIPMENT **Section 1 General** **101. General and application [See Guidance]** **1. to 2.** <same as the present Rules> **3.** The bower anchors given in **Table 10.22.1** are to be connected to their cables and stored on board ready for use. A spare anchor in addition to the requirements given in **Table 10.22.1** may be required for the ships such as cable layer, observation, research, patrol and fishing vessels in consideration of kind of ships, condition in service area, etc. <hereafter, same as the present Rules>	**CHAPTER 22 EQUIPMENT NUMBER AND EQUIPMENT** **Section 1 General** **101. General and application [See Guidance]** **1. to 2.** <same as the present Rules> **3.** The bower anchors given in **Table 10.22.1** are to be connected to their cables and stored on board ready for use. ~~A spare anchor in addition to the requirements given in **Table 10.22.1** may be required for the ships such as cable layer, observation, research, patrol and fishing vessels in consideration of kind of ships, condition in service area, etc.~~ <hereafter, same as the present Rules>

Present	Amendment
CHAPTER 23 OIL TANKERS	**CHAPTER 23 OIL TANKERS**
Section 1 General	**Section 1 General**
101. Application [See Guidance]	**101. Application [See Guidance]**
1.to 4. <same as the present Rules>	**1.to 4.** <same as the present Rules>
<newly added>	**5.** For ships not engaged in international voyages, the relevant requirements of flag administration may be applied in application of this Chapter.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>
103. Cofferdams [See Guidance]	**103. Cofferdams [See Guidance]**
1.to 4. <same as the present Rules>	**1.to 4.** <same as the present Rules>
5. Location and separation of spaces in tankers of 500 tons gross and above carrying oils having a flashpoint not exceeding 60°C are to be in accordance with the requirements in **Pt 8, Ch 1.**	**5.** Location and separation of spaces in tankers of 500 tons gross and above carrying oils having a flashpoint not exceeding 60°C are to be in accordance with the requirements in **Pt 8, Ch 2, 104.**
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Present	Amendment
107. Openings of superstructure and deckhouse The arrangement of openings on the boundaries of superstructure and deckhouse are to be such as to minimize the possibility of accumulation of vapours of cargoes. Due consideration in this regard is to be given when the ship is equipped to load or unload at the stern. Side scuttles to the poop front or other similar walls are to be of fixed type. Such openings of tankers of 500 gross tons and above carrying oils having a flash point not exceeding 60°C are to be in accordance with the requirements in **Pt 8, Ch 1, 402.** <hereafter, same as the present Rules>	**107. Openings of superstructure and deckhouse** The arrangement of openings on the boundaries of superstructure and deckhouse are to be such as to minimize the possibility of accumulation of vapours of cargoes. Due consideration in this regard is to be given when the ship is equipped to load or unload at the stern. Side scuttles to the poop front or other similar walls are to be of fixed type. Such openings of tankers of 500 gross tons and above carrying oils having a flash point not exceeding 60°C are to be in accordance with the requirements in **Pt 8, Ch 2, 104. 2.** <hereafter, same as the present Rules>

Present	Amendment
Section 2 Hatchways, Gangways and Freeing Arrangements	**Section 2 Hatchways, Gangways and Freeing Arrangements**
201. to 203. <same as the present Rules>	**201. to 203. <same as the present Rules>**
204. Permanent gangway and passage	**204. Permanent gangway and passage**
1. A fore and aft permanent gangway complying with the requirements of **Ch 22, 503.** is to be provided at the level of the superstructure deck between the midship bridge or deck house and the poop or aft deck house, or equivalent means of access is to be provided to carry out the purpose of the gangway, such as passage below deck. Elsewhere and in ships without midship bridge or deck house, arrangements to the satisfaction of the Society are to be provided to safeguard the crew in reaching all parts used in the necessary work of the ship.	**1.** A fore and aft permanent gangway complying with the requirements of **Pt 4, Ch 4, 503.** is to be provided at the level of the superstructure deck between the midship bridge or deck house and the poop or aft deck house, or equivalent means of access is to be provided to carry out the purpose of the gangway, such as passage below deck. Elsewhere and in ships without midship bridge or deck house, arrangements to the satisfaction of the Society are to be provided to safeguard the crew in reaching all parts used in the necessary work of the ship.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Present

Section 3 Longitudinal Frames and Beams in Cargo Oil Spaces

Table 10.23.1 Section modulus of bottom and side longitudinals

<table>
<tr><td rowspan="2">Positions</td><td colspan="3">Section modulus (cm^3)</td></tr>
<tr><td>Bottom longitudinals</td><td colspan="2">Side longitudinals including bilge frames</td></tr>
<tr><td>Midship part and between a point 0.15 L from the fore end and the collision bulkhead</td><td>$Z = 10Shl^2$</td><td>$Z = 9.3Shl^2$
$Z_{min} = 3.2\sqrt{L}Sl^2$</td><td rowspan="2">However, this value need not exceed the requirements for the bottom longitudinsls and it may be suitably modified for side longitudinals within 0.25 D_s from a point of 0.5 D_s above the top of keel.</td></tr>
<tr><td>Forward and afterward end parts</td><td colspan="2"><same as the present Rules></td></tr>
<tr><td colspan="4"><same as the present Rules></td></tr>
</table>

<hereafter, same as the present Rules>

Amendment

Section 3 Longitudinal Frames and Beams in Cargo Oil Spaces

Table 10.23.1 Section modulus of bottom and side longitudinals

<table>
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<tr><td>Forward and afterward end parts</td><td colspan="2"><same as the present Rules></td></tr>
<tr><td colspan="4"><same as the present Rules></td></tr>
</table>

<hereafter, same as the present Rules>

Present	Amendment
CHAPTER 24 DOUBLE HULL TANKERS	**CHAPTER 24 DOUBLE HULL TANKERS**
Section 1 General	**Section 1 General**
101. Application [See Guidance]	**101. Application [See Guidance]**
1. to 4. <same as the present Rules>	**1. to 4.** <same as the present Rules>
5. In addition to the requirements specified in **Par 4** the relevant requirements in **Pt 7, Ch 1, Sec 10** and **Pt 8, Ch 1, Sec 4** are to be applied to ships specified in **1.**	**5.** In addition to the requirements specified in **Par 4** the relevant requirements in **Pt 7, Ch 1, Sec 10** and **Pt 8, Ch 2, 104.** are to be applied to ships specified in **1.**
<newly added>	**6.** For ships not engaged in international voyages, the relevant requirements of flag administration may be applied in application of this Chapter.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>
102. Arrangement and separation of spaces [See Guidance]	**102. Arrangement and separation of spaces [See Guidance]**
1. to 7. <same as the present Rules>	**1. to 7.** <same as the present Rules>
8. Pipe duct in double bottom Pipe ducts in the double bottom are to comply with the following requirements: (1) to (3) <same as the present Rules> (4) For ships to which the convention applies, refer to SOLAS 1974(as amended) Regulation ll-2/56.9 <hereafter, same as the present Rules>	**8. Pipe duct in double bottom** Pipe ducts in the double bottom are to comply with the following requirements: (1) to (3) <same as the present Rules> (4) For ships to which the convention applies, refer to SOLAS 1974(as amended) Regulation ll-2/4, 5.2.4. <hereafter, same as the present Rules>

Present	Amendment
Section 10 Special requirements for Hatchways and Permanent Gangways	**Section 10 Special requirements for Hatchways and Permanent Gangways**
1001. to 1002. <same as the present Rules>	**1001. to 1002. <same as the present Rules>**
1003. Hatchways to spaces other than cargo oil tanks In exposed positions on the freeboard and forecastle decks or on the top of expansion trunks, hatchways serving spaces other than cargo oil tanks are to be provided with steel watertight covers having scantlings complying with the requirements in **Ch 19, Sec 4.**	**1003. Hatchways to spaces other than cargo oil tanks** In exposed positions on the freeboard and forecastle decks or on the top of expansion trunks, hatchways serving spaces other than cargo oil tanks are to be provided with steel watertight covers having scantlings complying with the requirements in **Pt 4, Ch 2, Sec 2.**
1004. Gangway and Access **1.** A fore and after permanent gangway complying with the requirements in **Ch 21, 503.** is to be provided at the level of the superstructure deck between the midship bridge or deckhouse and the poop or after deckhouse, or equivalent means of access is to be provided to carry out the purpose of the gangway such as passage below deck. Elsewhere, and in ships without midship bridge and deckhouse, arrangements to the satisfaction of the Society are to be provided to safeguard the crew in reaching all parts used in the necessary work of the ship.	**1004. Gangway and Access** **1.** A fore and after permanent gangway complying with the requirements in **Pt 4, Ch 4, 503.** is to be provided at the level of the superstructure deck between the midship bridge or deckhouse and the poop or after deckhouse, or equivalent means of access is to be provided to carry out the purpose of the gangway such as passage below deck. Elsewhere, and in ships without midship bridge and deckhouse, arrangements to the satisfaction of the Society are to be provided to safeguard the crew in reaching all parts used in the necessary work of the ship.
<hereafter, same as the present Rules>	<hereafter, same as the present Rules>

Revised Guidance for Approval of Manufacturing Process and Type Approval, Etc.

◉ To reflect Internal Request from Class Equipment Team
- Enter into force on 1 July 2014

Present	Amendment
<Newly added>	**CHAPTER 1 GENERAL** **Section 2 Definitions** **205. Manufacturer approval** Manufacturer approval is to certify for the manufacturers that their quality system complies with the requirements in the Guidance, where deemed satisfactory by the Society as the result of carrying out the plant audit specified in the Guidance and evaluating manufacturing process, the capability of a quality assurance of the manufacturers(paints, fire protection materials, etc.), as suppliers have type approval certificate without individual product inspection.

Present	Amendment
CHAPTER 3 TYPE APPROVAL	**CHAPTER 3 TYPE APPROVAL**
Section 1 General	**Section 1 General**
105. Plant audit	**105. Plant audit**
1. The Society may request the plant audit specified in **Ch 2, 104**. to assure the manufacturing process (including that of subcontractor's works) and quality assurance of the products.	**1.** The Society may request the plant audit specified in **Ch 2, 104**. to assure the manufacturing process (including that of subcontractor's works) and quality assurance of the products.
2. With regard to paints(Section 3, Section 4) and Fire Protection Materials(Section 26), the following periodical plant audit is to be performed.	~~**2.** With regard to paints(Section 3, Section 4) and Fire Protection Materials(Section 26), the following periodical plant audit is to be performed.~~
(1) General	~~(1) General~~
Periodical plant audit is to be carried out to the manufacturer's workshop annually within 3 months before and after the audit date by the Society.	~~Periodical plant audit is to be carried out to the manufacturer's workshop annually within 3 months before and after the audit date by the Society.~~
(2) Application	~~(2) Application~~
Manufacturers are to submit the audit application form to the Society.	~~Manufacturers are to submit the audit application form to the Society.~~
(3) Contents	~~(3) Contents~~
(A) Plant audit equivalent to Ch.2, 104 is to be carried out to confirm manufacturing process and quality management condition.	~~(A) Plant audit equivalent to Ch.2, 104 is to be carried out to confirm manufacturing process and quality management condition.~~
(B) Specification alteration of products or alteration to the approved manufacturing process and service records of the approved products are to be confirmed.	~~(B) Specification alteration of products or alteration to the approved manufacturing process and service records of the approved products are to be confirmed.~~
(C) Non-conformity of the approved products is to be confirmed.	~~(C) Non-conformity of the approved products is to be confirmed.~~
(4) Withdrawal of approval	~~(4) Withdrawal of approval~~
Where periodical plant audit is not carried out, the Society may cancel type approval of products.	~~Where periodical plant audit is not carried out, the Society may cancel type approval of products.~~

Present	Amendment
CHAPTER 3 TYPE APPROVAL	**CHAPTER 3 TYPE APPROVAL**
Section 3 Anti-corrosive Paints	**Section 3 Anti-corrosive Paints**
304. Periodical Plant audit Periodical plant audit is to comply with **105. 2**	**304. Manufacturer approval** The manufacturer is to be subjected to Manufacturer approval in accordance with **Ch 6**.
Section 4 Acid Resisting Paints	**Section 4 Acid Resisting Paints**
404. Periodical Plant audit Periodical plant audit is to comply with **105. 2**	**404. Manufacturer approval** The manufacturer is to be subjected to Manufacturer approval in accordance with **Ch 6**.
Section 26 Fire Protection Materials	**Section 26 Fire Protection Materials**
2605. Periodical Plant audit Periodical plant audit is to comply with **105. 2**	**2605. Manufacturer approval** The manufacturer is to be subjected to Manufacturer approval in accordance with **Ch 6**.

Present	Amendment
<Newly added>	**CHAPTER 6 MANUFACTURER APPROVAL** **Section 1 General** **101. Application** **1.** The requirements in this Chapter apply to the procedures for manufacturer approval of product (paints and fire protection materials, etc.) having no individual product inspection for which approval of the Society is to be obtained in advance before they are used in ships in accordance with the requirements in the Technical Rules of the Society. **2.** The manufacturers wishing to obtain the approval of the Society for items other than those in **Par 1** above are to comply with the requirements of this Chapter. **102. Approval application** **1.** The manufacturers wishing to the Manufacturer Approval for the first time are to submit a copy of the application of approval of quality assurance system (refer to **Annex 6**) together with two copies of data in **Ch 3, 102. 3 (2)** to the Society. **2.** The manufacturers wishing to the Periodical Audit and Renewal Audit of manufacturer approval are to submit a copy of the application of approval of quality assurance system (refer to **Annex 6**) together with following data to the Society. (1) Reviewed manufacturing process during previous plant audit, the specification and list of the alteration to the manufacturing facilities(where practicable, to be mentioned with a comparison table form between new and old) (2) List of Type Approved Equipment issued by the Society (3) The copies for test records and the date list of accuracy and calibration of inspection and testing facilities (4) Service records to the Society

Present	Amendment
<Newly added>	**3.** However, the required data previously submitted to the Society, according to the Technical Rules, may be exempted from submission. **Section 2 Assessment** **201. Documentation assessment** The Society examines the data submitted under the requirements in **102.** above. **202. Plant audit** **1.** Upon satisfactory outcome of the assessment of the documentation, a visit is made to evaluate the Manufacturing survey arrangement and to verify that the manufacturer's quality assurance system is to be in conformity. **2.** When parts of products are produced by subcontractors, the Society may request the audit of their facilities to assess the manufacturing process and quality control at their location. **3.** When an external person takes part in the manufacturing process relating to quality of products at works, the Society may request the audit of that person. **4.** When deficiencies in the quality assurance system are found, the manufacturer is to be informed by documentation, and after the corrective action of the deficiencies is taken by the manufacturer, the Surveyor's revisit may be made to evaluate the validity of the corrective action. **203. Periodical audit** **1.** Periodical audit is to be carried out to the manufacturer's workshop annually within 3 months before and after the anniversary date to confirm that the approved quality system, etc. of the works are maintained satisfactorily. However, the periodical audit may be performed with a shorter interval than that above, where deemed necessary by the Society.

Present	Amendment
<Newly added>	**2.** Periodical audit is to be carried out in accordance with **201.** and **202.** above. **3.** When deficiencies in the quality assurance system are found, it is to be in accordance with **202. 4** above. **204. Renewal audit** **1.** When the valid term of the approval certificate is expired, if the manufacturer intends renewal of the approval, renewal audit is to be carried out to the manufacturer's workshop in accordance with **201.** and **202.** above. **2.** Where deemed acceptable, a part of data to be submitted and audit may be reduced. **3.** When deficiencies in the quality assurance system are found, it is to be in accordance with **202. 4** above. **205. Occasional audit** **1.** The Society may request the occasional audit if any of the following condition happens: (1) Important changes of approved quality system (2) Products to be approved are changed or added (However, where the manufacturer obtained other approval specified in the relevant chapter in this Guidance in addition to Manufacturer approval, occasional audit may substitute for conforming the change or addition during the next periodical audit or renewal audit) (3) Where problem in the quality of the approved product is reported. **2.** In the occasional audit, it is to be confirmed by the Society that all the necessary requirement are in a satisfactory condition. **3.** When deficiencies in the quality assurance system are found, it is to be in accordance with **202. 4** above.

Present	Amendment
<Newly added>	**Section 3 Approval** **301. Notification and announcement of approval** **1.** After satisfactory completion of the documentation assessment and plant audit, the Society is to issue the Manufacturer Approval Certificate such as FORM AC-6A in **Annex 5** and send it to the applicant. **2.** The Society announces the manufacturers who have been granted Manufacturer Approval Certification in the "List of Approved Manufacturer & Type Approved Equipment" containing the types of products and the main conditions of approval. **302. Validity of the certificate** **1.** The Approval Certificate for Manufacturer Approval will be valid for five years from the date of issue. In case where the approval certificate is reissued in accordance with the requirements specified in the preceding **304.**, the expiration date will not be changed. **2.** This approval maintains its validity under the acceptance of periodical audit in **203.** above. **3.** The manufacturer who intends to have a continuation of the approval is to submit an application to the Society three months before the due date together with the contents of the alteration if there is any alteration to the manufacturing facilities and to the quality assurance systems. **4.** Where for operational reasons, the renewal audit falls outside the period of approval, the manufacturer will still be considered as approved if agreement to this audit date is made within the period of three months after expiry of the validity, in this instance if successful, the extension of approval will be back dated to the original renewal date.

Present	Amendment
<Newly added>	**303. Suspension and withdrawal of certification** **1.** When non-conformities in periodical audit and renewal audit of Manufacturer Approval are found, or when conditions for the issuing of the certificate or those for its maintenance have deteriorated, the manufacturer is to correct the non-conformities. Such corrections are to be verified by the Society. In case corrective actions are not taken within the specified period, the Society may suspend the approved certificate for a given period. In case the corrective actions are not taken for the suspended period, the Society may withdraw the Manufacturer Approval. **2.** The Society can withdraw the Manufacturer Approval and Type Approval of products if any of the following conditions happens: (1) When important changes having significant effect on the quality system is not communicated to the Society. (2) When the periodical or renewal audit is not carried out in the relevant period. (3) When a request for withdrawal is made by the manufacturer. (4) When the approval fees are not paid. (5) Causing public criticism **304. Changes in the approved contents** **1.** In case of any change having effect on the manufacturing process and the quality system, it is to be promptly communicated by the manufacturer to the Society. The Society may request an occasional plant audit, where deemed necessary upon reviewing the contents of alteration. **2.** When the manufacturing sites (including that of subcontractor's works) were relocated, changed or added, the manufacturer is to submit the application for alteration to the Society together with the detailed documents of the alteration(where practicable, to be mentioned with a comparison table form between new and old). The Society is to carry out the plant audit for the manufacturing process and quality system by visiting.

Present	Amendment
<Newly added>	**Annex 5 Approval Certificate for Manufacturer** **<5. Approval Certificate for Manufacturer>** (Refer to Attachment 1)
Annex 5 Application Form for Approval **<5. Application Form for Approval>**	**Annex 6 Application Form for Approval** **<6. Application Form for Approval>** (Refer to Attachment 2)

(Attachment 1)

<5. Approval Certificate for Manufacturer>

APPROVAL CERTIFICATE FOR MANUFACTURER

Certificate No. : **Initial Approval :**

Product :

Manufacturer :

Product Description :

Approval Condition :

THIS IS TO CERTIFY that the above-mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and / or of the recognized standards as follows and entered in the "List of Approved Manufacturers and Type Approved Equipment".

This Certificate is valid until
At Issuing Location on

KOREAN REGISTER OF SHIPPING

Approver

Note :1 : The approval will be automatically suspended and the Certificate become invalid from the expiry date of the Certificate in the event that the extension has not been granted or the renewal of the Certificate is not underway.
2 : The manufacturer should notify this Society of any modification or changes that may affect the validity of this Certificate.

AC-6A(2012.07)

(Attachment 2)

<6. Application Form for Approval>

KOREAN REGISTER OF SHIPPING

Application for

- ☐ **Approval of Manufacturing Process(MP)**
- ☐ **Type Approval(TA)**
- ☐ **Manufacturer Approval (MA)**
- ☐ **Design Approval(DA)**
- ☐ **Approval of Quality Assurance System(QA)**

☐ **Initial** ☐ **Renewal** ☐ **Annual** ☐ **Change** ☐ **Occasional**

Content of Application					
Name of Product					
Model(Brand) or Grade					
Approval Range					
Company Name					
Address of Factory					
Tel. No.		Fax. No.		E-mail	
Date of Approval Test		Date to be Approval			
Attachments	☐ Approval Test Program and applicable Standards ☐ Drawings and Specification, etc ☐ Other Data to be submitted (details can be found on KR Website, http://www.krs.co.kr)				

The undersigned hereby requests Korean Register of Shipping to carry out the Approval process for the above mentioned products in accordance with the requirements of the "Rules for Classification, Steel Ships" and/or the "Guidance for Approval of the Manufacturing Process and Type Approval, Etc.", and also agrees to pay all approval fee and expenses which will be incurred in the aforesaid approval.

Date ( ) YY ( ) MM ( ) DD

Applicant (Signature or stamp)

Address of Applicant

Tel. No. Fax. No. E-mail

Person in Charge Mobile No.

Checklist/Review for Service Request				**JOB ID No.**	
Receipt No.		**Date of Receipt**		**Staff in Charge**	
Check Items				**Staff in Charge(H.O.)**	
☐ **Any special information or requirements including MOU or agreement.** ☐ **The relevant standards in the department's masterlist.** **(If not, refer to)** ☐ **This department has the necessary capability.** **(If not, other source(s) :)** ☐ **Compliance with the Classification/Statutory requirements.**				**Instruction**	

Remark : (☑: Satisfactory, ⊟: N.A), The items in bold line are for surveyor use.

Reviewed by
(Signature)

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Person in charge : Jung J.H

No : 2016-1-E

To : All surveyors and whom it may concern **Date : 2016.1.15**

Subject	9.87 The Requirements of Ice Class IE
Application	The ships for which contracts for construction are signed on or after 15 January 2016.

1. This Circular is relating to on Ch 1 Strengthening for Navigation in Ice of '**Guidance for Ships for Navigation in Ice**'.

2. Class notations 'IE' is assigned to the ship in compliance with below requirements. This circular can be applied retroactively by owner's request.

- Below -

1. Definition

Ice Class IE : ships that are capable of navigating in sea area with very light ice condition such as sea area along China northern coast(Bohai sea, etc.) in winter.

2. Ice Strengthening

The ships with Ice Class IE are to comply with following requirements.

2.1. Shell Plating

2.1.1 The longitudinal extent of strengthening of the shell plating within the ice belt is to be from the stem to the greatest breadth of the ship at the full-load waterline but need not exceed 0.2L, and the vertical extent is to be from 500 mm above the draught on the fresh water load line in summer to 500 mm below the minimum draught fore. The strengthened area is to be indicated on the plan of shell expansion.

2.1.2 The changes in thickness of side shell plating within the ice belt are to be made gradually, and the thickness t is not to be less than the value obtained from the following formula:

$t = 1.25\, t_0 \sqrt{K}$ but need not to be greater than 25 mm

where K : material factor

t_0 : the Rule thickness of amidships shell plating according to **Pt 3, Ch 4 of the Rules for the Classification of Steel Ships** in mm(assumed as ordinary steel). In calculation, S is to be taken as the spacing of longitudinals/frames, (for the actual type of framing in bow region), but the intermediate longitudinal/frames not included.

2.2 Frames and Longitudinals

2.2.1 If intermediate frames are fitted in the fore peak or within the region from the stem to 0.075L (where the latter has a larger scope than the former), the section modulus of the intermediate frames is to be not less than 75% of that of the region where they are fitted. The vertical extent of the intermediate frames is to be from 1,000 mm below the ballast waterline to 1,000 mm above the summer fresh water load line, and the frames need not be connected at their ends. If intermediate frames are not fitted, the frame spacing is not to exceed 60% of the spacing of the amidships frames, but in no case is to be greater than 0.5 m.

2.2.2 For a distance along the line of extension of the stringers, panting beams or perforated platforms in the fore peak, starting from their respective connections with side shell and leading aft to the greatest breadth of the ship at the full-load waterline (but not necessarily over 0.2L), tripping brackets are to be fitted at each frame.

2.2.3 If longitudinal framing is fitted in the fore peak or within the region from the stem to 0.075L (where the latter has a larger scope than the former), the arrangement and scantling of longitudinals within the region are to comply with the following requirements:

(1) Continuous intermediate longitudinals are to be fitted within the region, and the vertical extent is to be the same as that of intermediate frames as specified in 2.2.1 of this Section

(2) The distance between intermediate longitudinals and longitudinals within the region is not to be greater than 0.5m

(3) The section modulus of intermediate longitudinals and longitudinals within the region is to comply with applicable requirements of **Pt 3, Ch 8, Sec 4 of the Rules for the Classification of Steel Ships**, but the spacing of longitudinal S is to be taken as 1.5 times the distance between intermediate longitudinals and adjacent longitudinals in calculation.

Where it is difficult to fit intermediate logitudinals and longitudinals will be spaced not more than 700 mm apart, they may be dispensed with, provided that the plate thickness t within the region complies with the following formula:

$t = 1.58\, t_0 \sqrt{K}$ but need not to be greater than 25 mm

where t_0 : the Rule thickness of amidships shell plating according to **Pt 3, Ch 4 of the Rules for the Classification of Steel Ships** in mm(assumed as ordinary steel). In calculation, S is to be taken as the spacing of longitudinals

2.2.4 Tripping brackets are to be fitted in way of an inclined frame fitted to the ice shell plating in the fore peak or within the region from the stem to 0.075L (where the latter has a larger scope than the former) in accordance with **Ch 1, Sec 4, 403.1**(3) of **the Guidance for Ships for Navigation in Ice.**

2.3. Stem

2.3.1 The plate thickness of a welded plate stem from the full load waterline up to 600 mm above the summer fresh water load line is to be 1.1 times the requirements of **Pt 3, Ch 2, Sec 1 of the Rules for the Classification of Steel Ships**, but need not exceed 25 mm. The thickness of the remainder of the stem may

be gradually tapered to that of the shell end at the upper deck.

2.4. Fire Pump

2.4.1 At least one of the fire pumps is to be connected to a sea chest which is provided with de-icing arrangements.

Note : The requirements of Ice Class IE are equivalents to Ice Class B of CCS.

담당 본부장

(Executive Vice President Concerned Division)

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Person in charge: Park Jae-sung

No : 2019-11-E
Date : 2019. 12. 20

To : All Surveyors and whom it may concern

Subject	**9.129 Notice for Amendments to the KR Technical Rules (Guidance, Part 1)**
Application	**1st Jan. 2020 (Date of which application for survey is submitted)**

1. Please be informed that the partial amendments have been made to the "Guidance Relating to the Rules for the Classification of Steel Ships, Pt. 1, as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Enhancement of the survey requirement for converted VLOCs from VLCCs which are 25 years of age and above.

2. Furthermore, please be informed that these amendments will be included in 2020 edition for Rule and Guidance on KR Classification Technical Rules which will be published in the first half of 2020.

Attachments: Amended Guidance, Part 1 --- 1 copy. (The End)

Amended Guidance Relating to the Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Dec. 2019

- Main Amendments -

(1) Effective date : 1st Jan. 2020 (Date of which application for survey is submitted)

◉ Damage reports of Converted VLOCs which are 25 years of age and above have been steadily increasing, so additional measures are needed to improve the safety of these vessels.

(1) Effective date : 1 Jan. 2020

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 1 CLASSIFICATION **Section 1 ~ 4 〈omitted〉** **Section 5 Certificates and Reports** **502. Interim Certificate of classification 【See Rule】** In application to 502. 2 of the Rules, the term "where a single direct voyage is allowed" means the cases as specified in 901. 5 or 7 of the Rules, etc. 〈newly added〉	**CHAPTER 1 CLASSIFICATION** **Section 1 ~ 4 〈omitted〉** **Section 5 Certificates and Reports** **502. Interim Certificate of classification 【See Rule】** 1. In application to 502. 2 of the Rules, the term "where a single direct voyage is allowed" means the cases as specified in 901. 5 or 7 of the Rules, etc. *(2020)* 2. In addition to the 502. of the Rules, where deemed necessary by the Society, Interim Certificate of Classification will be issued. And the additional cases of issuing the Interim Certificate of Classification are to be in accordance with the separate requirement specified by the Society. *(2020)*
CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME **Section 1 ~ 5 〈omitted〉** **Section 6 Double Skin Bulk Carriers** **601. General 【See Rule】** In application to 601. 1 (2) of the Rules, the term "when necessary" means the cases as specified in Ch 1, 801. 5 of the Guidance. **602. Annual Survey** **1.** In application to 602. 3 (7) of the Rules, the Surveyor is to consider the cases specified in Ch 1, 801. 1 of the Guidance when require the tightness test. 【See Rule】 **2.~ 5. 〈omitted〉** 〈newly added〉	**CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 1 ~ 5 〈omitted〉** **Section 6 Double Skin Bulk Carriers** **601. General 【See Rule】** In application to 601. 1 (2) of the Rules, the term "when necessary" means the cases as specified in Ch 1, 801. 5 of the Guidance. **602. Annual Survey** **1.** In application to 602. 3 (7) of the Rules, the Surveyor is to consider the cases specified in Ch 1, 801. 1 of the Guidance when require the tightness test. 【See Rule】 **2.~ 5 〈same as the current Guidance〉** 6. In addition to the requirements of Annual Survey specified in 602. of the Rules, ore carriers converted from very large crude oil carrier which are 25 years of age and above are to be subjected to the following surveys. And when considered necessary by the Surveyor, thickness measurements is to be carried out. *(2020)* 【See Rule】 (1) Overall Survey (A) inner bottom space under all cargo holds (B) all wing spaces facing to cargo holds(incl. ballast tanks and void spaces)

Present	Amendments
〈newly added〉	(2) Close-up Survey (A) all wing ballast tanks facing to cargo holds (B) In case there are damages identified to the "main structural members"[1] of the void spaces during Overall Survey, Close-up Survey is to be carried out as follows: (a) all structural members of the spaces in which damages identified (b) other side' void spaces which are similar in structure (C) Survey method Close-up Survey is to be carried out with remote inspection techniques(RIT), temporary scaffolding, inflatable rafts or boats etc. Especially for under deck areas, it should be carried out in accordance with Pt 1, Ch 3, 102. 6. of the Rules. NOTE [1] The "main structural members" mean the following members. (a) Side shell plating and adjacent primary/secondary members (b) Deck plating and adjacent primary/secondary members (c) Bottom plating and adjacent primary/secondary members (d) Inner bottom plating and adjacent primary members (e) Inner side plating and adjacent primary members (f) Bulkhead plating and adjacent primary members (g) Cargo hatch coaming 7. For ore carriers converted from very large crude oil carrier which are 25 years of age and above, Occasional Survey is to be carried out at the interval of six months between Periodical Surveys. (1) Overall Survey (A) inner bottom space under all cargo holds (B) all transverse bulkheads in cargo holds (C) all wing spaces facing to cargo holds(incl. ballast tanks and void spaces) (2) In case there are damages identified to the "main structural members"[1] during Overall Survey, 6. (2) (B) of the Guidances is to be applied.
<hereafter, omitted>	<hereafter, same as current Guidances>

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Person in charge: PARK Jaesung

No : 2022-1-E
Date : 2022. 1. 12

To : All Surveyors and whom it may concern

Subject	**9.155 Notice for Amendments to KR Technical Classification Rules (Clarify requirements for EDD and cases for arrangements of portable bilge pump instead of fixed bilge system)**
Application	**On or after 1st Feb. 2022 (The contract date for ship construction or The application for survey is submitted)**

1. Please be informed that the partial amendments have been made to the "Rules/Guidance for the Classification of Steel Ships, Pt. 1" and "Rules/Guidance for the Classification of Steel Barges" as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Clarify requirements for "the hull below load waterline is to be free of any CoC". (Pt. 1)
2) Clarify acceptable cases for arrangements of portable bilge pump instead of fixed bilge system. (Steel Barge)

2. Furthermore, please be informed that these amendments will be included in 2023 edition on KR Classification Technical Rules which will be published in the first half of 2023.

Attachments:
1) Amendments of Rules/Guidance for the Classification of Steel Ships, Pt 1. -- 1 copy.
2) Amendments of Rules/Guidance for the Classification of Steel Barges. --- 1 copy.
(The End)

Amendments of Classification Tech. Rules

Rules and Guidance for the Classification of Steel Ships

Pt. 1 Classification and Surveys

2022. 02.

- Main Amendments -

(1) Effective date : 1 Feb. 2022 (Date of which the application for survey is submitted)

◉ At the request of Survey Team(SUR 3000-3031- 2021, 30th Nov. 2021)

- Clarify requirements for “the hull below load waterline is to be free of any CoC”.

Present	Amendment
〈Rule〉 **CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 6 Docking Survey** 601. ~ 604. 〈omitted〉 605. Extended Dry-docking Interval System 1. 〈omitted〉 2. Necessary requirements The necessary requirements for implementation of the "Extended Dry-docking Interval System" are as followings. (1) ~ (6) 〈omitted〉 (7) The hull below load waterline is to be free of any Condition of Class *(2020)* 〈newly added〉	〈Rule〉 **CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 6 Docking Survey** 601. ~ 604. 〈same as the current Rules〉 605. Extended Dry-docking Interval System 1. 〈same as the current Rules〉 2. Necessary requirements The necessary requirements for implementation of the "Extended Dry-docking Interval System" are as followings. (1) ~ (6) 〈same as the current Rules〉 (7) The hull below load waterline is to be free of any Condition of Class *(2022)* **【See Guidance】**
〈Guidance〉 **CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 6 Docking Survey** 601. ~ 604. 〈omitted〉 605. Extended Dry-docking Interval System 1. ~ 2. 〈omitted〉 **〈newly added〉**	〈Guidance〉 **CHAPTER 2 PERIODICAL AND OTHER SURVEYS** **Section 6 Docking Survey** 601. ~ 604. 〈same as the current Guidances〉 605. Extended Dry-docking Interval System 1. ~ 2. 〈same as the current Guidances〉 3. In application to **605. 2** (7) of the Rules, the term "The hull below load waterline is to be free of any Condition of Class" means there is no damage or deterioration below the load waterline that requires repairs affecting vessel's fitness for continued service. *(2022)* **【See Rule】**

Amendments for Classification Tech. Rules

Rules for the Classification of Steel Barges

2022. 02.

- Main Amendments -

(1) Effective date : 01 February 2022
(based on contract date for construction or dates of which application for survey)

◎ Amendment of Ch.20 Sec.4

- Clarify acceptable cases for arrangements of portable bilge pump instead of fixed bilge system

Present	Amendment
Rule for the Classification of Steel Barges CHAPTER 20 MACHINERY Section 4 Auxiliaries and Piping Arrangement **407. Bilge systems** **1.** An efficient bilge pumping system is to be provided in all barges capable of pumping from and draining each watertight compartment when the barge is on an even keel and either upright or listed 5 deg. If the Society is satisfied that the safety of the barge is not impaired, the bilge system may be dispensed with for particular compartment.	Rule for the Classification of Steel Barges CHAPTER 20 MACHINERY Section 4 Auxiliaries and Piping Arrangement **407. Bilge systems** **1.** An efficient bilge pumping system is to be provided in all barges capable of pumping from and draining each watertight compartment when the barge is on an even keel and either upright or listed 5 deg. ~~If the Society is satisfied that the safety of the barge is not impaired, the bilge system may be dispensed with for particular compartment.~~ The portable bilge pumps may be considered for barges that are engaged in under coastal service (excluding international voyage) if approved by the Society.

Amendments for KR Tech. Rule

Guidance relating to
the Rules for the Classification of Steel Barges

2022. 02.

Present	Amendment
# Guidance relating to the Rules for the Classification of Steel Barges ## CHAPTER 20 MACHINERY ### Section 4 Auxiliaries and Piping Arrangement **407. Bilge systems** 1. The "particular compartment" referred to in **407. 1** of the rules is compartment referred to in **406. 2** of the Guidance. 2. The capacity of the power bilge pumps specified in **407. 3** of Rules is not to be less than Q obtained from the following formula, even where one of the pumps becomes out of use. *(Omitted)*	# Guidance relating to the Rules for the Classification of Steel Barges ## CHAPTER 20 MACHINERY ### Section 4 Auxiliaries and Piping Arrangement **407. Bilge systems** ~~1. The "particular compartment" referred to in **407. 1** of the rules is compartment referred to in **406. 2** of the Guidance.~~ 1. The "approved by the Society" referred to in **407. 1** of the rules is as follows; (1) volume for “particular compartment” referred to in 406. 2 of the Guidance is not more than 0.5% of L×B×D, or (2) stability condition is to be satisfied under full loading and highest center of gravity includes such “particular compartments” referred to in 406. 2 of the Guidance filled with seawater and maximum free surface effect. When two or more compartments are considered, the stability is to be separately examined for each compartment. 2. The capacity of the power bilge pumps specified in **407. 3** of Rules is not to be less than Q obtained from the following formula, even where one of the pumps becomes out of use. *(Omitted)*

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Person in charge: PARK Jaesung

No : 2022-5-E
Date : 2022. 4. 28

To : All Surveyors and whom it may concern

Subject	**9.159 Notice for Amendments to KR Technical Classification Rules (Amending the requirements of Suspension/Withdrawal of Class)**
Application	**On or after 1st May 2022 (From the time this became known to the Society & may be applicable retroactively)**

1. Please be informed that the partial amendments have been made to the "Rules for the Classification of Steel Ships, Pt. 1" as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Amending the requirements of Suspension/Withdrawal of Class.

2. Furthermore, please be informed that these amendments will be included in 2023 edition on KR Classification Technical Rules which will be published in the first half of 2023.

Attachments: Amendments of the Rules for the Classification of Steel Ships, Pt 1.
-- 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

Amendments of Classification Tech. Rules

Rules for the Classification of Steel Ships

Pt. 1 Classification and Surveys

April. 2022

- Main Amendments -

(1) Effective date : 1st May 2022 (From the time this became known to the Society & may be applicable retroactively)

◉ At the request of Class Register and Record Team by e-mail on 28th March 2022

- Amending the requirements of Suspension/Withdrawal of Class

Present	Amendment
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 9 Suspension/Withdrawal of Class and Reclassification	**Section 9 Suspension/Withdrawal of Class and Reclassification**
901. Suspension/Reinstatement of class	**901. Suspension/Reinstatement of class**
1. 〈omitted〉	**1.** 〈same as the current Rules〉
2. The classification may be suspended in accordance with the Society's suspension procedure. *(2020)* Classification will be reinstated if the cause of such suspension are removed, or upon verification that the overdue survey has been satisfactorily dealt with. Suspension of class decided by the Society takes effect from the date when the condition for suspension of class are met and will remain in effect until such time as the class is reinstated once the due items and/or surveys have been dealt with.	**2.** The classification may be suspended in accordance with the Society's suspension procedure. *(2020)* Classification will be reinstated if the cause of such suspension are removed, or upon verification that the overdue survey has been satisfactorily dealt with. Suspension of class decided by the Society takes effect from the date when the condition for suspension of class are met and will remain in effect until such time as the class is reinstated once the due items and/or surveys have been dealt with.
(1) ~ (8) 〈omitted〉	(1) ~ (8) 〈same as the curtrent Rules〉
(9) When a ship for which statutory certificates have been withdrawn by the relevant Administration or a ship is operating with no certificate of ship's nationality without any special reason *(2021)*	(9) When a ship for which statutory certificates have been withdrawn by the relevant Administration or a ship is operating with no certificate of ship's nationality without any special reason *(2021)*
(10) A ship which has been declared(or notified) by an international organization or a national body in violation of internationally approved sanctions provisions, including resolutions of the UN Security Council *(2021)*	(10) ~~A ship which has been declared(or notified) by an international organization or a national body in violation of internationally approved sanctions provisions, including resolutions of the UN Security Council *(2021)*~~ (A) A ship that violates or is doubtful of violating sanctions, prohibitions, or restrictions imposed by a nation, international or supranational organizations. (B) When it is judged that the Society may lose social credibility or be exposed to other negative situations due to a ship or shipowner. *(2022)*
(11) In the event of non-payment of fees	(11) In the event of non-payment of fees
〈here in after, omitted〉	〈here in after, same as the current Rules〉

Present	Amendment
902. Withdrawal of class **1.** The classification may be withdrawn under the approval of the Classification Committee. (1) when class of a vessel has been suspended for a period of six(6) months. A longer suspension period may be granted when the vessel is not trading as in cases of lay-up, awaiting disposition in case of a casualty or attendance for reinstatement. (2) when the vessel is reported as a constructive total loss. (3) when the vessel is lost. (4) when the vessel is reported scrapped. (5) when the Surveyor reports that the vessel has not complied with the Rules of the Society as regards surveys to maintain the classification specified in **Ch 2, 102.** (6) When a ship is detained following a Port State Control inspection with serious deficiencies found *(2021)* (7) When a ship for which statutory certificates have been withdrawn by the relevant Administration or a ship is operating with no certificate of ship's nationality without any special reason *(2021)* (8) A ship which has been declared(or notified) by an international organization or a national body in violation of internationally approved sanctions provisions, including resolutions of the UN Security Council *(2021)* 〈here in after, omitted〉	**902. Withdrawal of class** **1.** The classification may be withdrawn under the approval of the Classification Committee. (1) when class of a vessel has been suspended for a period of six(6) months. A longer suspension period may be granted when the vessel is not trading as in cases of lay-up, awaiting disposition in case of a casualty or attendance for reinstatement. (2) when the vessel is reported as a constructive total loss. (3) when the vessel is lost. (4) when the vessel is reported scrapped. (5) when the Surveyor reports that the vessel has not complied with the Rules of the Society as regards surveys to maintain the classification specified in **Ch 2, 102.** (6) When a ship is detained following a Port State Control inspection with serious deficiencies found *(2021)* (7) When a ship for which statutory certificates have been withdrawn by the relevant Administration or a ship is operating with no certificate of ship's nationality without any special reason *(2021)* (8) ~~A ship which has been declared(or notified) by an international organization or a national body in violation of internationally approved sanctions provisions, including resolutions of the UN Security Council *(2021)*~~ (A) A ship that violates or is doubtful of violating sanctions, prohibitions, or restrictions imposed by a nation, international or supranational organizations. (B) When it is judged that the Society may lose social credibility or be exposed to other negative situations due to a ship or shipowner. *(2022)* 〈here in after, same as the current Rules〉

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Person in charge : Kim Jeongmin

No : 2022-8-E
Date : 2022.06.30

To : All Surveyors and whom it may concern

Subject	**9.162 Notice for Amendment to the KR Technical Rules (Guidance for Maritime Cyber Security System)**
Application	**Refer to Effective date for each KR Technical Rules specified in Par.1**

1. Please be informed that the amendments have been made to the following KR Technical Rules 2022 as attachment to reflect Requests for Establishment/Revision of Classification Technical Rules. And you are kindly requested to apply the amendments on the relevant works according to effective date.

Amended KR Technical Rules	Effective Date	Amendments
Guidance for Maritime Cyber Security System	1 August 2022 (Date of which application for Classification survey is issued)	New notation CS0 has been added to respond to IMO MSC.428(98) Resolution.

2. Furthermore, please be informed that the establishment will be included in 2023 edition on KR Technical Rules which will be published in the first half of 2023.

Attachments: Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

Amendments of Classification Tech. Rule
(Guidance for Maritime Cyber Security System)

2022. 7.

Effective Date : 1 August 2022

(Date of which application for Classification survey is issued)

- Main Amendments -

◉ New notation CS0 has been added to respond to IMO MSC.428(98) Resolution.

Present	Amendment
# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** 〈same as the present Rules〉 **2.** This Guidance defines the level of cyber security management and its requirement according to the level, and the application scope is determined by request of the ship owner. **3. – 7. 〈same as the present Rules〉** **102. 〈same as the presnet Rules〉** **103. Notation** **1.** New ships with the cyber security system satisfying the requirements in **Ch. 4 Sec. 2.** of this Guidance may be given a notation "**CS Ready**." However, CS Ready notation may be replaced with corresponding **CS** notation when the cyber system satisfies the requirements in **Ch. 4 Sec. 3, 4** and/or **5.** of this Guidance at the request of the ship owners after the delivery. (1) 〈newly added〉 (1) Where the ship is with basic cyber security system satisfying the requirements in **Ch. 4 Sec. 3**, a notation **"CS1(Cyber Security System 1)"** may be assigned. (2) Where the ship is with enhanced cyber security system satisfying the requirements of CS1 and in **Ch. 4 Sec. 4**, a notation **"CS2(Cyber Security System 2)"** may be assigned. (3) Where the ship is with advanced cyber security system satisfying the requirements of CS2 and in **Ch. 4 Sec. 5**, a notation **"CS3(Cyber Security System 3)"** may be assigned.	# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** 〈same as the present Rules〉 **2.** This Guidance defines the level of cyber security management and its requirement according to the level, and the application scope is determined by request of the company or ship owner. *(2022)* **3. – 7. 〈same as the present Rules〉** **102. 〈same as the presnet Rules〉** **103. Notation** *(2022)* **1.** New ships with the cyber security management system satisfying the requirements in **Ch. 4 Sec. 2.** of this Guidance may be given a notation "**CS Ready**." However, **CS Ready** notation may be replaced with corresponding **CS** notation when the cyber system satisfies the requirements in **Ch. 4 Sec. 3, 4, 5** and/or **6.** of this Guidance at the request of the ship owners after the delivery. (1) Where the ship is with basic cyber security system satisfying the requirements in **Ch. 4 Sec. 3**, a notation **"CS0(Cyber Security System 0)"** may be assigned. ~~(1)~~(2) Where the ship is with matured cyber security system satisfying the requirements of CS0 and in **Ch. 4 Sec. 4**, a notation **"CS1(Cyber Security System 1)"** may be assigned. ~~(2)~~(3) Where the ship is with enhanced cyber security system satisfying the requirements of CS1 and in **Ch. 4 Sec. 5**, a notation **"CS2(Cyber Security System 2)"** may be assigned. ~~(3)~~(4) Where the ship is with advanced cyber security system satisfying the requirements of CS2 and in **Ch. 4 Sec. 6**, a notation **"CS3(Cyber Security System 3)"** may be assigned.

Present	Amendment
2. Although the ship does not receive "CS Ready", ships with the cyber security system satisfying the requirements in **Ch. 4 Sec. 3, 4** and/or **5.** of this Guidance will be issued a Certificate of Ship Cyber Security Compliance. 1, 2 or 3 may be added to the Certificate depending on the security capabilities of the cyber security system.	**2.** Although the ship does not receive "**CS Ready**", ships with the cyber security management system satisfying the requirements in **Ch. 4 Sec. 3, 4, 5** and/or **6.** of this Guidance will be issued a Certificate of Ship Cyber Security Compliance. 0, 1, 2 or 3 may be added to the Certificate depending on the security capabilities of the cyber security management system.
3. A Company with cyber security system satisfying the requirements in **Ch. 3 Sec. 2, 3 and/or 4** of this Guidance will be issued a Certification of Company Cyber Security Compliance. 1, 2 or 3 may be added to the Certificate depending on the security capabilities of the cyber security system.	**3.** A Company with cyber security management system satisfying the requirements in **Ch. 3 Sec. 2, 3, 4 and/or 5** of this Guidance will be issued a Certification of Company Cyber Security Compliance. 0, 1, 2 or 3 may be added to the Certificate depending on the security capabilities of the cyber security system.
104. – 105. 〈same as the present Rules〉	**104. – 105. 〈same as the present Rules〉**
# CHAPTER 2 SURVEYS	# CHAPTER 2 SURVEYS
## Section 1 General	## Section 1 General
101. General	**101. General**
1. – 3. 〈same as the present Rules〉	**1. – 3. 〈same as the present Rules〉**
4. Survey targets Survey targets of the ships are as follows: (1) 〈same as the present Rules〉 (2) Control and monitoring systems for primary essential services transferring data to and from other onboard systems over via network connection (3) Control and monitoring systems for secondary essential services transferring data to and from other onboard systems over via network connection (4) – (5) 〈same as the present Rules〉	**4. Survey targets** Survey targets of the ships are as follows. However, if it is confirmed that there is low risk through cyber risk assessment, it may be excluded from the target system. *(2022)* (1) 〈same as the present Rules〉 (2) ~~Control and monitoring systems for primary essential services transferring data to and from other onboard systems over via network connection~~ Category II and III systems specified in Pt 6, Ch 2, Sec 4 of the Rules for the Classification of Steel Ships *(2022)* (3) ~~Control and monitoring systems for secondary essential services transferring data to and from other onboard systems over via network connection~~ Category I systems that may adversely affect the above Category II and III systems by being networked *(2022)* (4) – (5) 〈same as the present Rules〉

Present	Amendment
5. – 6. 〈same as the present Rules〉	5. – 6. 〈same as the present Rules〉
Section 2 Initial Surveys for Company	**Section 2 Initial Surveys for Company**
201. 〈same as the present Rules〉	201. 〈same as the present Rules〉
202. Document review	202. Document review
1. 〈newly added〉	1. The company applying the certification corresponding to Company Cyber Security Compliance 0 should submit three copies of the following documents for review. (1) Cyber security organization chart and job description of security personnel (2) Cyber security plan and training report (3) Data backup and recovery criteria (4) Mobile security policy (5) List of cyber security related assets and equipments and Status of the personnel in charge of assets (6) Cyber security risk assessment report (7) Network configuration (8) Cyber security operating statements (9) Policies, procedures and guidances related to cyber security management system (10) Security policy for outsourcer (11) Physical security policy (12) Incident response and recovery policies (13) List of Cyber security threats (14) Risk management plan (15) Patch work / approval statements (16) Change management procedures and application for change (17) Cyber security internal audit procedure, plan and result report (18) Remote access management criteria
1. The company applying the certification corresponding to Company Cyber Security Compliance 1 should submit three copies of the following documents for review. (1) 〈same as the present Rules〉	~~1.~~ 2. In addition to 202. 1, ~~T~~ the company applying the certification corresponding to Company Cyber Security Compliance 1 should submit three copies of the following documents for review. (1) 〈same as the present Rules〉

Present	Amendment
(2) Policies, procedures and guidances related to cyber security system (3) Cyber security organization chart and job description of security personnel (4) Cyber security training plan and report (5) List of Cyber security threats (6) Cyber security risk management plan (7) 〈same as the present Rules〉 (8) Cyber security risk assessment report (9) 〈same as the present Rules〉 ~~(10) List of assets and equipments and Status of the personnel in charge of assets~~ (11) – (12) 〈same as the present Rules〉 ~~(13) Physical security policy~~ ~~(14) Incident response and recovery policies~~ (15) 〈same as the present Rules〉 (16) Mobile security policy (17) Security policy for outsourcer (18) 〈same as the present Rules〉 (19) Patch work / approval statements (20) Remote Access Security Policy (21) 〈same as the present Rules〉 (22) Network configuration (23) Change management procedures and application for change (24) Cyber security operating statement (25) Cyber security internal audit procedure, plan and result report *(2020)* (26) Data backup and recovery criteria	~~(2) Policies, procedures and guidances related to cyber security system~~ ~~(3) Cyber security organization chart and job description of security personnel~~ ~~(4) Cyber security training plan and report~~ ~~(5) List of Cyber security threats~~ ~~(6) Cyber security risk management plan~~ ~~(7)~~ (2) 〈same as the present Rules〉 ~~(8) Cyber security risk assessment report~~ ~~(9)~~ (3) Improvement plan and results report ~~(10) List of assets and equipments and Status of the personnel in charge of assets~~ ~~(11) – (12)~~ (4) – (5) 〈same as the present Rules〉 ~~(13) Physical security policy~~ ~~(14) Incident response and recovery policies~~ ~~(15)~~ (6) 〈same as the present Rules〉 ~~(16) Mobile security policy~~ ~~(17) Security policy for outsourcer~~ ~~(18)~~ (7) 〈same as the present Rules〉 ~~(19) Patch work / approval statements~~ ~~(20) Remote Access Security Policy~~ ~~(21)~~ (8) 〈same as the present Rules〉 ~~(22) Network configuration~~ ~~(23) Change management procedures and application for change~~ ~~(24) Cyber security operating statement~~ ~~(25) Cyber security internal audit procedure, plan and result report *(2020)*~~ ~~(26) Data backup and recovery criteria~~
2. In addition to **202. 1**, the company applying the certification corresponding to Company Cyber Security Compliance 2 should submit three copies of the following documents for review. (1) – (9) 〈same as the present Rules〉	~~2.~~ **3.** In addition to **202. ~~1~~ 2**, the company applying the certification corresponding to Company Cyber Security Compliance 2 should submit three copies of the following documents for review. (1) – (9) 〈same as the present Rules〉
3. In addition to **202. 2**, the company applying the certification corresponding to Company Cyber Security Compliance 3 should submit three copies of the following documents for review. (1) – (5) 〈same as the present Rules〉	~~3.~~ **4.** In addition to **202. ~~2~~ 3**, the company applying the certification corresponding to Company Cyber Security Compliance 3 should submit three copies of the following documents for review. (1) – (5) 〈same as the present Rules〉

Present	Amendment
4. 〈same as the present Rules〉	**~~4.~~ 5.** 〈same as the presentRules〉
203. On-site surveys	**203. On-site surveys**
1. - 3. 〈same as the present Rules〉	**1. - 3. 〈same as the present Rules〉**
4. 〈newly added〉	**4.** The following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 0. *(2022)* (1) Cyber security issue notices (2) Cyber security training result (3) Cyber security risk assessment report and risk management plan implementation status (4) Outsourcer management status (if applicable) (5) Physical security implemenation status (6) Anti-virus program status (7) Remote access control status (8) Data backup management register (9) Cyber security operating statement (10) Status of cyber security policy documents and procedures (11) Status of cyber incident response procedures and manuals (12) Software and hardware change management records (13) System patch management records (14) Mobile device management status (15) Results of internal audit
4. The following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 1. (1) Cyber security issue notices (2) Cyber security training plan and report (3) 〈same as the present Rules〉 (4) Cyber security risk assessment and management report (5) Retiree security pledge (if applicable) *(2020)* (6) Outsourcer asset return document (if applicable) *(2020)* (7) Access authority change record	**~~4.~~ 5.** In addition to **203. 4.**, ~~T~~the following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 1. ~~(1) Cyber security issue notices~~ ~~(2) Cyber security training plan and report~~ ~~(3)~~ (1) 〈same as the present Rules〉 ~~(4) Cyber security risk assessment and management report~~ ~~(5)~~ (2) 〈same as the present Rules〉 ~~(6) Outsourcer asset return document (if applicable) *(2020)*~~ ~~(7)~~ (3) Access authority change record

Present	Amendment
(8) – (9) 〈same as the present Rules〉 (10) Physical control measures (11) 〈same as the present Rules〉 (12) Anti-virus program status (13) 〈same as the present Rules〉 (14) Remote access control status (15) Log archiving and monitoring procedures and results (16) Data backup management register (17) Data storage media discard management register (18) 〈same as the present Rules〉 (9) 〈newly added〉	~~(8) – (9)~~ (4) – (5) 〈same as the present Rules〉 ~~(10) Physical control measures~~ ~~(11)~~ (6) 〈same as the present Rules〉 ~~(12) Anti-virus program status~~ ~~(13)~~ (7) 〈same as the present Rules〉 ~~(14) Remote access control status~~ ~~(15) Log archiving and monitoring procedures and results~~ ~~(16) Data backup management register~~ ~~(17) Data storage media discard management registerr~~ ~~(18)~~ (8) 〈same as the present Rules〉 (9) Vulnerability diagnosis result report and action implementation status *(2022)*
5. In addition to **203. 4**, the following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 2. (1) – (6) 〈same as the present Rules〉	~~**5.**~~ **6.** In addition to **203. ~~4~~ 5**, the following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 2. (1) – (6) 〈same as the present Rules〉
6. In addition to **203. 5**, the following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 3. (1) – (4) 〈same as the present Rules〉	~~**6.**~~ **7.** In addition to **203. ~~5~~ 6**, the following items should be surveyed during the on-site surveys for certification corresponding to Company Cyber Security Compliance 3. (1) – (4) 〈same as the present Rules〉
7. 〈same as the present Rules〉	~~**7.**~~ **8.** 〈same as the present Rules〉
204. Survey report and certification issue	**204. Survey report and certification issue**
1. 〈same as the presnet Rules〉	**1.** 〈same as the presnet Rules〉
2. The survey report for cyber security should include at least following: (1) – (3) 〈same as the present Rules〉 (4) Corrective action results (5) 〈same as the present Rules〉	**2.** The survey report for cyber security should include at least following: (1) – (3) 〈same as the present Rules〉 (4) Corrective action results (if applicable) *(2022)* (5) 〈same as the present Rules〉
Section 3 Initial Surveys for Ship	**Section 3 Initial Surveys for Ship**
301. 〈same as the present Rules〉	**301. 〈same as the present Rules〉**

Present	Amendment
302. Document review	**302. Document review**
1. 〈same as the presnet Rules〉	**1.** 〈same as the presnet Rules〉
2. 〈newly added〉	**2.** The ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 0 or CS0 notation for the ship should submit three copies of the following documents for review. However, a part of documents may be omitted for the ship with CS Ready notation. *(2022)* (1) Cyber security organization chart and job description of security personnel (2) Cyber security plan and training report (3) Data backup and recovery criteria (4) Mobile security policy (5) Basics of the ship (6) List of cyber security related assets and equipments and Status of the personnel in charge of assets (7) Cyber security risk assessment report (8) Network configuration (9) Cyber security operating statements (10) Policies, procedures and guidances related to cyber security management system (11) Security policy for outsourcer (12) Physical security policy (13) Incident response and recovery policies (14) List of Cyber security threats (15) Risk management plan (16) Patch work / approval statements (17) Change management procedures and application for change (18) Cyber security internal audit procedure, plan and result report (19) Remote access management criteria
2. The ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 1 or CS1 notation for the ship should submit three copies of the following documents for review. However, a part of documents may be omitted for the ship with CS Ready notation. *(2020)* (1) Cyber security organization chart and job description of security personnel (2) Cyber security plan and training report *(2020)* (3) Data backup and recovery criteria	~~2.~~ **3.** In addition to **302. 2**, ~~T~~ the ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 1 or CS1 notation for the ship should submit three copies of the following documents for review. However, a part of documents may be omitted for the ship with CS Ready notation. ~~(1) Cyber security organization chart and job description of security personnel~~ ~~(2) Cyber security plan and training report~~ ~~(3) Data backup and recovery criteria~~

Present	Amendment
(4) 〈same as the presnet Rules〉 (5) Mobile security policy (6) Basics of the ship (7) List of cyber security related assets and equipments and Status of the personnel in charge of assets (8) Cyber security risk assessment report (9) Network configuration (10) Operating statements (11) Policies, procedures and guidances related to cyber security system (12) Security policy for outsourcer (13) Physical security policy (14) Incident response and recovery policies (15) List of Cyber security threats (16) Risk management plan (17) – (20) 〈same as the present Rules〉 (21) Software introduction procedure (22) Patch work / approval statements (23) Encryption criteria (24) Change management procedures and application for change (25) Cyber security internal audit procedure, plan and result report *(2020)*	~~(4)~~ (1) 〈same as the presnet Rules〉 ~~(5) Mobile security policy~~ ~~(6) Basics of the ship~~ ~~(7) List of cyber security related assets and equipments and Status of the personnel in charge of assets~~ ~~(8) Cyber security risk assessment report~~ ~~(9) Network configuration~~ ~~(10) Operating statements~~ ~~(11) Policies, procedures and guidances related to cyber security system~~ ~~(12) Security policy for outsourcer~~ ~~(13) Physical security policy~~ ~~(14) Incident response and recovery policies~~ ~~(15) List of Cyber security threats~~ ~~(16) Risk management plan~~ ~~(17) – (20)~~ (2) – (5) 〈same as the present Rules〉 ~~(21) Software introduction procedure~~ ~~(22) Patch work / approval statements~~ ~~(23)~~ (6) Encryption criteria ~~(24) Change management procedures and application for change~~ ~~(25) Cyber security internal audit procedure, plan and result report~~ *~~(2020)~~*
3. In addition to **302. 2,** the ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 2 or CS2 notation for the ship should submit three copies of the following documents for review. *(2020)* (1) – (5) 〈same as the present Rules〉	**~~3.~~ 4.** In addition to **302. ~~2.~~ 3,** the ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 2 or CS2 notation for the ship should submit three copies of the following documents for review. (1) – (5) 〈same as the present Rules〉
4. In addition to **302. 3,** the ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 3 or CS3 notation for the ship should submit three copies of the following documents for review. *(2020)*	**~~4.~~ 5.** In addition to **302. ~~3~~ 4,** the ship owner who applies the SHIP CYBER SECURITY COMPLIANCE 3 or CS3 notation for the ship should submit three copies of the following documents for review.
5. 〈same as the present Rules〉	**~~5.~~ 6. 〈same as the present Rules〉**
303. On-site surveys	**303. ~~On-site~~ Onboard surveys *(2022)***
1. – 2. 〈same as the present Rules〉	**1. – 2. 〈same as the present Rules〉**
3. The following items should be surveyed during the on-site surveys for CS Ready notation.	**3.** The following items should be surveyed during the ~~on-site~~ onboard surveys for CS Ready notation.

Present	Amendment
(1) – (12) 〈same as the present Rules〉	(1) – (12) 〈same as the present Rules〉
4. 〈newly added〉	**4.** The following items should be surveyed during the onboard surveys for SHIP CYBER SECURITY COMPLIANCE 0 or CS0 notation. (1) Cyber security issue notices (2) Cyber security training result (3) Cyber security risk assessment report and risk management plan implementation status (4) Cyber asset management status (5) Outsourcer management status (6) Physical security implemenation status (7) Anti-virus program status (8) Remote access control status (9) Data backup management register (10) Operating manual for each system (if applicable) (11) Cyber security operating statements (12) Status of cyber security policy documents and procedures (13) Status of cyber incident response procedures and manuals (14) Software and hardware change management records (15) System patch management records (16) Mobile device management status (17) Results of internal audit
4. The following items should be surveyed during the on-site surveys for SHIP CYBER SECURITY COMPLIANCE 1 or CS1 notation. *(2020)* ~~(1) Cyber security issue notices~~ ~~(2) Cyber security training report~~ (3) 〈same as the present Rules〉 (4) Risk management report (5) Security training report for persons board a ship getting on and off a ship *(2020)* (6) Outsourcer asset return document (if applicable) *(2020)* (7) Access authority change record (8) Special authorization classification table (if applicable) *(2020)* (9) 〈same as the present Rules〉 (10) Physical control measures (11) 〈same as the present Rules〉 (12) Anti-virus program status (13) Data and communication encryption status	~~4.~~ **5.** In addition to **303. 4.**, ~~To~~ the following items should be surveyed during the ~~on-site~~ onboard surveys for SHIP CYBER SECURITY COMPLIANCE 1 or CS1 notation. ~~(1) Cyber security issue notices~~ ~~(2) Cyber security training report~~ ~~(3)~~ (1) 〈same as the present Rules〉 ~~(4) Risk management report~~ ~~(5) Security training report for persons board a ship getting on and off a ship~~ ~~(6) Outsourcer asset return document (if applicable)~~ ~~(7)~~ (2) Access authority ~~change~~ record ~~(8) Special authorization classification table (if applicable)~~ ~~(9)~~ (3) 〈same as the present Rules〉 ~~(10) Physical control measures~~ ~~(11)~~ (4) 〈same as the present Rules〉 ~~(12) Anti-virus program status~~ ~~(13) Data and communication encryption status~~

Present	Amendment
(14) Remote access control status (15) Log archiving and monitoring procedures and results (16) Data backup management register (17) Data storage media discard management register (18) New software test and transfer report (if applicable) (19) System operation manuals (if applicable) *(2020)* (5) 〈newly added〉	~~(14) Remote access control status~~ ~~(15) Log archiving and monitoring procedures and results~~ ~~(16) Data backup management register~~ (17) ~~Data storage media discard management register~~ ~~(18) New software test and transfer report (if applicable) *(2022)*~~ ~~(19) System operation manuals (if applicable)~~ (5) Vulnerability diagnosis result report and action implementation status
5. In addition to **303. 4.** the following items should be surveyed during the on-site surveys for SHIP CYBER SECURITY COMPLIANCE 2 or CS2 notation. *(2020)* (1) – (6) 〈same as the present Rules〉	**5.** **6.** In addition to **303. ~~4.~~ 5.** the following items should be surveyed during the ~~on-site~~ onboard surveys for SHIP CYBER SECURITY COMPLIANCE 2 or CS2 notation. *(2020)* (1) – (6) 〈same as the present Rules〉
6. In addition to **303. 5.** the following items should be surveyed during the on-site surveys for SHIP CYBER SECURITY COMPLIANCE 3 or CS3 notation. *(2020)* (1) – (4) 〈same as the present Rules〉	**~~5.~~ 6.** **7.** In addition to **303. ~~5.~~ 6.** the following items should be surveyed during the ~~on-site~~ onboard surveys for SHIP CYBER SECURITY COMPLIANCE 3 or CS3 notation. (1) – (4) 〈same as the present Rules〉
7. – 8. 〈same as the present Rules〉	**~~7. – 8.~~ 8. – 9. 〈same as the present Rules〉**
304. 〈same as the present Rules〉	**304. 〈same as the present Rules〉**
Section 4 Surveys for certification maintenance	**Section 4 Surveys for certification maintenance**
401. 〈same as the present Rules〉	**401. 〈same as the present Rules〉**
1. Companies with Cyber security system certification should be received annual surveys to maintain certification. (1) 〈newly added〉	**1.** Companies with Cyber security system certification should be received annual surveys to maintain certification. (1) The following items should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 0. *(2022)* (A) Cyber security incident action report (B) Software and hardware change management record (C) System patch management record (D) Management status of cyber assets (E) Physical security implementation status (F) Cyber security risk assessment report and implementation status of risk management plan (G) Cyber security training record

Present	Amendment
(1) The following items should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 1. (A) System user access log (B) Cyber security incident action report (if applicable) *(2020)* (C) Software and hardware change management record *(2020)* (D) 〈same as the present Rules〉 (E) System patch management record (F) List of cyber security related assets and equipments and Status of the personnel in charge of assets *(2020)* (G) Physical security implementation status (H) 〈same as the present Rules〉 (I) Cyber security risk assessment report and implementation status of risk management plan (J) Cyber security training record (K) 〈same as the present Rules〉 (D) 〈newly added〉 (2) In addition to **402. 1 (1)**, the following items should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 2. (A) 〈same as the present Rules〉 (B) Cyber security policies, procedures and guidances making/amendment history (C) - (D) 〈same as the present Rules〉 (3) In addition to **402. 1 (2)**, the audit results should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 3. (A) - (C) 〈newly added〉 **2.** 〈same as the present Rules〉	(H) Operation status of aniti-virus program (I) Cyber security policies, procedures and guidances making/amendment history ~~(1)~~ (2) In addition to **402. 1 (1)**, ~~T~~ the following items should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 1. ~~(A) System user access log~~ ~~(B) Cyber security incident action report~~ ~~(C) Software and hardware change management record~~ ~~(D)~~ (A) 〈same as the present Rules〉 ~~(E) System patch management record~~ ~~(F) List of cyber security related assets and equipments and Status of the personnel in charge of assets *(2020)*~~ ~~(G) Physical security implementation status~~ ~~(H)~~ (B) 〈same as the present Rules〉 ~~(I) Cyber security risk assessment report and implementation status of risk management plan~~ ~~(J) Cyber security training record~~ ~~(K)~~ (C) 〈same as the present Rules〉 (D) Vulnerability diagnosis result report and improvement measures implementation status ~~(2)~~ (3) In addition to **402. 1 ~~(1)~~ (2)**, the following items should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 2. (A) 〈same as the present Rules〉 ~~(B) Cyber security policies, procedures and guidances making/amendment history~~ (C) - (D) 〈same as the present Rules〉 ~~(3)~~ (4) In addition to **402. 1 ~~(2)~~ (3)**, the audit results should be surveyed during the on-site surveys for maintaining the certification corresponding to Company Cyber Security Compliance 3. *(2022)* (A) Cyber security external audit results (B) Disaster recovery simulation training results (C) Professional cyber security training result report **2.** 〈same as the present Rules〉

Present	Amendment
403. Surveys for certification maintenance of the ship	**403. Surveys for certification maintenance of the ship**
1. Ships with Cyber security system certification should be received annual surveys to maintain certification.	**1.** Ships with Cyber security system certification should be received annual surveys to maintain certification. *(2022)*
(1) 〈newly added〉	(1) The following items should be surveyed during the onboard surveys for maintaining the CS0 notation. (A) Cyber security incident action report (B) Software and hardware change management record (C) System patch management record (D) Management status of cyber assets (E) Physical security implementation status (F) Cyber security risk assessment report and implementation status of risk management plan (G) Cyber security training record (H) Operation status of aniti-virus program (I) Cyber security policies, procedures and guidances making/amendment history
(1) The following items should be surveyed during the on-site surveys for maintaining the CS1 notation. (A) System user access log (B) Cyber security incident action report (C) Software and hardware change management record *(2020)* (D) 〈same as the present Ruels〉 (E) System patch management record (F) List of cyber security related assets and equipments and Status of the personnel in charge of assets *(2020)* (B) 〈newly added〉 (G) Physical security implementation status (H) 〈same as the present Rules〉 (I) Access authority review report (J) Cyber security risk assessment report and implementation status of risk management plan (K) Cyber security training record (L) 〈same as the present Rules〉 (M) Access control implementation status (E) 〈newly added〉	~~(1)~~ (2) In addition to **403. 1. (1),** ~~T~~ the following items should be surveyed during the ~~on-site~~ onboard surveys for maintaining the CS1 notation. ~~(A) System user access log~~ ~~(B) Cyber security incident action report~~ ~~(C) Software and hardware change management record~~ ~~(D)~~ (A) 〈same as the present Rules〉 ~~(E) System patch management record~~ ~~(F) List of cyber security related assets and equipments and Status of the personnel in charge of assets *(2020)*~~ (B) Management status of cyber assets ~~(G) Physical security implementation status~~ ~~(H)~~ (C) 〈same as the present Rules〉 ~~(I) Access authority review report~~ ~~(J) Cyber security risk assessment report and implementation status of risk management plan~~ ~~(K) Cyber security training record~~ (D) 〈same as the present Rules〉 ~~(M) Access control implementation status~~ (E) Vulnerability diagnosis result report and improvement measures implementation status

Present	Amendment
(2) In addition to **403. 1**. **(1)**, the following items should be surveyed during the on-site surveys for maintaining the CS2 notation. (A) 〈same as the present Rules〉 (B) Cyber security policies, procedures and guidances making/amendment history (C) – (E) 〈same as the present Rules〉 (3) In addition to **403. 1**. **(2)**, the following items should be surveyed during the on-site surveys for maintaining the CS3 notation. (A) – (B) 〈same as the present Rules〉 **2. <same as the present Rules〉**	~~(2)~~ (3) In addition to **403. 1**. ~~**(1)**~~ **(2)**, the following items should be surveyed during the ~~on-site~~ onboard surveys for maintaining the CS2 notation. (A) 〈same as the present Rules〉 ~~(B) Cyber security policies, procedures and guidances making/amendment history~~ (C) – (E) 〈same as the present Rules〉 ~~(3)~~ (4) In addition to **403. 1**. ~~**(1)**~~ **(3)**, the following items should be surveyed during the ~~on-site~~ onboard surveys for maintaining the CS3 notation. (A) – (B) 〈same as the present Rules〉 **2. <same as the present Rules〉**
Section 5 〈same as the present Rules〉	**Section 5 〈same as the present Rules〉**
CHAPTER 3 REQUIREMENTS FOR CS SYSTEM OF THE COMPANY	**CHAPTER 3 REQUIREMENTS FOR CS SYSTEM OF THE COMPANY**
Section 1 〈same as the present Rules〉	**Section 1 〈same as the present Rules〉**
Section 2 〈newly added〉	**Section 2 COMPANY CYBER SECURITY COMPLIANCE 0 or CS0 *(2022)***
	201. Case review The Company should share with the employees including seafarer and employees without delay any information on changes in external environmental factors such as cyber security threats and cases. **202. Security policy** **1.** The company should designate the person responsible for establishing and continually reviewing and managing the security policy in accordance with the security operation procedures.

Present	Amendment
	2. Security organization should designate and assign responsibility and authority to the personnel who have competencies related to security activities. **203. Security training** **1.** The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan. **2.** The company that manages the ship shall conduct security training for the seasfarerler onboard the ship. **204. Risk management** **1.** Internal and external environmental factors affecting the environments of information technology in the company should be identified and cataloged as threats. **2.** Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks. **3. Risk assessment should be carried out at least once a year, linking** the threat identification and vulnerability diagnosis results to assets related to cyber security. **205. Asset management** **1.** All assets related to cyber security to be protected, such as systems, facilities, data, etc. should be established and classified. **2.** The company should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role. **206. Physical Security** **1.** The company should establish policies that define the physical security standards for system equipment, facilities, and so on.

Present	Amendment
	2. The company should provide physical controls to access protected areas containing assets related to cyber security only to authorized persons. **3.** The company should control its internal assets and network connections through portable storage media such as USB. **4.** Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied. **207. Incident Response and Recovery** **1.** The Company should establish cyber incident response and recovery policy, including the types of cyber incidents and their corresponding methods and procedures. **2.** The company should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed. **3.** In case of an incident, relevant functions should be provided and the manual should be documented so that the main system can be operated safely and continuously. **208. Outside Parties' Security** The company should establish a security policy for information technology equipment and data of outside parties in order to prepare for security incidents by the outside parties. **209. System Management** **1.** Before changing the system, the relevant data should be backed up in case of system failure.

Present	Amendment
	2. Change management procedures should be established and records of implementation shall be maintained. **210. Patch Management** **1.** The company should select the patch priority in the system patch, execute the patch through the approved procedure, and list the known vulnerabilities and obstacles before the patch. 2. Patch versions for each system should be recorded and managed. **211. Mobile Security** The company should establish security policies to control the use of corporate mobile devices and employee owned mobile devices. **212. Malicious code response** Malicious code control measures should be prepared to protect major systems. When software is installed, it should be updated periodically. *(2022)* **213. Network Management** **1.** When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied. **2.** It should have a graphical network flow that can identify the network path. **214. Cyber security internal audit** **1.** Cyber security internal audit procedure should be established and conducted periodically. **2.** Policy violations should be reported in accordance with cyber security internal audit plan.

Present	Amendment
Section 2 Company Cyber Security Compliance 1	**Section ~~2~~ 3 Company Cyber Security Compliance 1 *(2022)***
201. Case review	**~~201.~~ 301. Case review**
1. 〈same as the present Rules〉	**1.** 〈same as the present Rules〉
2. The Company should share with the employees and employees without delay any information on changes in external environmental factors such as cyber security threats and cases.	**2.** ~~The Company should share with the employees~~ including seafarer ~~and employees without delay any information on changes in external environmental factors such as cyber security threats and cases.~~ *(2022)*
202. Security policy	**~~202. Security policy~~**
1. The company should designate the person responsible for establishing and continually reviewing and managing the security policy in accordance with the security operation procedures.	**1.** ~~The company should designate the person responsible for establishing and continually reviewing and managing the security policy in accordance with the security operation procedures.~~
2. Security organization should designate and assign responsibility and authority to the personnel who have competencies related to security activities.	**2.** ~~Security organization should designate and assign responsibility and authority to the personnel who have competencies related to security activities.~~
203. Security training	**~~203.~~ 302. Security training**
1. The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan.	**1.** ~~The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan.~~
2. – 3. 〈same as the present Rules〉	**~~2. – 3.~~ 1. – 2. 〈same as the present Rules〉**
204. Risk management	**~~204.~~ 303. Risk management**
1. Internal and external environmental factors affecting the environments of information technology in the company should be identified and cataloged as threats. *(2020)*	**1.** ~~Internal and external environmental factors affecting the environments of information technology in the company should be identified and cataloged as threats.~~
2. Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks.	**2.** ~~Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks.~~

Present	Amendment
3. 〈same as the present Rules〉	**~~3.~~ 1. 〈same as the present Rules〉**
4. Risk assessment should be carried out at least once a year, linking the threat identification and vulnerability diagnosis results to all assets related to cyber security.	**~~4.~~** ~~Risk assessment should be carried out at least once a year, linking the threat identification and vulnerability diagnosis results to all assets related to cyber security.~~ *~~(2022)~~*
5. 〈same as the presnet Rules〉	**~~5.~~ 2.** 〈same as the present Rules〉
6. The results of the risk assessment should be shared with all stakeholder and be able to support improvement actions.	**~~6.~~ 3.** The results of the risk assessment should be shared with all stakeholder and be able to support improvement actions.
205. Asset management	**~~205.~~ 304. Asset management**
1. All assets related to cyber security to be protected, such as systems, facilities, data, etc. should be established and classified.	**~~1.~~** ~~All assets related to cyber security to be protected, such as systems, facilities, data, etc. should be established and classified.~~
2. The company should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role.	**~~2.~~** ~~The company should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role.~~
3. The importance of data should be classified and documented in consideration of criteria such as influence of asset leakage and damage.	**~~3.~~** ~~The importance of data should be classified and documented in consideration of criteria such as influence of asset leakage and damage.~~
4. Information assets should be protected in separate storage areas according to their importance.	**~~4.~~** ~~Information assets should be protected in separate storage areas according to their importance.~~
5. At the end of employment, contract and work of all employees and outside parties, including sailors, the assets owned by the internal and external employees should be returned.	**~~5.~~** ~~At the end of employment, contract and work of all employees and outside parties, including sailors, the assets~~ owned by the internal and external employees should be returned.
1. - 2. 〈newly added〉	**1.** Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused. *(2022)*
	2. When discarding the equipment in which the data is stored, the stored data should be deleted in a non-reproducible manner. *(2022)*

Present	Amendment
206. Access Control	**~~206.~~ 305. Access Control**
1. – 7. 〈same as the present Rules〉	**1. – 7. 〈same as the present Rules〉**
8. – 9. 〈newly added〉	8. The main system should manage the authority of the person who has physical and logical access separately and control the access of the unauthorized person. *(2022)*
	9. Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access. *(2022)*
207. Physical Security	**306. Physical Security**
1. The company should establish policies that define the physical security standards for system equipment, facilities, and so on.	**~~1.~~** ~~The company should establish policies that define the physical security standards for system equipment, facilities, and so on.~~
2. The company should provide physical controls to access protected areas containing assets related to cyber security only to authorized persons.	**~~2.~~** ~~The company should provide physical controls to access protected areas containing assets related to cyber security only to authorized persons.~~
3. 〈same as the present Rules〉	**~~3.~~ 1.** 〈same as the present Rules〉
4. If a device such as CCTV is installed to monitor the protected area, it is necessary to classify the users through the authentication means and block the connection of unauthorized persons.	**~~4.~~ 2.** If a device such as CCTV is installed to monitor the protected area, ~~it is necessary to classify the users through the authentication means and block the connection of unauthorized persons.~~ access control by unauthorized persons shall be implemented. *(2022)*
5. The main system should manage the authority of the person who has physical and logical access separately and control the access of the unauthorized person.	**~~5.~~** ~~The main system should manage the authority of the person who has physical and logical access separately and control the access of the unauthorized person.~~
6. – 7. 〈same as the presnet Rules〉	**~~6. – 7.~~ 3. – 4. 〈same as the present Rules〉**
8. The company should control its internal assets and network connections through portable storage media such as USB by using the methods like physical port locking and unused port inactivation	**~~8.~~** ~~The company should control its internal assets and network connections through portable storage media such as USB by using the methods like physical port locking and unused port inactivation.~~ *(2022)*
9. 〈same as the present Rules〉	**~~9.~~ 5. 〈same as the present Rules〉**
10. Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused.	**~~10.~~** ~~Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused.~~

Present	Amendment
11. Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied.	~~11. Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied.~~
208. Incident Response and Recovery	~~208.~~ 307. **Incident Response and Recovery**
1. The Company should establish an incident response and recovery policy, including the types of incidents and their corresponding methods and procedures.	~~1. The Company should establish an incident response and recovery policy, including the types of incidents and their corresponding methods and procedures.~~
2. The company should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed.	~~2. The company should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed.~~
3. The operating system in the ship should have an emergency operation function so that it can be operated even in case of an emergency.	~~3. The operating system in the ship should have an emergency operation function so that it can be operated even in case of an emergency.~~ *(2022)*
4. In case of an incident, relevant functions should be provided and the manual should be documented so that the system can be operated safely and continuously.	~~4. In case of an incident, relevant functions should be provided and the manual should be documented so that the~~ main system can be operated ~~safely and continuously.~~ *(2022)*
5. **〈same as the present Rules〉**	~~5.~~ 1. **〈same as the present Rules〉**
209. Outside Parties' Security	~~209.~~ 308. **Outside Parties' Security**
1. The company should establish a security policy for information technology equipment and data of outside parties in order to prepare for security incidents by the outside parties.	~~1. The company should establish a security policy for information technology equipment and data of outside parties in order to prepare for security incidents by the outside parties.~~
2. The company should specify the security requirements, management and supervision during the project period when contracting with outside parties.	~~2.~~ 1. The company should specify the security requirements, management and supervision during the project period when contracting with outside parties. (including ship related work) *(2022)*
3. – 4. 〈same as the present Rules〉	3. – 4. ~~2. – 3.~~ 〈same as the present Rules〉

Present	Amendment
210. Data Security	**~~210.~~ 309. Data Security**
1. – 2. 〈same as the present Rules〉	**1. – 2.** 〈same as the present Rules〉
3. Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access.	**~~3.~~** ~~Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access.~~
4. When discarding the equipment in which the data is stored, the stored data should be deleted in a non-reproducible manner.	**~~4.~~** ~~When discarding the equipment in which the data is stored, the stored data should be deleted in a non-reproducible manner.~~
4. – **5.** 〈newly added〉	4. Data transmitted or stored should establish encryption application standards according to importance. *(2022)*
	5. Data classified as important should be encrypted and stored if necessary. *(2022)*
211. Log Management	**~~211.~~ 310. Log Management**
1. 〈same as the present Rules〉	**1.** 〈same as the present Rules〉
2. When storing logs, it should be confirmed whether or not the log data integrity is maintained.	**~~2.~~** ~~When storing logs, it should be confirmed whether or not the log data integrity is maintained.~~ *(2022)*
3. The system in which the logs are stored should be physically and logically controlled to prevent unauthorized access.	**~~3.~~ 2.** The system in which the logs are stored should be ~~physically and logically controlled~~ protecetd to prevent unauthorized access. *(2022)*
4. – 5. 〈same as the present Rules〉	**~~4. – 5.~~ 3. – 4. 〈same as the present Rules〉**
212. 〈same as the present Rules〉	**~~212.~~ 311. 〈same as the present Rules〉**
213. System Management	**~~213.~~ 312. System Management**
1. – 2. 〈same as the present Rules〉	**1. – 2.** 〈same as the present Rules〉
3. When introducing information assets, the default value should be newly set or changed according to the security policy or change management standard of the company, and the use of the assets should be prohibited before the security setting is changed.	**3.** ~~When introducing information assets, the default value should be newly set or changed according to the security policy or change management standard of the company, and the use of the assets should be prohibited before the security setting is changed.~~
4. Before changing the system, the relevant data should be backed up in case of system failure.	**~~4.~~** ~~Before changing the system, the relevant data should be backed up in case of system failure.~~

Present	Amendment
5. - 6. 〈same as the present Rules〉	~~5. - 6.~~ 3. - 4. 〈same as the presnet Rules〉
7. When performing change management, pre-test should be conducted and change management records should be kept and managed.	~~7. When performing change management, pre-test should be conducted and change management records should be kept and managed.~~
214. Patch Management	~~214. Patch Management~~
1. The company should select the patch priority in the system patch, execute the patch through the approved procedure, and list the known vulnerabilities and obstacles before the patch.	~~1. The company should select the patch priority in the system patch, execute the patch through the approved procedure, and list the known vulnerabilities and obstacles before the patch.~~
2. If the automatic patching tool is not available or if the system is incompatible, the system should be managed separately.	~~2. If the automatic patching tool is not available or if the system is incompatible, the system should be managed separately.~~
3. Patches should be performed without a missing system, and patch versions for each system should be recorded and managed.	~~3. Patches should be performed without a missing system, and patch versions for each system should be recorded and managed.~~
215. Mobile Security	~~215. Mobile Security~~
1. The company should establish security policies to control the use of corporate mobile devices and employee owned mobile devices.	~~1. The company should establish security policies to control the use of corporate mobile devices and employee owned mobile devices.~~
2. The company should define the mobile devices and functions available in the company and identify the devices in use.	~~2. The company should define the mobile devices and functions available in the company and identify the devices in use.~~
3. Network and system connections to mobile devices should be restricted and the use of non-call features of mobile devices such as photo shooting should be controlled.	~~3. Network and system connections to mobile devices should be restricted and the use of non-call features of mobile devices such as photo shooting should be controlled.~~
4. The company should prevent mobile devices used by employees from accessing unauthorized access points(Rogue Access Points) that are exploited for malicious code infections or hacking.	~~4. The company should prevent mobile devices used by employees from accessing unauthorized access points(Rogue Access Points) that are exploited for malicious code infections or hacking.~~
216. Encryption	~~216. Encryption~~
1. An environment in which data can be communicated in an encrypted manner should be established.	~~1. An environment in which data can be communicated in an encrypted manner should be established.~~
2. Encryption standards for data protection should be established and planned.	~~2. Encryption standards for data protection should be established and planned.~~
3. Data classified as important should be encrypted and stored.	~~3. Data classified as important should be encrypted and stored.~~

Present	Amendment
217. Malicious code response	**~~217. Malicious code response~~**
Controls to protect networks, information systems, operating systems, and terminals from malicious code should be provided.	~~Controls to protect networks, information systems, operating systems, and terminals from malicious code should be provided.~~
218. Network Management	**~~218.~~ 313. Network Management**
1. Vulnerabilities of network equipment should be periodically checked so that it does not affect other networks due to communication channel flaws.	**~~1.~~** ~~Vulnerabilities of network equipment should be periodically checked so that it does not affect other networks due to communication channel flaws.~~
2. To protect the internal network, an intrusion prevention system should be installed and operated to block external unauthorized access, and should be managed continuously.	**~~2.~~ 1.** To protect the internal network, an intrusion prevention system(firewall, etc.) should be installed and operated to block external unauthorized access, and should be managed continuously.
3. The wireless network environment should be configured separately from the wireless network that can be accessed by outside parties.	**~~3.~~** ~~The wireless network environment should be configured separately from the wireless network that can be accessed by outside parties.~~
4. The information technology system should be restricted from being accessed through the wireless network.	**~~4.~~** ~~The information technology system should be restricted from being accessed through the wireless network.~~
5. 〈same as the present Rules〉	**~~5.~~ 2. 〈same as the present Rules〉**
6. When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied.	**6.** ~~When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied.~~
7. It should have a graphical network flow that can identify the network path.	**7.** ~~It should have a graphical network flow that can identify the network path.~~
8. 〈same as the present Rules〉	**~~8.~~ 3. 〈same as the present Rules〉**
9. When establishing a communication line, the communication path, connection priority, and protocol should be defined in advance to minimize the defect, and the service level agreement, etc. should be included in the supplier contract.	**9.** ~~When establishing a communication line, the communication path, connection priority, and protocol should be defined in advance to minimize the defect, and the service level agreement, etc. should be included in the supplier contract.~~
219. Cyber security internal audit	**314. Cyber security internal audit**
1. The company should conduct a half-yearly security check.	**~~1.~~** ~~The company should conduct a half-yearly security check.~~
2. 〈same as the present Rules〉	**~~2.~~ 1. 〈same as the present Rules〉**

Present	Amendment
Section 3 - 4 〈same as the present Rules〉	Section ~~3 - 4~~ 4 - 5 〈same as the present Rules〉
CHAPTER 4 REQUIREMENTS FOR CS SYSTEM OF THE SHIP	**CHAPTER 4 REQUIREMENTS FOR CS SYSTEM OF THE SHIP**
Section 1 〈same as the present Rules〉	Section 1 〈same as the present Rules〉
Section 2 CS Ready	Section 2 CS Ready
201. - 208. 〈same as the present Rules〉	201. - 208. 〈same as the present Rules〉
209. Patch Management	209. Patch Management
1. - 2. 〈same as the present Rules〉	1. - 2. 〈same as the present Rules〉
3. Patches should be performed without a missing system, and patch versions for each system should be recorded and managed.	3. ~~Patches should be performed without a missing system, and p~~ Patch versions for each system should be recorded and managed.
210. - 213. 〈same as the present Rules〉	210. - 213. 〈same as the present Rules〉
Section 3 〈newly added〉	Section 3 SHIP CYBER SECURITY COMPLIANCE 0 or CS0 (2022)
	301. Case review
	The ship should share with the crews without delay any information on changes in external environmental factors such as cyber security threats and cases.
	302. Security policy
	1. The ship should have, review and manage a cyber security policy that specifies the operational methods, procedures and responsibilities for security operations.
	2. The ship should designate and assign responsibility and authority to the personnel who have competencies related to security activities.

Present	Amendment
	303. Security training 1. The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan. **304. Risk management** 1. External environmental factors affecting the environments of internal information technology and operational technology should be identified and cataloged as threats. 2. Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks. 3. Risk assessment should be periodically carried out by linking the threat identification and vulnerability diagnosis results to assets related to cyber security. **305. Asset management** 1. All assets to be protected, such as systems, facilities, data, etc. should be established and classified. 2. The ship should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role. **306. Physical Security** 1. The ship should establish policies that define the physical security standards for system equipment, facilities, and so on. 2. The ship should provide physical controls to access protected areas containing assets only to authorized persons. 3. The ship should control its internal assets and network connections through portable storage media such as USB. 4. Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied.

Present	Amendment
	307. Incident Response and Recovery 1. The ship should establish cyber incident response and recovery policy, including the types of cyber incidents and their corresponding methods and procedures. 2. The ship should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed. 3. In case of an incident, relevant functions should be provided and the manual should be documented so that the main system can be operated safely and continuously. **308. Outside Parties' Security** 1. The ship should establish a security policy for cyber security equipment and data of outside parties in order to prepare for security incidents by the outside parties. **309. System Management** 1. Before changing the system, the relevant data should be backed up in case of system failure. 2. Change management procedures should be established and records of implementation shall be maintained. **310. Patch Management** 1. The ship should establish a policy to apply the patch to the main system and perform the security patch according to the approved policy. 2. Patch versions for each system should be recorded and managed.

Present	Amendment
	311. Mobile Security 1. The ship should establish security policies to control the use of corporate mobile devices and crew owned mobile devices. **312. Malicious code response** Malicious code control measures should be prepared to protect major systems. When software is installed, it should be updated periodically. **313. Network Management** 1. When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied. 2. It should have a graphical network flow that can identify the network path. **314. Cyber security internal audit** 1. Cyber security internal audit procedure should be established and conducted periodically. 2. The ship should periodically inspect and conduct security surveys while outsourcers perform business.
Section 3 SHIP CYBER SECURITY COMPLIANCE 1 or CS1 *(2020)* **301. Case review** The ship should share with the crews without delay any information on changes in external environmental factors such as cyber security threats and cases.	**Section 3 4 SHIP CYBER SECURITY COMPLIANCE 1 or CS1 ~~(2022)~~ *(2022)*** **~~301. Case review~~** ~~The ship should share with the crews without delay any information on changes in external environmental factors such as cyber security threats and cases.~~

Present	Amendment
302. Security policy	~~**302. Security policy**~~
1. The ship should have, review and manage a cyber security policy that specifies the operational methods, procedures and responsibilities for security operations.	~~**1.** The ship should have, review and manage a cyber security policy that specifies the operational methods, procedures and responsibilities for security operations.~~
2. The ship should designate and assign responsibility and authority to the personnel who have competencies related to security activities.	~~**2.** The ship should designate and assign responsibility and authority to the personnel who have competencies related to security activities.~~
303. Security training	~~**303.**~~ **401. Security training**
1. The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan.	~~**1.** The personnel involved in security activities should conduct security training at least once a year in accordance with the security training plan.~~
2. Security training for the person getting on and off the ship should be carried out.	~~**2.** Security training for the person getting on and off the ship should be carried out.~~
3. 〈same as the present Rules〉	~~**3.**~~ **4.** 〈same as the present Rules〉
304. Risk management	~~**304.**~~ **402. Risk management**
1. External environmental factors affecting the environments of internal information technology and operational technology should be identified and cataloged as threats.	~~**1.** External environmental factors affecting the environments of internal information technology and operational technology should be identified and cataloged as threats.~~
2. Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks.	~~**2.** Risk management plans including risk assessment methods and procedures should be established to manage cyber security risks.~~
3. 〈same as the present Rules〉	~~**3.**~~ **1. 〈same as the present Rules〉**
4. Risk assessment should be periodically carried out by linking the threat identification and vulnerability diagnosis results to all assets related to cyber security.	~~**4.** Risk assessment should be periodically carried out by linking the threat identification and vulnerability diagnosis results to all assets related to cyber security. *(2022)*~~
5. 〈same as the present Rules〉	~~**5.**~~ **2.** 〈same as the present Rules〉
6. The results of the risk assessment should be shared with all stakeholder and be able to support improvement actions.	~~**6.**~~ **3.** The results of the risk assessment should be shared with ~~all~~ stakeholder and be able to support improvement actions.

Present	Amendment
305. Asset management	**~~305.~~ 403. Asset management**
1. All assets to be protected, such as systems, facilities, data, etc. should be established and classified.	~~1. All assets to be protected, such as systems, facilities, data, etc. should be established and classified.~~
2. The ship should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role.	~~2. The ship should designate the person responsible for each asset, such as the equipment and facilities requiring security, and define the role.~~
3. The importance of data should be classified and documented in consideration of criteria such as influence of asset leakage and damage.	~~3. The importance of data should be classified and documented in consideration of criteria such as influence of asset leakage and damage.~~
4. Information assets should be protected in separate storage areas according to their importance.	~~4. Information assets should be protected in separate storage areas according to their importance.~~
1. 〈newly added〉	1. Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused.
306. Access Control	**~~306.~~ 404. Access Control**
1. - 4. 〈same as the present Rules〉	**1. - 4. 〈same as the present Rules〉**
5. Privileges granted for special purposes should be classified, identified and controlled separately.	~~5. Privileges granted for special purposes should be classified, identified and controlled separately.~~
6. 〈same as the present Rules〉	**~~6.~~ 5. 〈same as the present Rules〉**
7. Access record of users to the system should be retained for at least six months and reviewed periodically. *(2019)*	~~7. Access record of users to the system should be retained for at least six months and reviewed periodically.~~ *(2022)*
6. 〈newly added〉	6. Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access.
307. Physical Security	**~~307.~~ 405. Physical Security** *(2022)*
1. The ship should establish policies that define the physical security standards for system equipment, facilities, and so on.	~~1. The ship should establish policies that define the physical security standards for system equipment, facilities, and so on.~~
2. The ship should provide physical controls to access protected areas containing assets only to authorized persons.	~~2. The ship should provide physical controls to access protected areas containing assets only to authorized persons.~~

Present	Amendment
3. <same as the present Rules>	~~3.~~ 1. <same as the present Rules>
4. If a device such as CCTV is installed to monitor the protected area, it is necessary to classify the users through the authentication means and block the connection of unauthorized persons.	~~4.~~ 2. If a device such as CCTV is installed to monitor the protected area, ~~it is necessary to classify the users through the authentication means and block the connection of unauthorized persons.~~ access control by unauthorized persons shall be implemented.
5. - 6. 〈same as the present Rules〉	~~5. - 6.~~ 3. - 4. 〈same as the present Rules〉
7. Equipment essential for major system operation such as communication lines should be protected from physical attack and periodic inspection should be carried out.	~~7. Equipment essential for major system operation such as communication lines should be protected from physical attack and periodic inspection should be carried out.~~ *(2022)*
8. The ship should control its internal assets and network connections through portable storage media such as USB.	~~8. The ship should control its internal assets and network connections through portable storage media such as USB.~~
9. <same as the present Rules>	~~9.~~ 5. <same as the present Rules>
10. Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused.	~~10. Standards should be established for reusing all hardware assets, and countermeasures should be taken to ensure safe destruction if not reused.~~
11. Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied.	~~11. Clean desk operation and terminal screen protection policy of the area where documents and portable storage media are stored should be prepared and applied.~~
308. Incident Response and Recovery	~~308.~~ 406. Incident Response and Recovery
1. The ship should establish an incident response and recovery policy, including the types of incidents and their corresponding methods and procedures.	~~1. The ship should establish an incident response and recovery policy, including the types of incidents and their corresponding methods and procedures.~~
2. The ship should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed.	~~2. The ship should define the roles and responsibilities of the organization or persons responsible for immediate response and recovery activities to system operation and security issues. In addition, an emergency communication system should be established to enable rapid communication with internal and external stakeholder, and the emergency communication network should be updated and managed.~~

Present	Amendment
3. The operating system in the ship should have an emergency operation function so that it can be operated even in case of an emergency.	~~3. The operating system in the ship should have an emergency operation function so that it can be operated even in case of an emergency.~~
4. In case of an incident, relevant functions should be provided and the manual should be documented so that the system can be operated safely and continuously.	~~4. In case of an incident, relevant functions should be provided and the manual should be documented so that the system can be operated safely and continuously.~~
5. 〈same as the present Rules〉	~~5.~~ 1. 〈same as the present Rules〉
309. Outside Parties' Security	~~309.~~ 407. Outside Parties' Security
1. The ship should establish a security policy for cyber security equipment and data of outside parties in order to prepare for security incidents by the outside parties.	~~1. The ship should establish a security policy for cyber security equipment and data of outside parties in order to prepare for security incidents by the outside parties.~~
2. - 3. 〈same as the present Rules〉	~~2. - 3.~~ 1. - 2. 〈same as the present Rules〉
310. Data Security	~~310.~~ 408. Data Security
1. 〈newly added〉	1. For data stored in the ship or transmitted outside, the importance classification and management standards should be established in consideration of the impact in case of leakage or damage. *(2022)*
1. – 2. <same as the present Rules>	~~1. – 2.~~ 2. - 3. 〈same as the present Rules〉
3. Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access.	~~3. Private use of the Internet should be restricted to prevent unauthorized attack and data access through the use of personal e-mail, illegal site access.~~
4. When discarding the equipment in which the data is stored, the stored data should be deleted in a non-reproducible manner.	~~4. When discarding the equipment in which the data is stored, the stored data should be deleted in a non-reproducible manner.~~
4. - 5. 〈newly added〉	4. Data transmitted or stored should establish encryption application standards according to importance. *(2022)* 5. Data classified as important should be encrypted and stored if necessary. *(2022)*

Present	Amendment
311. Log Management	**~~311.~~ 409. Log Management**
1. <same as the present Rules>	1. <same as the presetn Rules>
2. When storing logs, it should be confirmed whether or not the log data integrity is maintained.	~~2. When storing logs, it should be confirmed whether or not the log data integrity is maintained.~~
3. The system in which the logs are stored should be physically and logically controlled to prevent unauthorized access.	~~3.~~ 2. The system in which the logs are stored should be ~~physically and logically controlled~~ protecetd to prevent unauthorized access.
4. Ship-run software and hardware should be synchronized at the same time.	~~4. Ship-run software and hardware should be synchronized at the same time.~~
5. Monitoring should be performed to prevent the excess of system performance and capacity, and in the event of a failure, prompt action should be taken.	~~5. Monitoring should be performed to prevent the excess of system performance and capacity, and in the event of a failure, prompt action should be taken.~~
312. System Management	**~~312.~~ 410. System Management**
1. It should be ensured whether unauthorized interfaces, ports, or services exist in the systems.	~~1. It should be ensured whether unauthorized interfaces, ports, or services exist in the systems.~~
2. When transferring file information in the operating system, it is necessary to confirm whether information provision standard is defined and applied.	~~2. When transferring file information in the operating system, it is necessary to confirm whether information provision standard is defined and applied.~~
3. – 6. <same as the present Rules>	~~3. – 6.~~ 1. – 4. <same as the present Rules>
7. Change management records of the system should be kept and managed.	~~7. Change management records of the system should be kept and managed.~~
313. Patch Management	**~~313. Patch Management~~**
1. The ship should select the patch priority in the system patch, execute the patch through the approved procedure, and list the known vulnerabilities and obstacles before the patch.	~~1. The ship should select the patch priority in the system patch, execute the patch through the approved procedure, and list the known vulnerabilities and obstacles before the patch.~~
2. If the automatic patching tool is not available or if the system is incompatible, the system should be managed separately.	~~2. If the automatic patching tool is not available or if the system is incompatible, the system should be managed separately.~~
3. Patches should be performed without a missing system, and patch versions for each system should be recorded and managed.	~~3. Patches should be performed without a missing system, and patch versions for each system should be recorded and managed.~~

Present	Amendment
314. Mobile Security	**~~314. Mobile Security~~**
1. The ship should establish security policies to control the use of corporate mobile devices and crew owned mobile devices.	~~1. The ship should establish security policies to control the use of corporate mobile devices and crew owned mobile devices.~~
2. The ship should define the mobile devices and functions available in the ship and identify the devices in use.	~~2. The ship should define the mobile devices and functions available in the ship and identify the devices in use.~~
3. Mobile devices should be restricted to connect network and systems, and the use of non-call features of mobile devices such as photo shooting should be controlled.	~~3. Mobile devices should be restricted to connect network and systems, and the use of non-call features of mobile devices such as photo shooting should be controlled.~~
4. The ship should prevent mobile devices used by crews from accessing unauthorized access points (Rogue Access Points) that are exploited for malicious code infections or hacking.	~~4. The ship should prevent mobile devices used by crews from accessing unauthorized access points (Rogue Access Points) that are exploited for malicious code infections or hacking.~~
315. Encryption	**~~315. Encryption~~**
1. An environment in which data can be communicated in an encrypted manner should be established.	~~1. An environment in which data can be communicated in an encrypted manner should be established.~~
2. Encryption standards for data protection should be established and planned.	~~2. Encryption standards for data protection should be established and planned.~~
3. Data classified as important should be encrypted and stored.	~~3. Data classified as important should be encrypted and stored.~~
316. Malicious code response	**~~316. Malicious code response~~**
Controls to protect networks, information systems, operating systems, and terminals from malicious code should be provided.	~~Controls to protect networks, information systems, operating systems, and terminals from malicious code should be provided.~~
317. Network Management	**~~317.~~ 411. Network Management**
1. Vulnerabilities of network equipment should be periodically checked so that it does not affect other networks due to communication channel flaws.	~~1. Vulnerabilities of network equipment should be periodically checked so that it does not affect other networks due to communication channel flaws.~~
2. To protect the internal network, an intrusion prevention system should be installed and operated to block external unauthorized access, and should be managed continuously.	~~2.~~ 1. To protect the internal network, an intrusion prevention system(firewall, etc.) should be installed and operated to block external unauthorized access, and should be managed continuously.
3. <same as the present Rules>	~~3.~~ 2. <same as the present Rules>

Present	Amendment
4. The operating system should be restricted from being accessed through the wireless network.	~~4.~~ 3. The operating system should be restricted from being accessed through the wireless network. If unavoidable, a secure connection method through enhanced authentication technology, etc. shall be applied.
5. The internal and external communication interfaces of the information system or the operating system should be controlled to limit the connection.	~~5.~~ 4. The ship internal and external communication interfaces of the information system or the operating system should be controlled to limit the connection.
6. The networks of information systems and operating systems should be operated separately.	~~6.~~ 5. The networks of information systems and operating systems should be operated ~~separately~~. dividing it physically or logically.
7. When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied.	~~7. When connecting to a system via an external network, a secure connection method using an enhanced authentication technique should be applied.~~
8. It should have a graphical network flow that can identify the network path.	~~8. It should have a graphical network flow that can identify the network path.~~
9. 〈same as the present Rules〉	~~9.~~ 6. 〈same as the present Rules〉
10. When establishing a communication line, the communication path, connection priority, and protocol should be defined in advance to minimize the defect, and the service level agreement, etc. should be included in the supplier contract.	~~10. When establishing a communication line, the communication path, connection priority, and protocol should be defined in advance to minimize the defect, and the service level agreement, etc. should be included in the supplier contract.~~
318. Cyber security internal audit	~~318. Cyber security internal audit~~
1. Policy violations should be reported in accordance with cyber security internal audit plan.	~~1. Policy violations should be reported in accordance with cyber security internal audit plan.~~
2. The ship should periodically inspect and conduct security surveys while outsourcers perform business.	~~2. The ship should periodically inspect and conduct security surveys while outsourcers perform business.~~
Section 4 – 5 〈same as the Present Rules〉	Section ~~4 – 5~~ 5 – 6 〈same as the Present Rules〉

CIRCULAR

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No : 2022-9-E
Date : 2022.08.16

To : All Surveyors and whom it may concern

Subject	9.163 Notice for Amendment to the KR Technical Rules - Rules and Guidance for Pt 1 - Guidance for Remote Survey
Application	1st January 2023 (Date of which application for survey is submitted)

1. Please be informed that the amendments have been made to the following KR Technical Rules 2022 as attachment to Requests for Establishment/Revision of Classification Technical Rules.

Amended KR Technical Rules	Effective Date	Amendments
Rules and Guidance for Pt 1	1st January 2023 (Date of which application for survey is submitted)	IACS UR Z10.3 (Rev.20 May 2022)
		IACS UR Z10.4 (Rev.17 May 2022)
		Amend the requirements for Remote Survey
		Disposal of the "Remote" Notation
Guidance for Remote Survey	1st January 2023 (Date of which application for survey is submitted)	IACS UR Z29 (Rev.0 Mar 2022)

2. Furthermore, please be informed that the establishment will be included in 2023 edition on KR Technical Rules which will be published in the first half of 2023.

Attachments : Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Aug. 2022

- Main Amendments -

(1) Effective date : 1 Jan. 2023 (Date of which the application for survey is submitted)

◉ Follow-up measures for IACS UR Z10.3(Rev.20 May 2022) & IACS UR Z10.4(Rev.17 May 2022)

- Amend minimum requirements for thickness measurements at Special Survey for Chemical Tanker & Double Hull Oil Tanker is in line with the amendments made to ESP Code wide Res. MSC.483(103).

◉ To amend the requirements for Remote Survey

- Because all requirements of IACS UR Z29(New Mar 2022) are reflected into the 'Guidance for Remote Survey", only minimum requirements are left in the Rules, Pt 1.

Present	Amendments
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 1 General	**Section 1 General**
101. Definitions The definitions of terms used in **Ch 2** and **Ch 3** are to be as specified in the followings, unless otherwise specified elsewhere.	**101. Definitions** The definitions of terms used in **Ch 2** and **Ch 3** are to be as specified in the followings, unless otherwise specified elsewhere.
1. ~ 8. 〈omitted〉	**1. ~ 8. 〈same as the current Rules〉**
9. A **ballast tank** is a tank that is being used primarily for salt water ballast. For Bulk Carriers and Double Skin Bulk Carriers subject to the requirements of **Ch 3, Sec 2 and Sec 6**, a **ballast tank** is a tank which is used solely for salt water ballast, or, where applicable, a space which is used for both cargo and slat water ballast will be treated as a ballast tank when substantial corrosion has been found in that space. A Double Side Tank is to be considered as a separate tank even if it is in connection to either the topside tank or the hopper side tank. And For Oil Tankers, Chemical Tankers and Double Hull Oil Tankers subject to the requirements of **Ch 3, Sec 3, Sec 4 and Sec 5** respectively, a **ballast tank** is a tank which is used solely for the carriage of salt water ballast. *(2020)*	**9.** A **ballast tank** is a tank that is being used primarily for salt water ballast. For Bulk Carriers and Double Skin Bulk Carriers subject to the requirements of **Ch 3, Sec 2 and Sec 6**, a **ballast tank** is a tank which is used primarily ~~solely~~ for salt water ballast, or, where applicable, a space which is used for both cargo and slat water ballast will be treated as a ballast tank when substantial corrosion has been found in that space. A Double Side Tank is to be considered as a separate tank even if it is in connection to either the topside tank or the hopper side tank. And For Oil Tankers, Chemical Tankers and Double Hull Oil Tankers subject to the requirements of **Ch 3, Sec 3, Sec 4 and Sec 5** respectively, a **ballast tank** is a tank which is used primarily ~~solely~~ for the carriage of salt water ballast. *(2023)*
10. ~ 32. 〈omitted〉	**10. ~ 32. 〈same as the current Rules〉**
33. Remote Survey (2019) Remote Survey is that enables survey by reviewing the data of the electronic file(photograph, video, copy of document, etc) submitted by the Owner without the need for direct physical attendance of surveyor to a ship and communicate with the ship in real time video, if necessary. The system to recognize such Remote Survey is called remote survey system. 〈herein after, omitted〉	**33. Remote Survey *(2023)*** A "Remote Survey" is a process of verifying that a ship and its equipment are in compliance with the rules of the Classification Society where the verification is undertaken, or partially undertaken, without physical attendance on board the ship by a surveyor. ~~Remote Survey is that enables survey by reviewing the data of the electronic file(photograph, video, copy of document, etc) submitted by the Owner without the need for direct physical attendance of surveyor to a ship and communicate with the ship in real time video, if necessary. The system to recognize such Remote Survey is called remote survey system.~~ 〈herein after, same as the current Rules〉

Present	Amendments
Section 11 Remote Survey *(2019)*	**Section 11 Remote Survey *(2019)***
1101. Remote Survey	**1101. Remote Survey**
1. Application *(2021)*	**1. Application *(2023)***
(1) Remote Survey shall be only carried out on the request of the Owner and approved by the flag state administration, and more detailed requirements are in accordance with the **Guidance of Remote Survey**. But its application may be restricted depending on purpose and condition of the ships.	(1) Remote Survey shall be only carried out on the request of the Owner and approved by the flag state administration, and ~~more detailed requirements are~~ in accordance with the **Guidance for ~~of~~ Remote Survey**. ~~But its application may be restricted depending on purpose and condition of the ships.~~
(2) Especially the ships subject to Korean Ship Safety Act shall be are approved by the Minister of the Ministry of Oceans and Fisheries (MOF),	~~(2) Especially the ships subject to Korean Ship Safety Act shall be are approved by the Minister of the Ministry of Oceans and Fisheries (MOF),~~
(3) Where the required data or conditions are not met or where any damages or defects requiring attention are identified or the Society deems it necessary, the Remote Survey is to be canceled and a traditional survey method is to be carried out.	~~(3) Where the required data or conditions are not met or where any damages or defects requiring attention are identified or the Society deems it necessary, the Remote Survey is to be canceled and a traditional survey method is to be carried out.~~
2. Condition of Remote Survey	**~~2. Condition of Remote Survey~~**
(1) Generally any damages in association with wastage over the allowable limits(including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, will affect the vessel's structural, watertight or weathertight integrity, will require surveyor physical attendance.	~~(1) Generally any damages in association with wastage over the allowable limits(including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, will affect the vessel's structural, watertight or weathertight integrity, will require surveyor physical attendance.~~
(2) The Owner is to submit the data required by the Society.	~~(2) The Owner is to submit the data required by the Society.~~
(3) The ship is to have at least an internet connection during the Remote Survey.	~~(3) The ship is to have at least an internet connection during the Remote Survey.~~
(4) If necessary, an environment is to be provided for smooth real-time bi-directional communication (video and audio) between a ship and the Society.	~~(4) If necessary, an environment is to be provided for smooth real-time bi-directional communication (video and audio) between a ship and the Society.~~
〈herein after, omitted〉	〈herein after, same as the current Rules〉

Present

CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME

Section 4 Chemical Tankers

401. ~ 403. 〈omitted〉

404. Special Survey

Table 1.3.8 Minimum requirements for thickness measurements at Special Survey of Chemical Tankers

Special Survey No. 1	Special Survey No. 2	Special Survey No. 3	Special Survey No. 4 and Subsequent
1. Suspect areas 2. One transverse section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast) 3. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to **Table 1.3.7** 1) or 2), as applicable	〈omitted〉		
(NOTES) 1) At least one section is to include a ballast tank within 0.5 L amidships.			

〈herein after, omitted〉

Amendments

CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME

Section 4 Chemical Tankers

401. ~ 403. 〈same as the current Rules〉

404. Special Survey

Table 1.3.8 Minimum requirements for thickness measurements at Special Survey of Chemical Tankers *(2023)*

Special Survey No. 1	Special Survey No. 2	Special Survey No. 3	Special Survey No. 4 and Subsequent
1. Suspect areas ~~2. One transverse section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)~~ ~~3. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to **Table 1.3.7** 1) or 2), as applicable~~	〈same as the current Rules〉		
(NOTES) 1) At least one section is to include a ballast tank within 0.5 L amidships.			

〈herein after, same as the current Rules〉

Present

Section 5 Double Hull Oil Tankers

501. ~ 503. 〈omitted〉

504. Special Survey

Table 1.3.11 Minimum requirements for thickness measurements at Special Survey of Double Hull Oil Tankers

Special Survey No. 1	Special Survey No. 2	Special Survey No. 3	Special Survey No. 4 and Subsequent
1. Suspect areas 2. One section of deck plating for the full beam of the ship within the cargo area 3. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to **Table 1.3.10**	〈omitted〉		
(NOTES) 1) At least one section is to include a ballast tank within 0.5 L amidships.			

〈herein after, omitted〉

Amendments

Section 5 Double Hull Oil Tankers

501. ~ 503. 〈same as the current Rules〉

504. Special Survey

Table 1.3.11 Minimum requirements for thickness measurements at Special Survey of Double Hull Oil Tankers *(2023)*

Special Survey No. 1	Special Survey No. 2	Special Survey No. 3	Special Survey No. 4 and Subsequent
1. Suspect areas ~~2. One section of deck plating for the full beam of the ship within the cargo area~~ ~~3. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to **Table 1.3.10**~~	〈same as the current Rules〉		
(NOTES) 1) At least one section is to include a ballast tank within 0.5 L amidships.			

〈herein after, same as the current Rules〉

Amended Guidance Relating to the Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

2022. 08

- Main Amendments -

(1) Effective date : 1 Jan. 2023 (Date of which the application for survey is submitted)

◉ Disposal of the “Remote” Notation.

Present

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

(Remarks) (35) : The following Additional Special Feature Notations are to be appended to ships complying with the relevant requirements. The Additional Special Feature Notations are to be located under Service Restriction Notations of Hull after Special Feature Notations regardless whether they are hull items or machinery items.

Additional Special Feature Notations	Relevant Requirements
〈omitted〉	
ESA1, ESA2 *(2022)*	to ships which comply with the requirements of enhanced shaft alignment specified in **Pt 5, Annex 5-12-1** of the **Guidance**. (Enhanced Shaft Alignment)
Remote *(2021)*	to ships comply with the requirement specified in **Ch 4** of the **Guidances for Remote Survey**

〈herein after, omitted〉

Amendments

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

(Remarks) (35) : The following Additional Special Feature Notations are to be appended to ships complying with the relevant requirements. The Additional Special Feature Notations are to be located under Service Restriction Notations of Hull after Special Feature Notations regardless whether they are hull items or machinery items. *(2023)*

Additional Special Feature Notations	Relevant Requirements
〈same as the current Guidance〉	
ESA1, ESA2 *(2022)*	to ships which comply with the requirements of enhanced shaft alignment specified in **Pt 5, Annex 5-12-1** of the **Guidance**. (Enhanced Shaft Alignment)
~~Remote *(2021)*~~	~~to ships comply with the requirement specified in **Ch 4** of the **Guidances for Remote Survey**~~

〈herein after, same as the current Guidance〉

Amended Guidance for Remote Survey

2022. 8.

Hull/Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2023 (Date of which the application for Classification Survey is submitted to the Society)

◉ Reflected IACS UR Z29

Present	Amendment
~~CHAPTER 1 GENERAL~~ ~~Section 1 General~~ ~~101. Application~~ 1. This Guidance provides specific applications for Remote Survey specified in Pt 1, Ch 2, Sec 11 of the Rules for the Classification of Steel Ships. ~~2. This Guidance describes type, procedures and the requirements for the equipment and communications for remote survey.~~ ~~3. This guidance can be applied to ships performing remote survey in place of conventional witness survey.~~ ~~4. In principle, remote survey is carried out through agreement between the shipowner and the Society after obtaining approval from the flag state when the surveyor cannot be witness.~~ ~~5. Prior to conducting the remote survey, an agreement between the shipowner and this Society should be discussed on type, procedure, equipment for the remote survey, and the quality of information/communication.~~ ~~6. In order to conduct the remote survey, the quality of information should be guaranteed equivalent with onboard survey carried out by surveyor.~~ ~~7. In application to this guidance, the relevant requirements in Pt 1, Ch 2 of the Rules for the Classification of Steel Ships are to be applied.~~ ~~102. Definitions~~ ~~The definitions of terms are to follow Rules for the Classification of Steel Ships, unless otherwise specified in this Guidance.~~ ~~1. "Remote Survey Information" means the information obtained by communication technology for remote survey, such as through photographs, videos, documents, live streaming, etc.~~	Section 1 General 101. General 1. The survey of ships may utilize different methods and concepts. This Guidance provides principles and minimum requirements for performing the remote survey specified in Pt 1, Ch 2, Sec 11 of the Rules for the Classification of Steel Ships. 2. Remote survey will only be appropriate provided the level of assurance is not compromised, and the survey is carried out with the same effectiveness as and is equivalent to, a survey carried out with attendance on board by a Surveyor. 102. Application 1. These requirements apply to all vessels, self-propelled or not. These requirements are not mandatory for offshore units. 2. Remote survey shall be carried out according to the PSC Total Matrix Point of the Society (hereinafter referred as "PSC TM Point") in Table 1 of 301 depending on the applied surveys and related items.

Present	Amendment
2. "Hardware" means equipment used for remote survey such as smartphones, tablet PCs, video, audio equipment and etc. 3. "Software" means a program that enables communication between ships and surveyor through hardware. 4. **"Applicant"** means a person of the shipowner or manager of the ship who applies for remote survey. 5. "Remote Survey Supporter" means a person who supports the surveyor to perform remote survey of a ship. 6. "Live Streaming" means a real-time broadcast for ship's conditions to the surveyor during the remote survey by audio and video throughout the Internet without any communication disruption. 7. "Cloud" means data stored on a central computer connected to the Internet, the data is available anywhere through the cloud. **103. Class notations** 1. Ships which comply with **Ch 4** may be assigned with the Remote notation at the request of the owner. **104. Equivalency** The equivalence of alternative and novel features which deviate from or are not directly applicable to the Guidance is to be in accordance with Pt 1, Ch 1, 105. of Rules for the Classification of Steel Ships. ⚓	**103. Definitions** The definitions of terms are to follow **Rules for the Classification of Steel Ships**, unless otherwise specified in this Guidance. 1. **"Remote Survey"** is a process of verifying that a ship and its equipment are in compliance with the rules of the Society where the verification is undertaken, or partially undertaken, without attendance on board by a surveyor. 2. **"Information and Communication Technology (ICT)"** are the technologies used in the scope of remote surveys for gathering, storing, retrieving, processing, analysing, and transmitting information which includes both software and hardware. 3. **"Live Streaming"** means real-time broadcasting using the video and sound of an event over the internet for transmitting ship's conditions to the surveyor during the remote survey. Notes: (1) **"Attendance on board by a surveyor"** means physical attendance on board the ship by a surveyor. (2) **"Remote classification activities"** not requiring a survey, such as some administrative tasks, are not to be considered as remote surveys. (3) **"Administrative task"** is a task where a survey decision is not being made, for example reissue of a certificate or record following a correction, or an update to the ship's records held by the Society or a document review.

Present

~~CHAPTER 2 REMOTE SURVEY~~

~~Section 1 General~~

~~101. General~~

~~1. At the request of the owner, the Society accepts that it is appropriate to carry out a remote survey in accordance with the requirements of this Guidance, remote survey can be applied instead of the conventional witness survey.~~

~~2. Remote survey is determined whether or not it can be conducted according to the PSC Total Matrix Point of the Society (hereinafter referred to as "PSC TM Point"), and the type of survey available in each section follow **Table 1**.~~

Table 1. Type of survey according to PSC TM Point

PSC TM Point	Annual Survey[1)]	Occasional Survey (Flag Change)[2)]	Occasional Survey (General)
TM Point 〈 80	Applicable	Applicable	Applicable
80 ≦ TM Point ≦ 100	Not Applicable	Applicable	Applicable
TM Point 〉 100	Not Applicable	Applicable	Applicable[2)]

(Remark)
~~1) For ship with Remote notation~~
2) After completion of the remote survey, the survey will be re-conducted at the next port that can be attended by surveyor.

~~3. Where the required data or conditions are not met or where any damages or defects requiring attention are identified or the Society deems it necessary, the Remote Survey is to be canceled and conventional witness survey is to be carried out.~~

Amendment

Section 2 Requirements for equivalency

201. General

1. The requirements for equivalency of a remote survey to a survey attended on board by a Surveyor include

(1) eligibility of the remote survey
(2) qualification of Surveyors
(3) planning of the remote survey
(4) performance of the remote survey
(5) assessment of the remote survey
(6) reporting

2. Equivalency is obtained when, with the use of available Information and Communication Technology (ICT), a surveyor can perform a survey remotely being able to:

(1) obtain the supporting and technical evidence required according to the applicable rules
(2) verify applicable survey items and relevant tests

and the results of the remote survey provide the same level of assurance obtained with attendance on board by a Surveyor.

202. Eligibility of the remote survey

1. Eligibility of the remote survey is to be decided based on type and scope of the requested survey, in accordance with **301.** and, if applicable, flag State Administration acceptance and possible instructions, when the classification survey is also related to a statutory item, and the Society is carrying out the statutory survey on behalf of the flag State Administration.

2. A remote survey is deemed eligible when it provides the same level of assurance, according to the requirements for equivalency, as if it was conducted with attendance on board by a Surveyor.

3. Remote surveys are generally to be carried out with internet connection allowing a live streaming visual examination, although, at the discretion of the Surveyor, a combination of remote survey methods (see **205.**) may be used. For simple/limited verifications, other types of Information and Communication Technology (ICT) may be accepted by the Surveyor.

Present	Amendment
~~102. Survey Method~~ ~~1. The following methods can be used for Remote Survey.~~ ~~(1) Documents~~ ~~(2) Pictures~~ ~~(3) Videos~~ ~~(4) Live Streaming~~ ~~(5) Other methods as deemed appropriate by the Society.~~ ~~2. Annual Survey should be carried out in accordance with Par 1 (4).~~ ~~103. Type of Remote Survey~~ ~~1. Remote Survey is applicable to the following items.~~ ~~(1) Occasional Survey (Laid-up, Minor Damage, etc.)~~ ~~(2) Three(3) month extension of Shaft Survey~~ ~~(3) Three(3) month extension of Boiler Survey~~ ~~(4) Continuous Machinery Survey~~ ~~(5) Outstanding COC(Condition of Class) or confirming the repairing deficiencies or corrective actions.~~ ~~(6) Annual Survey (It is applied to ship with Remote notation and feasibility shall be confirmed according to requirements in Ch 4)~~ ~~(7) Other Survey as deemed necessary by flag state and Society.~~ ~~2. Even for ships with Remote notation, Annual Survey is not applied if the PSC TM Point in Sec 101. 2 is 80 or more at the time of submission of the remote survey application.~~ ~~3. Notwithstanding Par 1, if deemed necessary by the Society, alternative survey methods or witness survey is to be required.~~	203. Qualification and monitoring of Surveyors 1. Qualification (1) Surveyors engaged in remote surveys are to be qualified as per standard procedures for the type of ship and type of survey, i.e., in accordance with IMO RO Code (MSC.349(92)), IACS Procedural Requirement PR 7, and the Society's training and qualification scheme. (2) Additional training is to be carried out, covering the Information and Communication Technology (ICT) used for the remote survey, in relation to the applicable remote survey scope and methods, in order to fully qualify the Surveyor engaged in remote surveys. (3) The additional training required for qualification for remote surveys shall be in accordance with the Society's procedures and shall provide: (A) knowledge of the operation of the Society's remote survey software, if applicable (B) knowledge of the technical and procedural aspects related to remote surveys (C) knowledge of the connectivity aspects related to remote surveys 2. Monitoring (1) The monitoring of a Surveyor qualified to perform the remote survey is to be carried out in accordance with Procedure for Work Monitoring reflect IACS Procedural Requirement 6

Present	Amendment
	3. Surveyor's Record (1) Records of Surveyor's training and qualification for remote surveys shall be maintained and updated as per the Society's standard procedures. Notes: (1) Society's surveyor engaged in remote classification activities not requiring a survey are to be trained and qualified according to the procedure for training. (2) On board personnel/Crew (A) Training and qualification of on board personnel/Crew are regulated by the STCW Convention and is a prerogative of the flag State Administration. (B) The ship's flag State Administration may require that the Safety Management System of the ship is updated by the Company to include provisions for specific training of the crew engaged in remote surveys.

Present	Amendment
	204. Planning of the remote survey 1. Planning of the remote survey is required to ensure that the remote survey is carried out in accordance with the applicable requirements. The content of the planning shall be based on the scope of the remote survey. 2. To ensure that the Surveyor can properly plan the remote survey and communicate with personnel/crew, so that the survey is carried out according to the applicable rules, adequate means are to be available enabling the Surveyor and allowing the Society to: (1) properly interact with personnel/crew involved in the remote survey, before and during the survey process, (2) agree on Information and Communication Technology (ICT) means to be used (3) verify that personnel/crew involved in the remote survey are suitably skilled to use the electronic devices and/or software used by the Society to perform the remote survey, (4) acquire as deemed necessary information on identity and ranking of personnel/crew involved in the remote survey, (5) provide the survey item/scope to the personnel/crew involved in facilitating the remote surveys, including the tests that will be performed, (6) communicate, during the remote survey, additional actions depending on the evidence to be collected. 3. One or more of the following means is to be provided for planning the remote survey: (1) live-streaming video and audio connection (2) exchange of data / electronic documents (3) other means acceptable to the Society 4. The owner is to provide the necessary facilities for the safe execution of the survey.

Present	Amendment
	205. Performance of the remote survey 1. To ensure that the Surveyor can properly perform the remote survey according to the applicable rules, the available evidence must allow the attending surveyor to: (1) examine and assess a survey item and/or a group of items and/or supporting documents, (2) verify and assess applicable tests and/or services. 2. The evidence provided to the Surveyor is subject to the technical evaluation and final acceptance by the Surveyor with respect to the completeness and accuracy, necessary to perform the requested survey according to the applicable requirements. 3. One or more of the following evidence is to be provided for performing the remote survey together with the Declaration of Master in **Annex 1**. (1) live-streaming video and audio (2) recorded videos provided by the Owner's representative (3) photos provided by the Owner's representative (4) other data and/or supporting documents acceptable to the Society. **206. Assessment of the remote survey** 1. The Surveyor shall evaluate all evidence received and accept them before crediting the remote survey. 2. The means used for the remote survey must allow the Surveyor to collect the necessary evidence that will be examined according to the Surveyor's professional judgement in order to satisfactorily complete and credit the relevant survey items. 3. In case the Surveyor, according to their professional judgement, deems that the remote survey does not provide the same level of assurance as a survey with attendance on board by a Surveyor, the Surveyor may decide not to credit the relevant survey items. 4. If deemed necessary by the Surveyor, Attendance on board by a surveyor may be required.

Present	Amendment
~~CHAPTER 3 PREPARATION~~	
~~Section 1 General~~	Section 3 Scope and procedures
	A remote survey will be only appropriate provided it reaches the same level of assurance as, and is equivalent to, a survey attended on board by a Surveyor.
~~101. General~~	301. Scope – Eligible survey items
~~1. This chapter provides the matters to be prepared on the ship before remote survey.~~	1. A remote survey may be proposed as an alternative to a survey attended on board by a Surveyor for the surveys listed in Table 1.
~~2. This chapter describes equipment and communication requirements used for remote survey, and qualifications of remote survey supporter.~~	2. The flag State Administration acceptance is required for a remote survey, and any additional requirements are to be complied with.
~~3. For cyber security purposes, remote survey equipment should be independent of the ship's main communication system.~~	3. The Surveyor may require to confirm the results of the remote survey, by a survey attended on board by a Surveyor, to credit the relevant survey items, in case the remote survey is not carried out to the Surveyor's satisfaction or it is required by the Society.
~~4. When conducting remote survey in enclosed spaces of the ship (ballast tanks, engine room, etc.), equipment in Ch 4, Sec 2 may be required.~~	
~~Section 2 Technical Requirements for Remote Survey equipment~~	
~~201. Requirements for Remote Survey equipment~~	
~~1. When selecting information collecting equipment and communication equipment, the reliability of hardware and software should be considered.~~	
~~2. The data format of recorded video and photo should be universal, and a communication environment that can reliably transmit and receive recorded video and photo with quality suitable for remote survey.~~	
~~3. Data transmission means for messive capacity recorded videos and photos should be discussed with the Society in advance.~~	

Present

202. Quality of Informations and Communications

1. When selecting information collecting equipment and communication equipment, the reliability of hardware and software should be considered.
2. The data format of recorded video and photo should be universal, and a communication environment that can reliably transmit and receive recorded video and photo with quality suitable for remote survey.
3. Data transmission means for messive capacity recorded videos and photos should be discussed with the Society in advance.

Section 3 Remote Survey Supporter

301. General

1. Remote survey supporter should provide surveyor with remote survey information that guarantees the same quality as conventional witness survey.

302. Qualification

1. Remote survey supporter should be fully familiar with management and use of remote survey equipment and procedures.

Amendment

Table 1 Eligible remote survey items

No.	Surveys and related items eligible to remote survey	Live streaming required (See Notes)	Whether survey practicable according to PSC TM Point (A)		
			A 〈 80	80 ≦ A ≦ 100	A 〉 100
1	Postponement, issuance, deletion of Condition of Class	X(1)	Applicable	Applicable	Applicable(3)
2	Postponement of Class surveys	X(1)	Applicable(4)	Applicable(4)	Applicable(3)
3	Items of Continuous Survey for Machinery or Planned Maintenance Scheme	X(1)	Applicable	Applicable	Applicable(3)
4	Occasional survey for change of ship's name	X(1)	Applicable	Applicable	Applicable(3)
5	Occasional survey for loss of anchor	X(1)	Applicable	Applicable	Applicable(3)
6	Occasional survey for minor machinery or equipment damage	X(1)	Applicable	Applicable	Applicable(3)
7	Occasional survey for minor hull damage	X(1)	Applicable	Applicable	Applicable(3)
8	Occasional survey for minor deficiencies/defects not subject to a Condition of Class	X(1)	Applicable	Applicable	Applicable(3)
9	In-water bottom survey	X	Applicable	Applicable(5)	Not Applicable(6)
10	Specified items of a class periodical survey (excluding additional specific items of initial or renewal surveys), including completion of remaining items of a part held class periodical survey	X(1)(2)	Applicable(3)	Applicable(3)	Not Applicable
11	Non-propelled / un-manned barges/pontoon . annual surveys when no survey of hull compartments is due	X	Applicable(3)	Applicable(3)	Applicable(3)
12	Minor retrofit / installation/upgrade of equipment	X(1)	Applicable	Applicable	Applicable(3)
13	Documentary or data based initial / periodical / renewal / occasional verifications and surveys		Applicable	Applicable	Applicable

Notes:

1. Live streaming may be required for surveys not marked X in the Table, depending on the survey scope at the sole discretion of the Society.
2. "Minor" in the items 6, 7, 8 and 12 means that the item can be surveyed remotely according to requirements for equivalency given in **201.**
3. (1) to (6) in the table are as follows.
   (1) Live streaming may not be required for minor survey scope or that a combination remote survey method, as listed in 205.3, may be used at the sole discretion of the Society.
   (2) Documentary verifications are eligible in accordance with item 13.
   (3) After completion of the remote survey, a survey shall be carried out with attendance on board by a Surveyor at the next port where a surveyor is possible to attend. In case of the in-water survey, possible visible parts such as sea chests, sea connections, overboard discharge valves and cocks are to be examined with attendance on board by a Surveyor.
   (4) In case of postponement of periodical survey, the survey according to (3) is to be carried out.
   (5) In the case of in-water survey instead of docking survey, the survey according to (3) is to be carried out.
   (6) Remote survey may be applied if special considered by the Society.

Present	Amendment
	302. Procedures **1. Eligibility** Refer to **202.** **2. Digital information quality, completeness, and accuracy** (1) Final appraisal of the quality of digital information is at the discretion of the Surveyor, who is to be satisfied with the content and the quality of digital information collected, and the survey carried out, allowing the Surveyor to confirm its completion. (2) The Owner is responsible for the completeness and accuracy of digital information provided. The digital information submitted by the Owner to the Surveyor is to reflect the real situation of the surveyed item. The date and time, when a photo or video was taken are to be made available to the Surveyor or identifiable from its metadata. (3) The Society is to collect and store digital information as evidence of the survey. It is not necessary to store all of digital information received; the exact digital information stored shall support the survey decision and is to be decided by the Surveyor crediting the survey. (4) The remote survey is carried out under the supervision and upon instructions of the Surveyor, who is in charge of crediting the remote surveys. A surveyor attendance on board may be required to complete the survey, upon the Surveyor's request and at their discretion. **3. Requirements for a remote survey when live streaming is not used** (1) When live streaming is not used, communication and digital information collection are to be performed through an Information and Communication Technology (ICT) channels (such as emails, data streams and clouds), which is to be accepted by the Society prior to the survey. (2) The Owner's representative is to confirm the identity of the ship at the commencement of the survey.

Present	Amendment
	4. Requirements for a remote survey when live streaming is used The Owner's is to ensure that: (1) the Owner's representative is attending onboard and has access to the areas intended to be surveyed (2) the Owner's representative has at his disposal a 2-ways visual and audible communication means complying with the requirements in **Sec 4**. (3) Information and Communication Technology (ICT) solution is available on the communication means and meets the requirement described in **Sec 4**. In the case these requirements cannot be fulfilled, the remote survey may be rejected. The Surveyor is to verify the identity of the ship at the commencement of the survey by live streaming. **303. Hardware and Information and Communication Technology (ICT) solution** Refer to **401**. **304. Requirements for Connectivity** 1. The Owner's representative is to ensure that internet connectivity tests are carried out before the survey and that proper connectivity is available and maintained during the survey. 2. When remote survey by live streaming is being undertaken, a connection that enables live streaming between the Surveyor and the Owner's representative attending on board is required. The quality of the live streaming connection (audio and video) is to ensure proper communication and to allow the Surveyor to carry out the survey remotely, to the Surveyor's satisfaction. In the case where a live streaming connection with the Surveyor is not possible or is not continuous at the place of the survey (e.g., Engine Room), partly online sequences (where the Owner is able to capture pictures and videos offline of those items not covered by live streaming) may be accepted by the Surveyor.

Present	Amendment
~~CHAPTER 4 REQUIREMENTS FOR Remote NOTATION~~ ~~Section 1 Survey~~ ~~101. General~~ ~~1. In addition to Ch 3, Ships complying with this chapter may be assigned with the Remote notation at the request of the owner.~~ ~~2. The shipowner should identify type of survey including annual survey, and reflect the type of survey and the list of necessary equipment in remote survey procedure manual.~~ ~~3. Notwithstanding the above notation, survey types and items applied to remote survey shall be sufficiently discussed with the Society before proceeding with the survey.~~ ~~102. Classification Survey~~ ~~Ships intending to register should be satisfied with this chapter.~~ ~~1. Drawings and data~~ ~~The following drawings and data are to be kept onboard after reviewed by the Society.~~ ~~(1) Remote Survey Procedure Manual (for reference)~~ ~~(A) type of survey~~ ~~(B) Procedure of remote survey~~ ~~(C) equipment list for remote survey~~ ~~(D) Instructions of equipment for remote survey~~ ~~(E) Maintenance procedure for remote survey equipment (changes, maintenance records, etc.)~~ ~~(F) Designated remote survey supporter of the ship~~ ~~(2) Where remote survey equipment are installed, wiring diagram and arrangement (for review)~~ ~~2. Testing and inspection~~ ~~(1) Visual inspection~~ ~~(2) Function test~~ ~~(3) Simulation test (if necessary)~~	Section 4 Information and Communication Technology (ICT) 401. General This section outlines the minimum requirements for the use of Information and Communication Technology (ICT) that can capture images, record video and/or live stream video or other data from a ship as considered acceptable to the Society. 402. Hardware 1. The Owner is responsible for ensuring that all hardware installations on board used for the remote survey shall comply with the applicable requirements relevant for use and location on board, including hazardous areas. The Information and Communication Technology (ICT) shall typically consist of: (1) A host computer device, to receive the streaming of images/data/video. This is usually a laptop or desktop computer compatible with the software application used for the remote survey (2) On board standalone device which may include digital cameras capable of capturing videos/photos/data (3) On board smart device compatible with the applicable software/technology (4) Communication accessories like headphones and microphone for the noisy environment as applicable and as deemed necessary Notes: The smart device may be a smartphone, tablet, computer, wearable device, smart glass, digital camera, or any other device which can be connected to the network and capable of transmitting the necessary data/images to shore. 2. The communication equipment used for the live streaming shall have the following minimum functionality: (1) both ends shall simultaneously see the same image/videos in near real-time (i.e., live streaming) (2) two-way direct voice communication (3) possibility to take screenshots

Present	Amendment
~~103. Periodical Survey~~ ~~1. Check that the remote survey procedure manual specified in 102. 1 is provided on board and well maintained.~~ ~~2. Through the tests and inspections specified in 102. 2, the effectiveness of the remote survey equipment is verified.~~ ~~Section 2 Remote Survey equipment~~ ~~201. General~~ ~~1. The remote survey equipment should be capable of live streaming in the area to which the remote survey is applied.~~ ~~2. The remote survey supporter should manage the remote survey equipment so that the remote survey can be performed smoothly.~~ ~~3. It should be able to check the list of remote survey equipment and its management history through the remote survey procedure manual.~~ ~~4. The remote survey information collected or transmitted through the remote survey equipment should be marked with an accurate date and time or be confirmed by other means.~~ ~~5. All equipment used in the hazardous area should be explosion-proof suitable for the area.~~ ~~202. Remote Survey equipment~~ ~~1. At least the following information collecting equipment should be available on the ship.~~ ~~(1) Live streaming equipment~~ ~~(2) Filming equipment such as video and camera~~ ~~(3) Equipment necessary for collecting other information~~	3. When using a portable device on board for live streaming, the movement of the handheld device may affect the stability of the video and the image, leading to lower quality outputs. When necessary, a suitable anti-shake device shall be used to provide proper stability. Notes (1) The host computer screen is to be able to present an image quality that is sufficient to enable a survey decision to be made (2) Portable equipment on board shall be equipped with a power capacity suitable for the intended scope and time of the survey 403. Internet Connectivity (coverage and speed) 1. For internet connectivity requirements on board, refer to 304. 2. The on board smart devices shall have the capability of transmitting the images/video/data over a Cellular, Wi-Fi or Satellite Connection to the remote Surveyor. 3. When live streaming communication is applied, the internet connection shall have sufficient and stable bandwidth capacity to ensure quality (such as resolution and frame rate) of the direct colour image/video and voice communication to the remote survey location to the satisfaction of the Surveyor. 404. Software and data security 1. The software used for the remote survey is to be acceptable to the Society. The overall function and ability of the software used to ensure the security of data shall be evaluated prior to use as per the below requirements. 2. The Surveyor shall normally control the live video call, providing instructions to the on-site personnel/crew and supervising survey activities for capturing relevant information. The on board device shall have the capability of transmitting the data over a Cellular, Wi-Fi, or Satellite Connection to the Surveyor.

Present	Amendment
2. The following information and communication technology equipment can be used in ship. (1) Communication equipment (A) Smartphones, tablet PC and computers capable of video conference (B) Equipment capable of transmitting and receiving remote survey information (C) Wi-Fi modem (D) Network cable for use in enclosed spaces where wireless communication is not available (E) Closed headphones with microphone (F) Other equipment required for Internet access (2) Software (A) Application for video calling 3. Other necessary equipment (1) Cloud or equivalent equipment that can submit remote survey information	3. The software used to perform the remote survey may also be provided with technologies that support the Surveyor in the process of making a decision, such as: (1) Artificial Intelligence (AI) for the recognition and the classification of defects (2) Internet of things (IoT) for collecting parameters and evaluating acceptability/working condition of machinery and equipment (3) Data driven verification or other means considered acceptable by the Society 4. The above software and technologies are to be evaluated and accepted by the Society in each case. 5. When considering the use of software/applications and other technologies, data protection shall be considered in accordance with applicable requirements of the Society before the remote survey is commenced. The software/application used to perform the remote survey is to be compatible with the technical requirements detailed in this paragraph; in addition, the software used is to comply with the Society's applicable requirements for. (1) cybersecurity (2) data protection and confidentiality for the transmitted data Notes : 'Applicable requirements of the Society' means the use of officially recognized software/applications for general purpose/commercial and other technologies. In case the software or applications is not used during the remote survey, a review by Society is to be needed. 6. When not provided by the Society itself, the audio/video software or application used to perform the remote survey is to be accepted by the Society. 7. During the survey preparation, it is the Owner's responsibility to ensure that their data security policies are implemented as per the Company's Safety Management System. Notes : The Company's SMS may take into account IMO resolution MSC.428(98), MSC-FAL.1/Circ.3 and IACS Rec.166.
Section 3 Remote Survey Supporter **301. General** 1. The remote survey supporter should be designated in the shipping company's safety management system manual or remote survey procedure so that the surveyor can perform the survey smoothly. **302. Qualification** 1. Since the survey is conducted on the ship, it is a principle that the person in charge of the relevant job of the ship is in charge of the remote survey according to the division of work in the safety management system manual of the shipping company. However, depending on the situation of the ship, an assigned person by the ship owner may substitute for it.	

Present	Amendment
~~CHAPTER 5 CONDUCT REMOTE SURVEY~~ ~~Section 1 General~~ ~~101. General~~ ~~1. The remote survey is applied after the applicant and the Society agree.~~ ~~2. This chapter deals with preparations and survey procedures required for remote survey.~~ ~~3. When live streaming is applied to remote survey, there should be sufficient consultation between the Society and the applicant on the type of survey.~~ ~~102. Precautions for survey~~ ~~1. The surveyor confirms that the quality of the information provided by the remote survey supporter can be sure the reliability equivalent to witness survey.~~ ~~2. Remote survey supporter should collect and provide necessary information at the request of the Surveyor.~~ ~~3. The remote survey can be canceled if the remote survey information for the surveyor's judgment cannot be obtained, such as communication failure during the survey or the inability to transmit the informations.~~	Section 5 Recording of evidence and reporting of survey 501. Recording of Evidence 1. Required evidence (refer to 205.) In principle, live streaming video and audio shall be applied to remote surveys as a primary means (refer to Table 1 in 301.). Additionally, and/or alternatively, one or more of the following evidence may be submitted or verified as requested by the Surveyor during remote survey so that the Surveyor is able to verify conditions of survey items: (1) Recorded video and audio (2) Photos (3) Master's/chief engineer's statement (4) Ship's logbook (5) Owner's confirmation 2. Evidence list (1) Live streaming video and audio Live streaming video and audio using Information and Communication Technology (ICT) shall be in accordance with the requirements in Sec 4. (2) Recorded videos/photos For the recorded videos/photos, the following information is to be available: (A) confirmation that they were actually taken on the ship by the Owner's representative (B) date and time when they were taken (C) identity of the personnel/crew responsible for taking evidence (3) Master's/chief engineer's statement Recorded videos/photos provided by the Owner's representative may be supplemented with a statement signed by the master and/or the chief engineer confirming the condition of the items shown in the evidence. The final evaluation of the remote survey by the Surveyor is to be based on all of the provided evidence, and it does not delegate the responsibility to the master/chief engineer's statement only.

Present	Amendment
~~Section 2 Remote Survey Procedure~~ ~~201. Remote survey conduct procedure~~ ~~1. Applicants submit an application for remote survey to the headquarters or branch office of the society.~~ ~~2. After confirming the approval of the flag state and the survey application at the headquarters, the Society approves the conduct for remote survey and informs the applicant of the results. If it is determined that remote survey is not possible, it should be conducted through conventional witness survey.~~ ~~3. The surveyor review the type, methods and procedures of the survey. In addition, the surveyor checks the operating status of the hardware and software used for remote survey and/or the communication environment between the shore and the ship to ensure the quality of the survey.~~ ~~4. The surveyor should confirm that the ship for which the remote survey is applied and the ship conducting the survey are the same.~~ ~~5. Before the start of the survey, the surveyor checks the communication status with the ship and performs remote survey as follows;~~ ~~(1) Preparation meeting between the remote survey applicant and the surveyor (when remote survey is performed through live streaming)~~ ~~(2) Confirmation of the survey target according to the method specified by the surveyor~~ ~~(3) Depending on the type of survey, the information and verification means (videos, photos, documents, etc.) to be collected by remote survey supporter according to the instructions of the surveyor are provided together with the 'Declaration of Master' in Annex 1.~~ ~~(4) The surveyor confirms the collected information and determines the survey results.~~ ~~(5) Remote survey close meeting~~ ~~6. If the remote survey results are satisfactory, the Surveyor issues a ship survey report.~~	(4) Ship's logbook The Master shall make entries into ship's logbook on the following occasions and submit copies of the relevant pages when requested by the Surveyor: (A) when a remote survey is carried out by the Surveyor (B) when videos/photos are taken and submitted to the Surveyor with the master's/chief engineer's statement and additional documents as applicable. (5) Owner's confirmation The Owner's representative or the master is to confirm the correctness and completeness of the provided information and evidence (if any) relevant to the condition of the items requested to be surveyed. This confirmation may be included in the survey application. **3. Retaining/filing evidence** (1) The evidence submitted by the Owner's representative or master shall be retained/filed in accordance with the Society's procedures which shall include: (A) type of evidence to be retained/filed (B) duration/location to be retained/filed (2) It is not required for the Society to record and save live streaming video and audio as evidence unless the Surveyor considers it necessary. **4. Other supporting documents** (1) The Surveyor may request the Owner's representative or master to submit supplementary documents such as ship's maintenance reports and record for the operation of machinery, and equipment and service reports issued by manufacturers, service suppliers or service providers. (2) While the Surveyor shall verify that the documents are duly prepared and issued to the ship, they may not be required to be retained/filed by the Society as evidence.

Present	Amendment
	502. Reporting of remote survey 1. The report of a remote survey shall be issued in accordance with the Society's procedure. The survey report shall also include the following additional information: (1) indication that the survey was carried out remotely (2) description of the means used during the remote survey (3) indication of the provided evidence (4) confirmation of the flag State Administration's authorization, when applicable

Present	Amendment
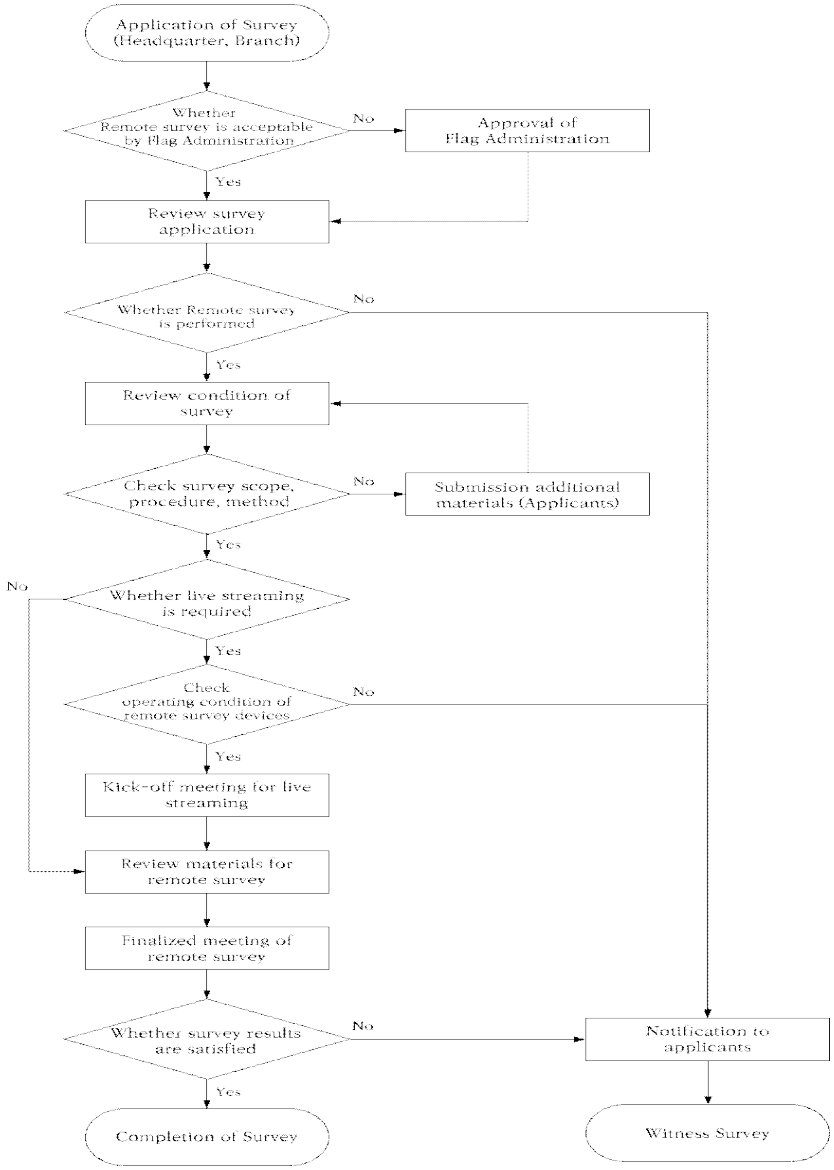	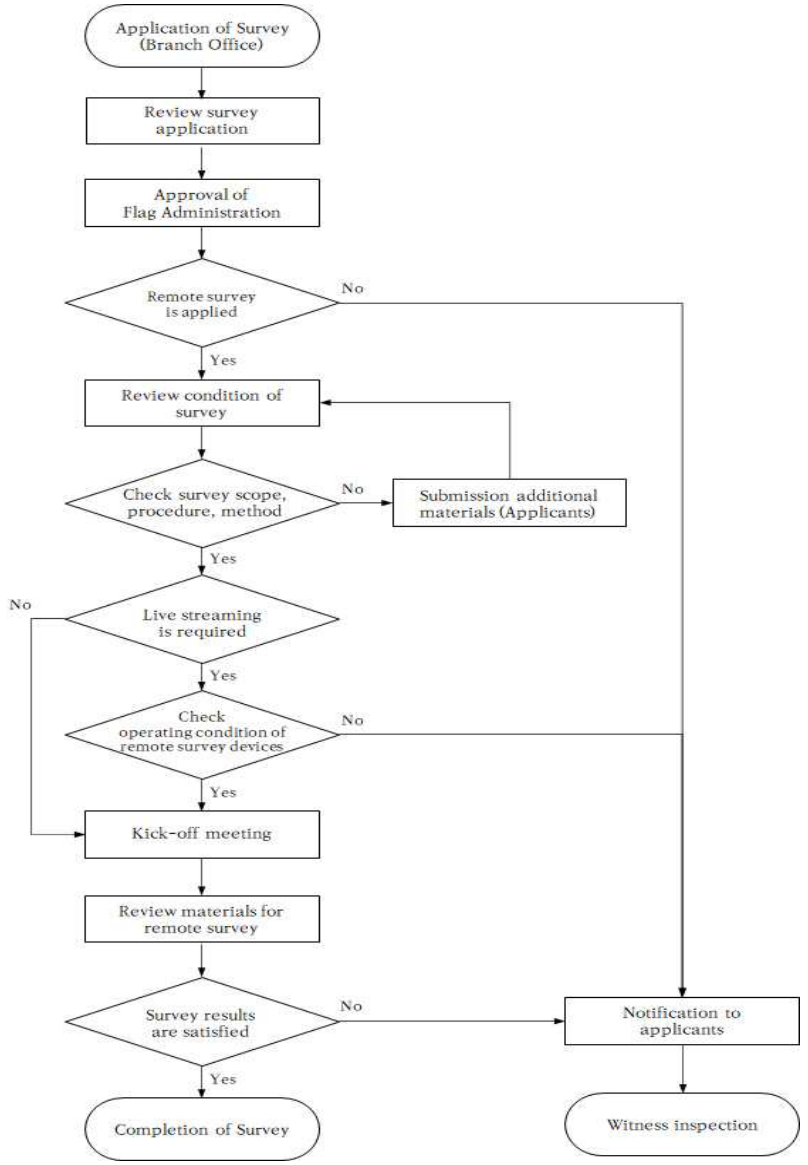
Fig. 1 Flow chart of remote survey procedure	Fig. 1 Flow chart of remote survey procedure

Present

Annex 1 Declaration of Master

The master should prepare and submit a declaration in accordance with Ch 5, 201. 5 (3), and an example of the preparation is shown in Table 1.

Table 1 Example for declaration of master

DECLARATION OF MASTER

Ship name	
IMO No.	
Flag	
Name of the Master	

I, Master of the subject ship, declare that there is no falsehood on the presented data (video, photo, statement, documents, etc.) to Korean Register for the survey at this time, and agree with Terms and Condition of Survey Application of Korean Register.

Day. Month. Year

Master Signature (Stamp)

Amendment

Annex 1 Declaration of Master

The master should prepare and submit a declaration in accordance with Sec 2, 205. 3, and an example of the preparation is shown in Table 1.

Table 1 Example for declaration of master

DECLARATION OF MASTER

Ship name	
IMO No.	
Flag	
Name of the Master	

I, Master of the subject ship, declare that there is no falsehood on the presented data (video, photo, statement, documents, etc.) to Korean Register for the survey at this time, and agree with Terms and Condition of Survey Application of Korean Register.

Day. Month. Year

Master Signature (Stamp)

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No : 2022-10-E
Date : 2022. 8. 24

To : All Surveyors and whom it may concern

Subject	**9.164 Notice for Amendments to the KR Technical Rules (Pt.7 Ships of Special Service)**
Application	**Pt.7 Ships of Special Service : On or after 1st September 2022 (the contract date for ship construction)**

1. Please be informed that the partial amendments have been made to the 'Pt.7 Ships of Special Service', as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Pt.7 Ships of Special Service : requirements for Pure Car Carrier

2. Furthermore, please be informed that these amendments will be included in 2023 edition for Rule and Guidance.

Attachments : Circular 9.164(E) ----- 1 copy. (The End)

Amendments of the Rules / Guidance

Pt. 7 Ship of Special Service

2022. 8

Hull Rule Development Team

- Main Amendments -

1. Effective Date : 1 September 2022 (based on contracted date for construction)

Present	Amendment	Note
〈Newly added〉	**〈Rules〉** **CHAPTER 7 Car Ferries and Roll-On/Roll-off Ships** **Section 5 Pure Car Carrier (New)** **501. Application【See Guidance】** This Section applies to Pure Car Carrier (hereinafter **PCC**) not less than 150 m in length, with multiple car-decks. The scantlings and arrangements are to be as required by **Pt 3** except as otherwise specified in this Section.	

Present	Amendment	Note
〈Newly added〉		

〈Guidance〉

CHAPTER 7 Car Ferries and Roll-On/Roll-off Ships

Section 5 Pure Car Carrier (New)

501. Application【See Rule】

This section provides the requirements for evaluation of plating and stiffeners for PCC. The offered scantling is to be greater than or equal to the required scantling based on requirements provided in 502 ~ 507 of this section.

502. Minimum thickness of shell plating above freeboard deck

The thickness of shell plating above freeboard deck is not to be less than:

$$t = 1.0 + 0.5\sqrt{KL'} \quad \text{(mm)}$$

L' = length of ship (m), but need not be taken greater than 230 m.

503. Thickness of side shell plating above freeboard deck

The thickness of side shell plating from the freeboard deck to the level at 4.6 m above is not to be less than:

$$t = C_1 C_2 S\sqrt{(0.05L' + h_1)\frac{D}{D+4.6}} + 1.5 \quad \text{(mm)}$$

C_1 = coefficient defined in Pt 3, Ch 4, Table 3.4.1 of the Rules.

C_2 = coefficient defined in Pt 3, Ch 4, Table 3.4.1 of the Rules.

S = spacing of frames (m)

L' = length defined in 502.

h_1 = height defined in Pt 3, Ch 4, 302 of the Rules.

504. Side longitudinals above freeboard deck

The section modulus of side longitudinals above the freeboard deck is not to be less than that obtained from the following formula, whichever is the greater:

$$Z_1 = 100CShl^2 \quad \text{(cm}^3\text{)}$$

$$Z_2 = C'K\sqrt{L'}Sl^2 \quad \text{(cm}^3\text{)}$$

Present	Amendment	Note
〈Newly added〉	S= spacing of longitudinals (m). l= distance between the web frames or between the transverse bulkhead and the web frame including the length of connection (m). L'= length defined in **502.** h= vertical distance from the side longitudinal concerned to a point $d+0.038L'$ above baseline (m). C= coefficient as defined in **Pt 3, Ch 8, 401** of the Rules. C'= coefficient given by the following: $C'=0.8$ for longitudinals from the freeboard deck to the level at 4.6 m above $C'=0.5$ elsewhere **505. Bulkhead stiffeners of deep tank** The scantlings are to be in accordance with the requirements in **Pt 3, Ch 15, 203** of the Rules. The section modulus for h_3, however, is not to be less than: $Z=125C_1C_2C_3C_4Shl^2$ (cm^3) C_1= coefficient defined in **Pt 3, Ch 15, 202** of the Rules. C_2= coefficient taken equal to: $C_2=\frac{K}{22.5}$ C_3= coefficient defined in **Pt 3, Ch 15, 203** of the Rules. C_4= coefficient taken equal to: $C_4=1.2$ for vertical stiffeners $C_4=1.0$ for horizontal stiffeners S= spacing of stiffeners (m) l= span of stiffeners, as defined in **Pt 3, Ch 14, 303** of the Rules (m).	

Present	Amendment	Note
〈Newly added〉	**506. Thickness of vehicle deck** The thickness of vehicle deck is to be in accordance with the requirements in **301. 1**. The value of C, however, is to be substituted by the value defined in following **Table 7.7.11**.	

Table 7.7.11 Coefficient C

Frames \ Vehicles			Vehicles used for cargo handling	Other vehicles
Longitudinal strength member	Midship part of strength deck (0.4L)	Longitudinal framing	$4.6\sqrt{K}$	$\frac{17.83\sqrt{K}}{\sqrt{24-K\alpha}}$ but, in no case is it to be less than $5\sqrt{K}$
		Transverse framing	$4.9\sqrt{K}$	$\frac{123.6\sqrt{K}}{\sqrt{576-K^2\alpha^2}}$ but, in no case is it to be less than $5\sqrt{K}$
	Fore and aft end part		$4.6\sqrt{K}$	$5.2\sqrt{K}$
Elsewhere			$4.6\sqrt{K}$	$5.2\sqrt{K}$

α : either α_1 or α_2 according to value of y. However, value of α is not to be less than β.

$\alpha_1 = 15.36 f_D\left(\frac{y-y_B}{Y'}\right)$ for $y_B \le y$ $\alpha_2 = 15.36 f_B\left(\frac{y_B-y}{y_B}\right)$ for $y_B > y$

β : coefficient determined according to values of L as specified below:

$\beta = 6/a$ when L is not greater than 230 m

$\beta = 10.5/a$ when L is not less than 400 m

For intermediate value of L, β is to be obtained by linear interpolation.

y : distance (m) from the baseline to the lower edge of plating when the plating under consideration is under y_B or to the upper edge of plating when the plating under consideration is above y_B.

Y' : the greater of the values defined in **Pt 3, Ch 3, 203.**, (5) (a) and (b)

a : $\sqrt{K}$ when high tensile steels are used for not less than 80 % of side shell plating at the transverse section amidship and 1.0 for other parts.

y_B : vertical distance from the baseline to the horizontal neutral axis of the hull transverse section (m).

f_D, f_B : factors defined in **Pt 3, Ch 1, 124.** of the Rules, but not less than 0.5 in longitudinal framing system of midship part of strength deck

Note : For the intermediate parts between midship part and fore/aft end part, C is to be determined by linear interpolation.

Present	Amendment	Note
〈Newly added〉	**507. Scantlings of vehicle deck beams** The section modulus for vehicle deck beams is not to be less than; $Z = 0.92 C_1 C_2 M$ (cm^3) C_1 = coefficient defined in **301. 2** C_2 = coefficient defined in **Table 7.7.12** M = moment defined in **301. 2**	

Table 7.7.12 Coefficient C_2

Frames \ Vehicles		Vehicles used for cargo handling	Other vehicles
Longitudinal beam	Midship part of strength deck (0.4L)	$\frac{86.4K}{24-0.544K\alpha}$ but, in no case is it to be less than $4.8K$	$\frac{110.4K}{24-K\alpha}$ but, in no case is it to be less than $5.52K$
	Fore and aft end part	$3.6K$	$4.6K$
Elsewhere		$3.6K$	$4.6K$

α : either α_1 or α_2 according to value of y. However, value of α is not to be less than β.

$\alpha_1 = 15.36 f_D \left(\frac{y - y_B}{Y'} \right)$ for $y_B \le y$ $\alpha_2 = 15.36 f_B \left(\frac{y_B - y}{y_B} \right)$ for $y_B > y$

β : coefficient determined according to values of L as specified below:

$\beta = 6/a$ when L is not greater than 230 m $\beta = 10.5/a$ when L is not less than 400 m

For intermediate value of L, β is to be obtained by linear interpolation.

y : Vertical distance (m) from the baseline to the beam under consideration

Y' : the greater of the values defined in **Pt 3, Ch 3, 203.**, (5) (a) and (b)

a : $\sqrt{K}$ when high tensile steels are used for not less than 80 % of side shell plating at the transverse section amidship and 1.0 for other parts.

y_B : vertical distance from the baseline to the horizontal neutral axis of the hull transverse section (m).

f_D, f_B : factors defined in **Pt 3, Ch 1, 124** of the Rules, but not less than 0.5 in longitudinal framing system of midship part of strength deck

Note : For the intermediate parts between midship part and fore/aft end part, C is to be determined by linear interpolation.

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Person in charge: Kim JoonSoo

No : 2022-11-E
Date : 30 Sep. 2022

To : All Surveyors and whom it may concern

Subject	9.165 Notice for Establishment to the KR Technical Rules
Application	1 Jan. 2023 (See below)

1. Please be informed that the amendments have been made to reflect IACS Resolutions, IMO Circulars and Requests for Establishment/Revision of Classification Technical Rules, and you are kindly requested to apply the amendments on the relevant works according to effective date.

2. Furthermore, please be informed that the amendments will be included in 2023 edition on Classification Technical Rules which will be published in the first half of 2023.

--------- below ---------

Classification Technical Rules	Effective Date	Main Amendments
Rules/Guidance for the Classification of Steel Ships Pt 2	The application date for certification of material & welding or the contract date for ship construction on or after 01.01.2023	IACS UR W2(Rev.3 Sep 2021) IACS UR W13(Rev.7 Sep 2021) IACS UR W17(Rev.6 Sep 2021) IACS UR W25(Rev.6 Sep 2021) IACS UR W14(Rev.3 Sep 2021)
Rules for the Classification of Steel Ships Pt 5	The contract date for ship construction on or after 01.01.2023	IACS UR M60 (Rev.1 Nov 2021)
	The application date for certification on or after 01.01.2023	IACS UR M73 (Rev.1 Mar 2022)

Rules for the Classification of Steel Ships Pt 5 Ch 6	The contract date for ship construction on or after 01.01.2023	IACS UR M61 (Rev.1 Feb 2022)
Guidance for the Classification of Steel Ships Pt 7 Ch 5	The contract date for ship construction on or after 01.01.2023	IACS UI GC 32(Rev.1 Feb 2022) MSC Circ. 1651 To reflect result of internal review
Rules for the Classification of Mobile Offshore Drilling Units	The contract date for ship construction on or after 01.01.2023	IACS UR D11(Rev.4 Dec 2021)

Attachments: Amendments for the Classification Technical Rules (K/E) --- each 1 copy.
(The End)

Amended Rules for the Classification of Steel Ships

(Part 2 Materials and Welding)

- Main Amendments -

(1) Effective date : 1 January 2023 (the date of application for certification of material & welding or the contract date for ship construction)

◉ To reflect IACS UR W2(Rev.3 Sep 2021)
◉ To reflect IACS UR W13(Rev.7 Sep 2021)
◉ To reflect IACS UR W17(Rev.6 Sep 2021)
◉ To reflect IACS UR W25(Rev.6 Sep 2021)

Present	Amendment
CHAPTER 1 MATERIALS **Section 1 〈Omitted〉** **Section 2 Test Specimens and Testing Procedures** **201. General** **1. 〈Omitted〉** **2. Testing machine** (1) The testing machines used for the tests relative to this Chapter are to be managed by competent personnel on machines. (2) Tension/compression testing machines are to be calibrated in accordance with *ISO* 7500-1 or other recognised standard. **【See Guidance】** (3) Impact testing machines are to be calibrated in accordance with *ISO* 148-2 or other recognised standard. **【See Guidance】** (4) The accuracy of tensile test machines is to be within ±1% **3. 〈Omitted〉** **201. ~ 203. 〈Omitted〉**	**CHAPTER 1 MATERIALS** **Section 1 〈Same as the present Rules〉** **Section 2 Test Specimens and Testing Procedures** **201. General** **1. 〈Same as the present Rules〉** **2. Testing machine** (1) The testing machines used for the tests relative to this Chapter are to be managed by competent personnel on machines. (2) Tension/compression testing machines are to be calibrated in accordance with *ISO 7500-1:2018* or other recognised standard. *(2023)* **【See Guidance】** (3) Impact testing machines are to be calibrated in accordance with *ISO 148-2:2016* or other recognised standard. *(2023)* **【See Guidance】** (4) The accuracy of tensile test machines is to be within ±1%. **3. 〈Same as the present Rules〉** **201. ~ 203. 〈Same as the present Rules〉**

Present	Amendment
Section 3 Rolled Steels	**Section 3 Rolled Steels**
301. Rolled steels for hull structural	**301. Rolled steels for hull structural**
1. ~ **7.** 〈Omitted〉	**1.** ~ **7.** 〈Same as the present Rules〉
8. Verification of dimensions and thickness 【See Guidance】	**8. Verification of dimensions and thickness** 【See Guidance】
(1) **Scope** (a) The Requirements apply to the tolerance on thickness of steel plates and wide flats with widths of 600 mm or greater with thicknesses of 5 mm and over. The thickness tolerances for products below 5 mm are to be in accordance with a national or international standard, e.g. Class B of **ISO 7452**. However, the minus tolerance is to be not exceed 0.3 mm. The wide flats with under 600 mm of width may be agreed between the manufacturer and purchaser at the time of ordering. *(2019)* (b) ~ (d) 〈Omitted〉 (2) ~ (5) 〈Omitted〉	(1) **Scope** (a) The Requirements apply to the tolerance on thickness of steel plates and wide flats with widths of 600 mm or greater with thicknesses of 5 mm and over. The thickness tolerances for products below 5 mm are to be in accordance with a national or international standard, e.g. Class B of *ISO 7452:2013*. However, the minus tolerance is to be not exceed 0.3 mm. The wide flats with under 600 mm of width may be agreed between the manufacturer and purchaser at the time of ordering. *(2019) (2023)* (b) ~ (d) 〈Same as the present Rules〉 (2) ~ (5) 〈Same as the present Rules〉
9. ~ **13.** 〈Omitted〉	**9.** ~ **13.** 〈Same as the present Rules〉
302. ~ 312. 〈Omitted〉	**302. ~ 312. 〈Same as the present Rules〉**
Section 4 ~ Section 7 〈Omitted〉	**Section 4 ~ Section 7** 〈Same as the present Rules〉

Present	Amendment
Section 8 Aluminium Alloys	**Section 8 Aluminium Alloys**
801. Aluminium alloys	**801. Aluminium alloys**
1. ~ **7.** 〈Omitted〉	**1.** ~ **7.** 〈Same as the present Rules〉
8. Drift expansion tests The manufacturer has to demonstrate by macrosection tests or drift expansion tests of closed profiles performed on each batch of closed profiles that there is no lack of fusion at the press welds. (1) ~ (3) 〈Omitted〉 (4) The lengths of the drift expanding test specimens are to be equal to 1.5 times the external diameter(D) of the test specimen in accordance with *(KS B) ISO 8493*. The test piece may be shorter provided that after testing the remaining cylindrical portion is not less than 0.5D. (5) ~ (6) 〈Omitted〉	**8. Drift expansion tests** The manufacturer has to demonstrate by macrosection tests or drift expansion tests of closed profiles performed on each batch of closed profiles that there is no lack of fusion at the press welds. (1) ~ (3) 〈Same as the present Rules〉 (4) The lengths of the drift expanding test specimens are to be equal to 1.5 times the external diameter(D) of the test specimen in accordance with *(KS B) ISO 8493:1998*. The test piece may be shorter provided that after testing the remaining cylindrical portion is not less than 0.5D. *(2023)* (5) ~ (6) 〈Same as the present Rules〉
9. Corrosion testing (1) **Testing procedures** (a) 〈Omitted〉 (b) A reference photomicrograph taken at 500x, under the conditions specified in **ASTM B928**, Section 9.4.1, shall be established for each of the alloy-tempers and thickness ranges relevant. (c) The reference photographs shall be taken from samples which have exhibited no evidence of exfoliation corrosion and a pitting rating of PB or better, when subjected to the test described in **ASTM G66** (ASSET). (d) The samples shall also have exhibited resistance to intergranular corrosion at a mass loss no greater than 15mg/cm^2, when subjected to the test described in **ASTM G67** (NAMLT). (e) ~ (f) 〈Omitted〉	**9. Corrosion testing** (1) **Testing procedures** (a) 〈Same as the present Rules〉 (b) A reference photomicrograph taken at 500x, under the conditions specified in *ASTM B928:2015*, Section 9.4.1, shall be established for each of the alloy-tempers and thickness ranges relevant. *(2023)* (c) The reference photographs shall be taken from samples which have exhibited no evidence of exfoliation corrosion and a pitting rating of PB or better, when subjected to the test described in *ASTM G66:2018* (ASSET). *(2023)* (d) The samples shall also have exhibited resistance to intergranular corrosion at a mass loss no greater than 15mg/cm^2, when subjected to the test described in *ASTM G67:2018* (NAMLT). *(2023)* (e) ~ (f) 〈Same as the present Rules〉

Present	Amendment
(2) **Acceptance criteria** (a) For batch acceptance of 5xxx-alloys in the H116 and H321 tempers, metallographic examination of one sample selected from mid width at one end of a coil or random sheet or plate is to be carried out in accordance with **ASTM B928** or equivalent standards agreed by the Society. The microstructure of the sample is to be compared to the reference photomicrograph of acceptable material in the presence of the Surveyor. **【See Guidance】** (b) 〈Omitted〉 (c) Corrosion tests with respect to exfoliation and intergranular corrosion resistance are to be in accordance with **ASTM G66** and **G67** or equivalent standards agreed by the Society. **【See Guidance】** (i) The samples have exhibited no evidence of exfoliation corrosion and a pitting rating of PB or better when subjected to the test described in **ASTM G66**. (ii) The samples shall also have exhibited resistance to intergranular corrosion at a mass loss no greater than 15 mg/cm2, when subjected to the test described in **ASTM G67**. If the results from testing satisfy the acceptance criteria, the batch is accepted, else it is to be rejected. (d) As an alternative to metallographic examination, each batch may be tested for exfoliation-corrosion resistance and intergranular corrosion resistance, in accordance with **ASTM G66** and **G67** under the conditions specified in **ASTM B928**, or equivalent standards. If this alternative is used, then the results of the test must satisfy the acceptance criteria stated in (c) above. **10.** ~ **14.** 〈Omitted〉	(2) **Acceptance criteria** (a) For batch acceptance of 5xxx-alloys in the H116 and H321 tempers, metallographic examination of one sample selected from mid width at one end of a coil or random sheet or plate is to be carried out in accordance with *ASTM B928:2015* or equivalent standards agreed by the Society. The microstructure of the sample is to be compared to the reference photomicrograph of acceptable material in the presence of the Surveyor. *(2023)* **【See Guidance】** (b) 〈Same as the present Rules〉 (c) Corrosion tests with respect to exfoliation and intergranular corrosion resistance are to be in accordance with *ASTM G66:2018* and *G67:2018* or equivalent standards agreed by the Society. *(2023)* **【See Guidance】** (i) The samples have exhibited no evidence of exfoliation corrosion and a pitting rating of PB or better when subjected to the test described in *ASTM G66:2018*. *(2023)* (ii) The samples shall also have exhibited resistance to intergranular corrosion at a mass loss no greater than 15 mg/cm2, when subjected to the test described in *ASTM G67:2018*. *(2023)* If the results from testing satisfy the acceptance criteria, the batch is accepted, else it is to be rejected. (d) As an alternative to metallographic examination, each batch may be tested for exfoliation-corrosion resistance and intergranular corrosion resistance, in accordance with *ASTM G66:2018* and *G67:2018* under the conditions specified in *ASTM B928:2015*, or equivalent standards. If this alternative is used, then the results of the test must satisfy the acceptance criteria stated in (c) above. *(2023)* **10.** ~ **14.** 〈Same as the present Rules〉

Present	Amendment
CHAPTER 2 WELDING	**CHAPTER 2 WELDING**
Section 1 ~ Section 2 〈Omitted〉	**Section 1 ~ Section 2** 〈Same as the present Rules〉
Section 6 Welding Consumables	**Section 6 Welding Consumables**
601. 〈Omitted〉	**601.** 〈Same as the present Rules〉
602. Electrodes for manual arc welding for normal strength steels, higher strength steels and steels for low temperature service	**602. Electrodes for manual arc welding for normal strength steels, higher strength steels and steels for low temperature service**
1. ~ **5.** 〈Omitted〉	**1.** ~ **5.** 〈Same as the present Rules〉
6. Hydrogen test	**6. Hydrogen test**
The hydrogen test to be carried out by the mercury method or thermal conductivity detector method. The use of the glycerine method may be admitted at the Society discretion. *(2017)*	The hydrogen test to be carried out by the mercury method or thermal conductivity detector method. The use of the glycerine method may be admitted at the Society discretion. *(2017)*
(1) The mercury method to be as specified in the Standard **ISO 3690**. *(2017)*	(1) The mercury method to be as specified in the Standard *ISO 3690:2018*. *(2017) (2023)*
(2) The thermal conductivity detector method is to be as specified in **ISO 3690**. Four weld assemblies are to be prepared. The temperature of the specimens and minimum holding time are to be complied with **Table 2.2.31**, according to the measuring method respectively. *(2017)*	(2) The thermal conductivity detector method is to be as specified in *ISO 3690:2018*. Four weld assemblies are to be prepared. The temperature of the specimens and minimum holding time are to be complied with **Table 2.2.31**, according to the measuring method respectively. *(2017) (2023)*
(hereafter, omitted)	(hereafter, same as the present Rules)

Guidance relating to the Rules for the Classification of Steel Ships

(Guidance Part 2 Materials and Welding)

- Main Amendments -

(1) Effective date : 1 January 2023 (the date of application for certification of material & welding or the contract date for ship construction)

◉ To reflect IACS UR W14(Rev.3 Sep 2021)

Present	Amendment
CHAPTER 1 MATERIALS	**CHAPTER 1 MATERIALS**
Section 1 ~ Section 2 〈Omitted〉	**Section 1 ~ Section 2 〈Same as the present Guidance〉**
Section 3 Rolled Steels	**Section 3 Rolled Steels**
301. ~ 309. 〈Omitted〉	**301. ~ 309. 〈Same as the present Guidance〉**
310. Additional requirements for through thickness properties	**310. Additional requirements for through thickness properties**
1. ~ **2.** 〈Omitted〉	**1.** ~ **2.** 〈Same as the present Guidance〉
3. Ultrasonic tests	**3. Ultrasonic tests**
(1) Ultrasonic test procedures and acceptance criteria, specified in **310. 7** (2) of the Rules, are to be in accordance with either *EN* 10160 *Level S1/E1*, *ASTM A* 578 *Level C* or accepted standard at the discretion of the Society **【See Rule】**	(1) Ultrasonic test procedures and acceptance criteria, specified in **310. 7** (2) of the Rules, are to be in accordance with either *EN* 10160 *Level S1/E1*, *ASTM A* 578:*2027 Level C* or accepted standard at the discretion of the Society *(2023)* **【See Rule】**
(hereafter, omitted)	(hereafter, same as the present Rules)

Amended Rules for the Classification of Steel Ships

(Part 5 Machinery Installations)

- Main Amendments -

(1) Effective date : 1 Jan. 2023 (Date of which contracts for construction are signed)

◉ The requirement for safety devices of gas turbines has been revised to reflect IACS UR M60 (Rev.1 Nov 2021).

(2) Effective date : 1 Jan. 2023 (Application date for certification of a new turbocharger type or of a turbocharger type that has undergone substantive modifications in respect of the one previously type approved, or for renewal of an expired type approval certificate)

◉ IACS UR M73 (Rev.1 Mar 2022) on change of effective date of the requirements for turbocharger has been reflected.
- The effective date of Ch 1, 211. has been changed.
- The effective date of Ch 2, 202. 3 (3), (4), (5) has been changed.
- The effective date of Ch 2, 211. 2 (1) has been changed.

Present	Amendment
CHAPTER 2 MAIN AND AUXILIARY ENGINES	**CHAPTER 2 MAIN AND AUXILIARY ENGINES**
Section 4 Gas Turbines	**Section 4 Gas Turbines**
401. ~ 403. 〈omitted〉	**401. ~ 403. 〈same as the present〉**
404. Safety devices	**404. Safety devices**
1. Gas turbines are to be provided with automatic safety systems and devices for safeguards against hazardous conditions arising from malfunctions in their operation. The design of safety devices is to be evaluated with failure mode and effects analysis. *(2021)*	1. Gas turbines are to be provided with automatic safety systems and devices for safeguards against hazardous conditions arising from malfunctions in their operation. The design of safety devices is to be evaluated with failure mode and effects analysis. *(2021)*
2. Governors and overspeed protective devices	**2. Governors and overspeed protective devices**
(1) ~ (2) 〈omitted〉	(1) ~ (2) 〈same as the present〉
3. Hand trip gear for shutting off the fuel in an emergency is to be provided at the local control position and, where applicable, at the gas turbine control station. *(2021)*	3. Hand trip gear for shutting off the fuel in an emergency is to be provided at the local control position and, where applicable, at the gas turbine control station. *(2021)*
4. Alarms and shutdowns *(2021)*	**4. Alarms and shutdowns *(2021)***
Gas turbines are to be provided with audible and visible alarming devices, and a quick closing device (shutdown device) which automatically shuts off the fuel supply to the gas turbines as a minimum in listed in **Table 5.2.6**.	Gas turbines are in principle to be provided with audible and visible alarming devices, and a quick closing device (shutdown device) which automatically shuts off the fuel supply to the gas turbines ~~as a minimum~~ in listed in **Table 5.2.6**. However, alarm and shutdown devices can be added or omitted, taking into account the result of FMEA specified in **Par** 1. *(2023)*
(hereafter, omitted)	(hereafter, same as the present Rules)

Amended Rules for Classification of Steel Ships

(Pt. 5 Machinery Installations - Chapter 6)

- Main Amendments -

(1) Effective date : 1 Jan 2023 (based on contract date for construction)

◉ reflected of IACS UR M61 Rev.1

Present	Amendment
CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT **Section 11 Compressed Air System** **1101. Compressed air starting devices 【See Guidance】** **1. Number and capacity of main air reservoirs** (1) Where the main engines are arranged for starting by compressed air, at least two starting air reservoirs of about equal capacity are to be fitted. These reservoirs are to be connected ready for use. (2) The total capacity of air reservoirs is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts altering between Ahead and Astern of each main engine of the reversible type, and not less than 6 consecutive starts of each main non-reversible type engine. The number of starts refers to engine in cold and ready to start conditions. (3) Where the auxiliary engines are designed for starting by compressed air, two separate auxiliary air reservoirs which are to be sufficient for at least three starts for each auxiliary engine when in cold and ready to start conditions are to be fitted, or starting air for auxiliary engines is to be supplied by separate piping from main air reservoirs. In case where only one auxiliary reservoir is fitted, starting air pipes are to be connected with main air reservoir. (4) Where the auxiliary engines are designed for starting by the main air reservoirs, the capacity of the main air reservoirs is to be more than sum of the capacity required in (2) and (3) above, and the amount consumed for engine control systems, whistle, etc. (5) For multi-engine installations, the number of starts required for each engine is to be determined as deemed appropriate by the Society. 〈Omitted〉	**CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT** **Section 11 Compressed Air System** **1101. Compressed air starting devices 【See Guidance】** **1. Number and capacity of main air reservoirs *(2023)*** (1) Where the main engines are arranged for starting by compressed air, at least two starting air reservoirs of about equal capacity are to be fitted. These reservoirs are to be connected ready for use. (2) The total capacity of air reservoirs is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts altering between Ahead and Astern of each main engine of the reversible type, and not less than 6 consecutive starts of each main non-reversible type engine. ~~The number of starts refers to engine in cold and ready to start conditions.~~ (3) Where the auxiliary engines are designed for starting by compressed air, two separate auxiliary air reservoirs which are to be sufficient for at least three starts for each auxiliary engine ~~when in cold and ready to start conditions~~ are to be fitted, or starting air for auxiliary engines is to be supplied by separate piping from main air reservoirs. In case where only one auxiliary reservoir is fitted, starting air pipes are to be connected with main air reservoir. (4) Where the auxiliary engines are designed for starting by the main air reservoirs, the capacity of the main air reservoirs is to be more than sum of the capacity required in (2) and (3) above, and the amount consumed for engine control systems, whistle, etc. (5) For multi-engine installations, the number of starts required for each engine is to be determined as deemed appropriate by the Society. 〈Omitted〉

Amended Guidance Related to Rules for the Classification of Steel Ships

(Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk)

- Main Amendments -

(1) Reflecting (MSC Circ. 1651, IACS UI GC 32(rev.1) <ships contracted for construction on or after 2023/01/01>

◉ MRD4800-131-2022: Outer Duct in Gas Fuel Piping Systems

Present	Amendment
Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems	**Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems**
501. to 503. <omitted>	**501. to 503. <same as the present>**
504. Design pressure [See Rule]	**504. Design pressure** [See Rule]
1. <omitted> <newly added>	1. <same as the present>
2. For the purpose of the requirements in 504. 4 of the Rules, the expression "design pressure of the outer pipe or duct" is either of the following: *(2021)* (1) the maximum pressure that can act on the outer pipe or equipment enclosure after the inner pipe rupture as documented by suitable calculations taking into account the venting arrangements; or (2) for gas fuel systems with inner pipe working pressure greater than 1 MPa, the "maximum built-up pressure arising in the annular space", after the inner pipe rupture, which is to be calculated in accordance with **Ch 9, 802. of Rules for the Classification of Ships Using Low-flashpoint Fuels.**	2. The expression "duct" in 504. 4 of the Rules means to include the equipment enclosure required in 1604. 3 (1) and (2) of the Rules (e.g. GVU enclosure) as well as the structural pipe duct intended to contain any release of gas from inner pipe or equipment. The term "structural pipe duct" means an outer duct forming part of a structure such as a hull structure or superstructure or deck house, where permitted, other than gas valve unit rooms. The gas valve unit rooms are to be: *(2023)* (1) gastight toward other enclosed spaces; (2) equipped with mechanical exhaust ventilation having a capacity of at least 30 air changes per hour and arranged to maintain a pressure less than the atmospheric pressure; and (3) able to withstand the maximum built-up pressure arising in the room in case of a gas pipe rupture, as documented by suitable calculations taking into account the ventilation arrangements.
	3. For the purpose of the requirements in 504. 4 of the Rules, the expression "design pressure of the outer pipe or duct" is either of the following: *(2021)* (1) the maximum pressure that can act on the outer pipe or equipment enclosure after the inner pipe rupture as documented by suitable calculations taking into account the venting arrangements; or (2) for gas fuel systems with inner pipe working pressure greater than 1 MPa, the "maximum built-up pressure arising in the annular space", after the inner pipe rupture, which is to be calculated in accordance with **Ch 9, 802. of Rules for the Classification of Ships Using Low-flashpoint Fuels.**

Present	Amendment
501. to 512. <omitted>	**501. to 512. <same as the present Guidance>**
513. Testing requirements *(2022)*	**513. Testing requirements *(2022)***
1. Requirements of type tests 【See Rule】	**1. Requirements of type tests** 【See Rule】
<omitted>	<same as the present>
2. Application 【See Rule】	**2. Application** 【See Rule】
For the purpose of the requirements in **513. 2** (1) of the Rules, for pipes within the cargo tank and pipes with open ends, the hydraulic test and leak test specified in the requirements in **513. 2** (2) and (3) of the Rules may be omitted. However, the hydraulic test specified in the requirements in **513. 2** (2) of the Rules is to be conducted for pipes without open ends and discharging pipes provided inside the cargo tanks.	For the purpose of the requirements in **513. 2** (1) of the Rules, for pipes within the cargo tank and pipes with open ends, the hydraulic test and leak test specified in the requirements in **513. 2** (2) and (3) of the Rules may be omitted. However, the hydraulic test specified in the requirements in **513. 2** (2) of the Rules is to be conducted for pipes without open ends and discharging pipes provided inside the cargo tanks.
3. Pressure test	**3. Pressure test**
For the purpose of the requirements in **513. 2** (4) of the Rules, the expression "maximum pressure at gas pipe rupture" is the maximum pressure to which the outer pipe or duct is subjected after the inner pipe rupture and for testing purposes it is the same as the design pressure used in **504. 4** of the Rules. *(2021)*	For the purpose of the requirements in **513. 2** (4) of the Rules, the expression "maximum pressure at gas pipe rupture" is the maximum pressure to which the outer pipe or duct is subjected after the inner pipe rupture and for testing purposes it is the same as the design pressure used in **504. 4** of the Rules. The expression "duct" in **513. 2 (4)** of the Rules means to comply **504. 2.** *(2023)*
4. Test under operating condition	**4. Test under operating condition**
For the purpose of the requirements in **513. 2** (5) of the Rules, the test is to be conducted according to the requirements in **420. 4** of the Guidance.	For the purpose of the requirements in **513. 2** (5) of the Rules, the test is to be conducted according to the requirements in **420. 4** of the Guidance.
<hereafter, omitted>	<hereafter, same as the present>

Amended Rules for the Classification of Steel Ships

(Mobile Offshore Drilling Units)

- Main Amendments -

(1) Effective date : 1 Jan. 2023 (Date of which contracts for construction are signed)

◉ The requirement for fire extinction has been revised to reflect IACS UR D11.

Present	Amendment
CHAPTER 10 FIRE PROTECTION, MEANS OF ESCAPE AND FIRE EXTINCTION	**CHAPTER 10 FIRE PROTECTION, MEANS OF ESCAPE AND FIRE EXTINCTION**
Section 3 Fire Extinction	**Section 3 Fire Extinction**
302. Fire pumps, fire mains, hydrants and hoses	**302. Fire pumps, fire mains, hydrants and hoses**
2. The arrangements of the pumps, sea suctions and sources of power are to be such as to ensure that a fire in any space would not put both the required pumps out of action.	**2.** The arrangements of the pumps, sea suctions and sources of power are to be such as to ensure that a fire or flooding in any space would not put both the required pumps out of action. *(2022)*
〈omitted〉	〈omitted〉
308. Fixed automatic gas detection and alarm systems	**308. Fixed automatic gas detection and alarm systems**
1. Fixed automatic gas detection and alarm systems are to be provided for the following areas. (1) Cellar deck (2) Drill floor 〈Newly added〉 (3) Mud pit area (4) Shale shaker area (5) Enclosed spaces containing the open components of mud circulation system from the bell nipple to the mud pits. (6) Ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines and boilers; and (7) Ventilation intakes and near other openings of accommodation spaces. 〈Newly added〉	1. Areas for protection *(2022)* Fixed automatic gas detection and alarm systems are to be provided for the following areas. (1) Cellar deck (2) Drill floor (3) Ventilation intake of positive pressure driller's cabin. *(2022)* (4) Mud pit area (5) Shale shaker area (6) Enclosed spaces containing the open components of mud circulation system from the bell nipple to the mud pits. ~~(6) Ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines and boilers; and~~ (7) Ventilation intakes ~~and near other openings~~ of accommodation spaces. *(2022)* (8) Ventilation intakes of enclosed machinery spaces contiguous to hazardous areas and containing internal combustion engines, boilers;, or non-explosion proof electrical equipment *(2022)* (9) Air intakes to all combustion engines or machinery, including internal combustion engines, boilers, compressors or turbines, located outside of an enclosed machinery space *(2022)* (10) At each access door to accommodation spaces. *(2022)* (11) Near other openings, including emergency egress, of accommodation spaces, regardless if these openings are fitted with self-closing and gas-tight closing appliances. *(2022)*
〈omitted〉	〈same as present〉

Present	Amendment
〈Newly added〉	2. Areas where protection is not required *(2022)* Fixed automatic combustible gas detection and alarm systems are not required. (1) Near access doors to accommodation spaces where these form part of an air-lock which is provided with a gas detection and alarm system between the two doors of the air-lock. (2) Near emergency egress doors which are fitted with a mechanism to prevent use other than in an emergency (e.g. doors fitted with security seals acting as a deterrent but easily breakable in a real emergency.) (3) Near other openings which are provided with closing appliances of non-opening type, (e.g. bolted closed maintenance ways etc.) 〈same as present〉

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No : 2022-11-E
Date : 2022.10.05

To : All Surveyors and whom it may concern

Subject	**9.166 Notice for Amendments to the KR Technical Rules (Pt.1 Classification and Surveys, Rules for the Classification of Dredgers)**
Application	**(Refer to Effective date for each KR Technical Rules specified in Par.1 and the attachment)**

1. Please be informed that the amendments have been made to the following KR Technical Rule 2022 as attachment to reflect Requests for Establishment/Revision of Classification Technical Rules. And you are kindly requested to apply the amendments on the relevant works according to effective date.

Amended KR Technical Rule	Effective Date	Amendments
Pt.1 Classification and Surveys	1st Jan. 2023 (The application for survey is submitted)	Revision of additional special feature notation for 'Reduced Freeboard'
Rules for the Classification of Dredgers		- Clarify inspection items for dredgers with reduced freeboard - Updating text and numbers to clarification

2. Furthermore, please be informed that these amendments will be included in 2023 edition for Rule and Guidance.

Attachments : Circular 9.166(E) ----- 1 copy. (The End)

Amendments of the Guidance relating to the Rules

Part 1 Classification and Surveys

Annex 1-1 Character of Classification

2022.10.

Hull Rule Development Team

Main Amendments

(1) Background of Amendment

1) Change special feature notation of dredger for “Reduced Freeboard” to additional special feature notation according to request for establishment/revision of Classification Technical Rules(STS6000-401-2022[(1)])

[(1)] ‘Reduced Freeboard’ notation can be applicable not only for Dredger but also for all ships having dredging capability. And, additional survey items are required for ships assigned with reduced freeboard.

(2) Effective Date : 1 January 2023 (Date of which the application for survey is submitted)

Presnet	Amendment	Note

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Ship Types	Special Feature Notations	Remarks
1. ~ 18.	<omitted>	
19-1. Dredger	Trailing Suction Cutter Suction Grab Bucket Dipper Suction/Dump Reduced Freeboard	
19-2. Dredger (Self-propelled)		
	<omitted below>	

(Remarks)[35] : The following Additional Special Feature Notations are to be appended to ships complying with the relevant requirements. The Additional Special Feature Notations are to be located under Service Restriction Notations of Hull after Special Feature Notations regardless whether they are hull items or machinery items.

Additional Special Feature Notations	Relevant Requirements
	<omitted>
Remote (2021)	to ships comply with the requirement specified in Ch 4 of the Guidances for Remote Survey

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Ship Types	Special Feature Notations	Remarks
1. ~ 18.	<same as present>	
19-1. Dredger	Trailing Suction Cutter Suction Grab Bucket Dipper Suction/Dump ~~Reduced Freeboard~~	
19-2. Dredger (Self-propelled)		
	<same as present below>	

(Remarks)[35] : The following Additional Special Feature Notations are to be appended to ships complying with the relevant requirements. The Additional Special Feature Notations are to be located under Service Restriction Notations of Hull after Special Feature Notations regardless whether they are hull items or machinery items.

Additional Special Feature Notations	Relevant Requirements
	<same as present>
Remote (2021)	to ships comply with the requirement specified in Ch 4 of the Guidances for Remote Survey
Reduced Freeboard	to ships comply with the requirement specified in Annex 1 of the Rules for the Classification of Dredgers

Amendments of the Rules for Dredgers

2022. 10.

Hull Rule Development Team

Main Amendments

(1) Background of Amendment

1) Modified to clarify inspection items for dredgers with reduced freeboard according to request for establishment/ revision of Classification Technical Rules(STS6000-401-2022[(1)]) (ref. DR-68)

[(1)] 'Reduced Freeboard' notation can be applicable not only for Dredger but also for all ships having dredging capability. And, additional survey items are required for ships assigned with reduced freeboard.

2) Cross-reference is corrected and requirements are rearranged and editorial improvement

(2) Effective Date : 1 January 2023 (Date of which the application for survey is submitted)

Present	Amendment	Note
CHAPTER 2 REGISTRATION AND CLASSIFICATION SURVEYS **Section 1 ~ Section 2 <omitted>** **Section 3 Periodical Survey** **301. General <omitted>** **302. Annual survey** 1. Annual survey is to be carried out in accordance with Pt 1, Ch 2, 202. and 203. of the Rules for the Classification of Steel Ships, and on the condition of the safety equipments and appliances as prescribed in Ch 13, 102. of this Rules. 2. Overall examination is to be carried out for the external and operating condition of dredging equipment. **303. Intermediate survey** 1. In addition to above 302. Intermediate survey is to be carried out in accordance with Pt 1, Ch 2, 302. and 303. of the Rules for the Classification of Steel Ships. 2. Dismantling and opening survey for the dredging equipment.	**CHAPTER 2 REGISTRATION AND CLASSIFICATION SURVEYS** **Section 1 ~ Section 2 <same as present>** **Section 3 Periodical Survey** **301. General <same as present>** **302. Annual survey** 1. Annual survey is to be carried out in accordance with Pt 1, Ch 2, 202. and 203. of the Rules for the Classification of Steel Ships, and on the condition of the safety equipments and appliances as prescribed in Ch 13, 101.7. of this Rules. 2. Overall examination is to be carried out for the external and operating condition of dredging equipment. 3. For dredgers assigned with reduced freeboard in accordance with Annex 1, overall examination is to be carried out for the external and operating condition of the following items and onboard status of the instruction, etc. should be confirmed. (1) Dumping System; (2) The emergency control systems for opening the hopper doors and closing the dredging valves; (3) The draft indicators; and (4) Information to be provided to the master including the limiting sea state information posted on the navigating bridge and emergency control system instruction, etc. **303. Intermediate survey** 1. In addition to above 302. Intermediate survey is to be carried out in accordance with Pt 1, Ch 2, 302. and 303. of the Rules for the Classification of Steel Ships. 2. Dismantling and opening survey for the dredging equipment.	

Present	Amendment	Note
3. Functional tests are to be carried out for the safety equipments and appliances prescribed in Ch 13, 102. of this Rules **304. Special survey <omitted>**	3. Functional tests are to be carried out for the safety equipments and appliances prescribed in Ch 13, 101.7. of this Rules **304. Special survey <same as present>**	

Present	Amendment	Note
# CHAPTER 13 MACHINERY OF DREDGERS ## Section 1 Machinery and Dredging Equipment of Non Self-propelled dredgers ### 101. General 1. The machinery is to be designed, manufactured and installed in order not to hinder the safety of dredger and the safety of life in normal operating condition. 2. The rotating, reciprocating, high temperature and electrically charged of machinery are to be provided with proper protection devices in order not to be hindered to monitor, handle or access to these parts. 3. The machinery is not to be leaked the gas which are harmful to the health of operators or dangerous of fire as far as practicable. 4. The machinery space is to be well ventilated to exhaust the gas of Par 3 rapidly. 5. The machinery is to be of the constructions and arrangements which are easily maintained and inspected. 6. Application These requirements are to apply to prime mover, power transmission system, boiler, pressure vessels, auxiliary machinery, piping system and electric installations for pump type, bucket type, dipper type or grab type non self-propelled dredgers. 7. Terms (1) The equipment or installations which are related to the safety of dredgers are; (A) Anchoring system (B) Mooring system (C) Fire-fighting system (D) Bilge discharging system	# CHAPTER 13 MACHINERY OF DREDGERS ## Section 1 Machinery and Dredging Equipment of Non Self-propelled dredgers ### 101. General 1. The requirements in this Chapter apply to prime mover, power transmission system, boiler, pressure vessels, auxiliary machinery, piping system and electric installations for pump type, bucket type, dipper type or grab type non self-propelled dredgers. 2. The machinery is to be designed, manufactured and installed in order not to hinder the safety of dredger and the safety of life in normal operating condition. 3. The rotating, reciprocating, high temperature and electrically charged of machinery are to be provided with proper protection devices in order not to be hindered to monitor, handle or access to these parts. 4. The machinery is not to be leaked the gas which are harmful to the health of operators or dangerous of fire as far as practicable. 5. The machinery space is to be well ventilated to exhaust the gas of Par 3 rapidly. 6. The machinery is to be of the constructions and arrangements which are easily maintained and inspected. 7. The equipments or installations which are related to the safety of dredgers are; (A) Anchoring system (B) Mooring system (C) Fire-fighting system (D) Bilge discharging system	

Present	Amendment	Note
(E) Ballasting and de-ballasting system (F) Lighting system (G) Communication system (H) Ventilation system for the spaces of internal combustion engines or boilers and the spaces which are required ventilation (I) Feed water supply and burning system of boiler which are to supply steam to the equipment or installations mentioned from (A) to (H) and (J). (J) Electrical power generating and its starting system which are supplying the electricity to the equipment or installations mentioned from (A) to (I) and navigational lights, signal lights and radio equipment. (K) Other installations where deemed necessary by this society (2) The dredgers with restricted service areas are the dredgers of which navigational or working areas are restricted to smooth water and coastal, or equivalent area of smooth or coastal. 8. Special design or installation Specially designed machinery or equipment are to comply with that acceptable to this society.	(E) Ballasting and de-ballasting system (F) Lighting system (G) Communication system (H) Ventilation system for the spaces of internal combustion engines or boilers and the spaces which are required ventilation (I) Feed water supply and burning system of boiler which are to supply steam to the equipment or installations mentioned from (A) to (H) and (J). (J) Electrical power generating and its starting system which are supplying the electricity to the equipment or installations mentioned from (A) to (I) and navigational lights, signal lights and radio equipment. (K) Other installations where deemed necessary by this society 8. The dredgers with restricted service areas are the dredgers of which navigational or working areas are restricted to smooth water and coastal, or equivalent area of smooth or coastal. 9. Specially designed machinery or equipment are to comply with that acceptable to this society.	

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No : 2022-13-E
Date : 2022. 12. 20

To : All Surveyors and whom it may concern

Subject	**9.167 Notice for Amendments to KR Technical Classification Rules (Rule/Guidance, Part 1)**
Application	**On or after 1st Feb. 2023 (Date of which the application for survey is submitted)**

1. Please be informed that the partial amendments have been made to the "Rules and Guidance Relating to the Rules for the Classification of Steel Ships, Pt. 1" as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) To add survey item for container ships provided with container lashing calculation program & instrument, and assigned **CL*** as Special Feature Notations.

* where **CL** means **C**alculation for **L**ashing

2) To update Container Ship's Special Feature Notations and Barge's Special Feature Notations respectively.

2. Furthermore, please be informed that these amendments will be included in 2024 edition for Rule and 2023 edition for Guidance on KR Classification Technical Rules which will be published in the first half of 2023 and 2024 respectively.

Attachments: Amended Rule/Guidance, Pt 1. -- 1 copy. (The End)

Amendments of Classification Technical Rules

Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Dec. 2022

- Main Amendments -

(1) Effective date : 1 Feb. 2023 (Date of which the application for survey is submitted)

◉ To add survey item for container ships provided with container lashing calculation program & instrument, and assigned CL* as Special Feature Notations.
(At the request of the Survey Team (SUR3000-2112-2022, 8 Nov. 2022))

(1) Effective date : 1 Feb. 2023

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 2 Annual Survey	**Section 2 Annual Survey**
201. Due range 〈omitted〉	**201. Due range 〈same as the current Rules〉**
202. Hull, equipment and fire-extinguishing appliances	**202. Hull, equipment and fire-extinguishing appliances**
1. The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, and equipment are maintained in a satisfactory condition.	**1.** The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, and equipment are maintained in a satisfactory condition.
(1) ~ (26) 〈omitted〉	(1) ~ (26) 〈same as the current Rules〉
(27) For container ships equipped with container securing arrangements in accordance with **Pt 7, Ch 4, 1002.** of the Rules, the container securing arrangements are to be examined as follows: (a) general examination for arrangements (b) confirmation of on-board record book	(27) For container ships equipped with container securing arrangements in accordance with **Pt 7, Ch 4, 1002.** of the Rules, the container securing arrangements are to be examined as follows: (a) general examination for arrangements (b) confirmation of on-board record book
〈newly added〉	(28) For container ships provided with container lashing calculation program and instrument approved by the Society in accordance with the requirements of Guidance **Pt 7, Annex 7-2** and assigned "CL" as Special Feature Notations, it is to be confirmed that the container lashing calculation program and the instrument having the performance and functions as deemed appropriate by the Society is installed on board. *(2023)*
(28) For ships provided with a loading instrument in accordance with the requirements of **Pt 3, Ch 3, 104.,** it is to be confirmed that a loading instrument having the performance and functions as deemed appropriate by the Society is installed on board. Where a stability instrument specified in **Ch 1, 307.** is provided on-board, then the system is to be tested.	(29) ~~(28)~~ For ships provided with a loading instrument in accordance with the requirements of **Pt 3, Ch 3, 104.,** it is to be confirmed that a loading instrument having the performance and functions as deemed appropriate by the Society is installed on board. Where a stability instrument specified in **Ch 1, 307.** is provided on-board, then the system is to be tested.
(29) Documentations on board including the stability data, etc. approved by the Society are to be confirmed to be kept on board.	(30) ~~(29)~~ Documentations on board including the stability data, etc. approved by the Society are to be confirmed to be kept on board.
(30) ~ (35) 〈omitted〉 〈hereinafter, omitted〉	(31) ~~(30)~~ ~ (36) ~~(35)~~ 〈same as the current Rules〉 〈hereinafter, same as the current Rules〉

Amendments of Classification Technical Rules

Guidance Relating to the Rules for the Classification of Steel Ships
(Part 1 Classification and Surveys)

Nov. 2022

- Main Amendments -

(1) Effective date : 1 Feb. 2023 (Date of which the application for survey is submitted)

◉ Updating of Container Ship's Special Feature Notations in Annex 1-1

◉ Updating of Barge's Special Feature Notations in Annex 1-1

(1) Effective date : 1 Feb. 2023

(Date of which application for survey is submitted)

Present

Annex 1-1 Class Notations

1. Class Notations

Ship Types	Special Feature Notations	Remarks
11. Container Ship[20]	LS[20-1] LS(CL)[20-2] LS(CL, RS)[20-3] LS(CL, RS+)[20-4] LS(CL, RS, HHS or HHT)[20-5]	[20] : 〈omitted〉 [20-1] : 〈omitted〉 [20-2] : 〈omitted〉 [20-3] : 〈omitted〉 [20-4] : This notation shall be assigned to ships where the contents related to the application of the user-specified route reduction factors provided by the Society are included in Cargo Securing Manual and ships equipped with a program that can calculate the route reduction factors for an arbitrary route in accordance with Pt 7, Annex 7-2 of the Guidance in addition to [20-2] above. *(2019)* [20-5] : This notation shall be assigned to ships where container securing arrangements are used, and design and construction of the system are in accordance with **Ch 3, Sec 25, 2504** or **2505** of the **Guidance for Approval of Manufacturing Process and Type Approval, Etc** *(2022)*

〈omitted〉

Amendments

Annex 1-1 Class Notations

1. Class Notations

Ship Types	Special Feature Notations	Remarks
11. Container Ship[20]	LS[20-1] LS(CL)[20-2] LS(CL, RS)[20-3] LS(CL, RS+)[20-4] LS(HHS or HHT)[20-5] *(2023)*	[20] : 〈same as the current Guidance〉 [20-1] : 〈same as the current Guidance〉 [20-2] : 〈same as the current Guidance〉 [20-3] : 〈same as the current Guidance〉 [20-4] : 〈same as the current Guidance〉 [20-5] : 〈same as the current Guidance〉

〈same as the current Guidance〉

Present

Ship Types	Special Feature Notations		Remarks
〈omitted〉			
18. Barge (FAC)[1] (FAO)[1] (FBC)[1]	A (Type)	B (Loaded cargo name or additional purpose)	– : Additional notation is not required for barge excluding 3 types of barge below, and for barges with hatch opening on the deck and built to carry cargo in cargo holds. [26] : See special feature for chemical tanker as shown in row 3. [27] : See special feature for liquefied gas carrier as shown in row 2-1. *(2022)* Type A : permanent connection type Type B : removable connection type
	– Pontoon Integrated Pusher Barge (Type A) (Type B) Hopper(or Dump)	Chemical[26] Liquiefied Gas[27] Oil Container Sand Crane Pipe-Laying Piling Cable-Laying Salvage Submersible Accommodation Waste Log Heavy Cargo Oil Recovery (GA, GB or GC)[25] Power Plant *(2019)* Wind Turbine Transportation *(2019)* 〈Newly added〉	
〈omitted〉			

Amendments

Ship Types	Special Feature Notations		Remarks
〈same as the current Guidance〉			
18. Barge (FAC)[1] (FAO)[1] (FBC)[1]	A (Type)	B (Loaded cargo name or additional purpose)	- : Additional notation is not required for barge excluding 3 types of barge below, and for barges with hatch opening on the deck and built to carry cargo in cargo holds. [26] : See special feature for chemical tanker as shown in row 3. [27] : See special feature for liquefied gas carrier as shown in row 2-1. *(2022)* Type A : permanent connection type Type B : removable connection type
	- Pontoon Integrated Pusher Barge (Type A) (Type B) Hopper(or Dump)	Chemical[26] Liquiefied Gas[27] Oil Container Sand Crane Pipe-Laying Piling Cable-Laying Salvage Submersible Accommodation Waste Log Heavy Cargo Oil Recovery (GA, GB or GC)[25] Power Plant *(2019)* Wind Turbine Transportation *(2019)* Harbor Construction (Crane, Dredger, Ground Amelioration or Piling) *(2023)*	
〈same as the current Guidance〉			

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Person in charge :KIM Heesung

No :2022-14-E
Date :2022. 12. 15

To :All Surveyors and whom it may concern

Subject	9.168 Notice for Amendment to the KR Technical Rules
Application	1 January 2023 (Refer to Effective date for specified in Par.1)

1. Please be informed that the amendments of KR Technical Rules have been made to reflect IACS Resolutions, and you are kindly requested to apply the amendments on the relevant works according to effective date.

Amended KR Technical Rules	Effective date	Revision contents
Guidance for the Classification of Steel Ships Pt 7 Ch 6	For ships contracted for construction on or after 1 January 2023	IACS UI CC6 Rev.1

2. Furthermore, please be informed that the establishment will be included in 2023 edition on KR Technical Rules which will be published in the first half of 2023.

Attachments: Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

(Form No.:FI-03-03)(20.06.2018)

Amended Guidance Relating to the Rules for Classification of Steel Ships

Pt. 7 Ch. 6

2022.12.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan 2023 (based on contract date for construction)

◉ reflected of IACS UI CC6 Rev.1

Present	Amendment	Note
# CHAPTER 6 SHIPS CARRYING DANGEROUS CHEMICALS IN BULK ## Section 15 Special Requirements 〈Omitted〉 **1511. Acids** **1. Anti-corrosive treatment 【See Rule】** For the purpose of the requirements in **1511. 2** of the Rules, the use of lining or corrosion-resistant materials is to be applied also to the boundary walls of cargo pump room (the bottom and boundaries to a height of 1 m from the bottom). Where the effectiveness of lining or corrosion-resistant materials is not verified, the boundary walls are to be used corrosion-resistant materials. In this case, "lining" is an acid-resistant material that is applied to the tank or piping system in a solid state with a defined elasticity property. 〈Omitted〉	# CHAPTER 6 SHIPS CARRYING DANGEROUS CHEMICALS IN BULK ## Section 15 Special Requirements 〈Omitted〉 **1511. Acids** **1. Anti-corrosive treatment 【See Rule】** For the purpose of the requirements in **1511. 2** of the Rules, the use of lining or corrosion-resistant materials is to be applied also to the boundary walls of cargo pump room (the bottom and boundaries to a height of 1 m from the bottom). Where the effectiveness of lining or corrosion-resistant materials is not verified, the boundary walls are to be used corrosion-resistant materials. In this case, "lining" is an acid-resistant material that is applied to the tank or piping system in a solid state ~~with a defined elasticity property.~~ i.e. not spray on. The requirement for the elasticity of a lining to be not less than the supporting boundary plating is to prevent debonding at the interface between the lining and the lined surface. 〈Omitted〉	- UI CC6 Rev.1

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Person in charge :Kim Hyunjung

No : 2023-1-E
Date : 2023.01.03

To : All Surveyors and whom it may concern

Subject	9.169 Notice for Amendment to the KR Technical Rules - Guidance for Pt 9
Application	Immediately

1. Please be informed that the amendments have been made to the following KR Technical Rules 2023 as attachment to Requests for Establishment/Revision of Classification Technical Rules.

Amended KR Technical Rules	Effective Date	Amendments
Guidance for Pt 9	Immediately	Ventilation rate and personal equipment requirements for Installation of BWMS on-board ships have been amended

2. Furthermore, please be informed that the establishment will be included in 2023 edition on KR Technical Rules which will be published in the first half of 2023.

Attachments : Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

Amended Guidance for Classification of Steel Ships

Part 9 Additional Installations

2023. 01.

- Main Amendments -

(1) Effective date : Immediately

◉ Ventilation rate and personal equipment requirements for Installation of BWMS on-board ships have been amended to the Guidance.

Present	Amendment
CHAPTER 10 Ballast Water Management	**CHAPTER 10 Ballast Water Management**
Section 4 Installation of BWMS on-board ships	**Section 4 Installation of BWMS on-board ships**
406. 〈Newly added〉	**406. Ventilation *(2023)*** **1.** In case **406. 2** (3) **of the Rules** is applied to the engine room, the ventilation rate may be appropriately reduced if it is recognized that sufficient ventilation is achieved through methods such as the arrangement of ducts in the engine room. *(2023)*
407. 〈Newly added〉	**407. Personal equipment *(2023)*** **1.** In applying **406. 4 of the Rules**, SOLAS and flag State requirements may be considered.
(hereafter, omitted)	(hereafter, same as the present)

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Person in charge :Kim Hyunjung

No : 2023-2-E
Date : 2023.02.06

To : All Surveyors and whom it may concern

Subject	9.170 Notice for Amendment to the KR Technical Rules - Guidance for Pt 1
Application	1 Mar 2023 (Date of which the application for survey is submitted)

1. Please be informed that the amendments have been made to the following KR Technical Rules 2023 as attachment to Requests for Establishment/Revision of Classification Technical Rules.

Amended KR Technical Rules	Effective Date	Amendments
Guidance for Pt 1	1 Mar 2023 (Date of which the application for survey is submitted)	Clarification of items covered by the CMS system

2. Furthermore, please be informed that the establishment will be included in 2023 edition on KR Technical Rules which will be published in the first half of 2023.

Attachments : Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

Amended Guidance Relation to the Rules for Classification of Steel Ships

(Part 1 Classification and Surveys)

Feb. 2023

- Main Amendments -

(1) Effective date : 1 Mar 2023 (Date of which the application for survey is submitted)

◉ Clarification of items covered by the CMS system and machinery permissible for the chief engineers inspection (CRR3100-1537-2022)

(1) Effective date : 1 Mar 2023

(Date of which application for survey is submitted)

Present

Annex 1-7 Continuous Machinery Survey Procedure(CMS)

Table 1 Items Covered by the CMS System

Items	Details
1. Main diesel engines	(a) Cylinder covers, cylinder liners, pistons (including piston pins and piston rods), crossheads (including pins, bearings and guides), connecting rods, crank shafts and bearings, camshafts and their driving gears, turbo chargers, scavenge air pumps or blowers, air intercoolers, attached essential pumps (bilge, lubricating oil, fuel oil and cooling water)
2. Main steam turbines	(a) Turbine rotors, blades, bearings, casings, nozzles, nozzle valves and maneuvering valves
5. Auxiliary machinery	〈Omitted〉 (c) Windlass and mooring winches (d) Cargo refrigerating installations (excluding those for provision storage): compressors, pumps, evaporators and condensers (e) Fresh water generators for main boilers (f) Fuel oil heaters (excluding those for purifiers) and tank cleaning heaters (g) Condensers and feed water heaters (h) Coolers (excluding those for air compressors) (i) Inert gas systems (j) Exhaust gas Emission Abatement system(SCR, EGR & EGCS) - Pump, exhaust fan, blower, reductant or chemical storage tank and residue tank and inside of SCR chamber & scrubber. (k) Air reservoirs (excluding those for emergency use) and other pressure vessels for essential uses (l) Fuel oil tanks not form a part of the ship's structure (m) Other items considered to be applicable under the CMS by the Society

Amendments

Annex 1-7 Continuous Machinery Survey Procedure(CMS)

Table 1 Items Covered by the CMS System

Items	Details
1. Internal combustion engines for main engines	(a) Cylinder covers, cylinder liners, pistons (including piston pins and piston rods), crossheads (including pins, bearings and guides), connecting rods, crank shafts and bearings, camshafts and their driving gears, turbo chargers, scavenge air pumps or blowers, air intercoolers, attached essential pumps (bilge, lubricating oil, fuel oil and cooling water)
2. Steam turbines for main engines	(a) Turbine rotors, blades, bearings, casings, nozzles, nozzle valves and maneuvering valves
5. Auxiliary machinery	〈Same as present〉 (c) Windlass and mooring winches (d) Cargo refrigerating installations (excluding those for provision storage): compressors, pumps, evaporators and condensers (e) Fresh water generators for main boilers (f) Heaters, coolers and condensers for essential services *(2023)* - Fuel oil heaters (excluding those for purifiers) and tank cleaning heaters - Condensers and feed water heaters - Coolers (excluding those for air compressors) - Cargo heat exchangers (g) Inert gas systems (h) Exhaust gas Emission Abatement system(SCR, EGR & EGCS) - Pump, exhaust fan, blower, reductant or chemical storage tank and residue tank and inside of SCR chamber & scrubber. (i) Air reservoirs (excluding those for emergency use) and other pressure vessels for essential uses (j) Fuel oil tanks not form a part of the ship's structure (k) Other items considered to be applicable under the CMS by the Society

Present

Table 2 Machinery Permissible for the Chief Engineers Inspection, etc. ***(2022)***

	Items	Remarks
Machinery permissible for the Chief Engineers inspection	1. Main diesel engine 2. Auxiliary diesel engine(Refer to remarks) 3. Forced draft fans & burning pumps for main boiler 4. Auxiliary machinery (1) Air compressor (2) Auxiliary blower (3) Pump (4) Heat exchanger (5) Portable fuel oil tank (6) Fresh water generator (7) Deck machinery (8) Hydraulic pumps of steering gears (9) Exhaust gas emission abatement system (SCR, EGR & EGCS) 〈Newly added〉 ※ However, for ships subject to Korean Ship Safety Act, each part of the main internal combustion engine and internal combustion engine to drive main generator among machinery permissible for the Chief Engineer's inspection, open-up survey by the Surveyor for at least one of two CMS cycles is to be carried.	● The Chief Engineer's inspection for auxiliary diesel engines ● The engine is completely opened up and a careful examination is made on all cylinder units, cylinder liners, cylinder covers, cylinder cover valves, pistons, piston rings, connecting rods and top and lower bearings, piston pins, camshaft driving gears, turbo-chargers, air-intercoolers, crankcase and crankcase doors, engine foundation bolts, and crank case safety valves. ● The top halves of all main bearings are removed and two bottom halves are taken out for examination. ● An examination is made on all crankpins and journals to detect cracks, especially at fillet and areas in the vicinity of oil holes and crank shaft oil grooves. ● Crank web deflections are measured and recorded. ● Wear downs of the cylinder liners are measured and recorded. ● The L.O. cooler attached to the engine, L.O. pumps, cooling water pumps, etc. of direct driven-type are opened up and examined. ● Verify through performance tests that safety devices are in good operating condition. ● The service hours of crank pin bolts are checked and recorded.

Amendments

Table 2 Machinery Permissible for the Chief Engineers Inspection, etc. ***(2022)***

	Items	Remarks
Machinery permissible for the Chief Engineers inspection	1. Internal combustion engines for main engines 2. Auxiliary diesel engine(Refer to remarks) 3. Forced draft fans & burning pumps for main boiler 4. Auxiliary machinery (1) Air compressor (2) Auxiliary blower (3) Pump (4) Heat exchanger (5) Portable fuel oil tank (6) Fresh water generator (7) Deck machinery (8) Hydraulic pumps of steering gears (9) Exhaust gas emission abatement system (SCR, EGR & EGCS) 5. Among items Covered by the CMS System in Table 1, items not designated machinery impermissible for the Chief Engineers inspection *(2023)* ※ However, for ships subject to Korean Ship Safety Act, each part of the main internal combustion engine and internal combustion engine to drive main generator among machinery permissible for the Chief Engineer's inspection, open-up survey by the Surveyor for at least one of two CMS cycles is to be carried.	● The Chief Engineer's inspection for auxiliary diesel engines ● The engine is completely opened up and a careful examination is made on all cylinder units, cylinder liners, cylinder covers, cylinder cover valves, pistons, piston rings, connecting rods and top and lower bearings, piston pins, camshaft driving gears, turbo-chargers, air-intercoolers, crankcase and crankcase doors, engine foundation bolts, and crank case safety valves. ● The top halves of all main bearings are removed and two bottom halves are taken out for examination. ● An examination is made on all crankpins and journals to detect cracks, especially at fillet and areas in the vicinity of oil holes and crank shaft oil grooves. ● Crank web deflections are measured and recorded. ● Wear downs of the cylinder liners are measured and recorded. ● The L.O. cooler attached to the engine, L.O. pumps, cooling water pumps, etc. of direct driven-type are opened up and examined. ● Verify through performance tests that safety devices are in good operating condition. ● The service hours of crank pin bolts are checked and recorded.

Present

Table 2 Machinery Permissible for the Chief Engineers Inspection, etc. ***(2022)***

	Items	Remarks
Machinery impermissible for the Chief Engineers inspection	1. Crank shaft, crank pin bearing and journal bearing of main engine, crank pin bolts and camshaft driven equipment(Refer to remarks) 2. Steam turbine (main, auxiliary, etc.) 3. Power transmission gear 4. Shafting arrangements 5. Air reservoir 6. Other items not applied to CMS by the Society (1) Refrigeration installations for provision storage (2) Electrical installations (3) Boiler (4) Cargo handling gears(cargo winch) (5) Spare parts (6) Emergency compressors, emergency air tank, emergency generators, emergency fire pumps, etc. (7) Steering gears (8) Bilge pumps for oily water separators (9) Heaters for purifiers (10) Coolers for air compressors (11) Other items not considered subject to CMS by the Society	● Measurement of crank web deflection for main diesel engine and check of foundation bolts

Amendments

Table 2 Machinery Permissible for the Chief Engineers Inspection, etc. ***(2022)***

	Items	Remarks
Machinery impermissible for the Chief Engineers inspection	1. Crank shaft, crank pin bearing and journal bearing of main engine, crank pin bolts and camshaft driven equipment(Refer to remarks) 2. Steam turbine (main, auxiliary, etc.) 3. Power transmission gear 4. Shafting arrangements 5. Air reservoir ~~6. Other items not applied to CMS by the Society~~ ~~(1) Refrigeration installations for provision storage~~ ~~(2) Electrical installations~~ ~~(3) Boiler~~ ~~(4) Cargo handling gears(cargo winch)~~ ~~(5) Spare parts~~ ~~(6) Emergency compressors, emergency air tank, emergency generators, emergency fire pumps, etc.~~ ~~(7) Steering gears~~ ~~(8) Bilge pumps for oily water separators~~ ~~(9) Heaters for purifiers~~ ~~(10) Coolers for air compressors~~ ~~(11) Other items not considered subject to CMS by the Society~~	● Measurement of crank web deflection for main diesel engine and check of foundation bolts

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No : 2023-3-E
Date : 2023. 3. 2

To : All Surveyors and whom it may concern

Subject	**9.171 Notice for Amendments to KR Technical Classification Rules**
Application	**On or after 1st April 2023 (Refer to Effective date for specified in Par.1)**

1. Please be informed that the amendments have been made to reflect the Requests for Establishment/Revision of Classification Technical Rules as below, and you are kindly requested to apply these amendments on the relevant works.

= Below =

Classification Technical Rules	Effective date	Amendments
Rules/Guidance for the Classification of Steel Ships Pt 1	On or after 1st April 2023 (Date of which application for survey is submitted)	Clarification for ballast tanks of same type for (Double Skin) Bulk Carriers at Intermediate Survey
		Clarification for “Representative ballast spaces” and the acceptance of thickness measurement during TOC

2. Furthermore, please be informed that these amendments will be included in 2024 edition on Rule and Guidance, Pt 1 which will be published in the first half of 2024.

Attachments: Amended Rule/Guidance, Pt 1. -- 1 copy. (The End)

Amendments of Classification Technical Rules

Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Mar. 2023

- Main Amendments -

(1) Effective date : 1 April 2023 (Date of which the application for survey is submitted)

◉ Clarification for ballast tanks of same type for (Double Skin) Bulk Carriers at Intermediate Survey

- Addition of Internal Note of IACS Survey Panel

(1) Effective date : 1 April 2023

(Date of which application for survey is submitted)

Present	Amendments
CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME	**CH 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME**
Section 1 General 〈omitted〉	**Section 1 General 〈same as the current Rule〉**
Section 2 Bulk Carriers	**Section 2 Bulk Carriers**
201. ~ 202. 〈omitted〉	**201. ~ 202. 〈same as the current Rule〉**
203. Intermediate Survey	**203. Intermediate Survey**
1. General 〈omitted〉	**1. General 〈same as the current Rule〉**
2. Examination of ballast tanks	**2. Examination of ballast tanks**
The examination of ballast tanks in Intermediate Survey is to be in accordance with the follows.	The examination of ballast tanks in Intermediate Survey is to be in accordance with the follows.
5 years〈 age ≤ 10 years[1), 2), 3)]	5 years〈 age ≤ 10 years[1), 2), 3)]
1. Overall Survey of representative ballast tanks 2. Overall Survey and Close-up Survey of suspect areas identified at previous surveys	1. Overall Survey of representative ballast tanks 2. Overall Survey and Close-up Survey of suspect areas identified at previous surveys
〈omitted〉	〈same as the current Rule〉
(NOTES) 1) 〈omitted〉. 2) Where POOR coating condition, corrosion or other defects are found in ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type. 〈newly added〉 3) 〈omitted〉	(NOTES) 1) 〈same as the current Rule〉. 2) Where POOR coating condition, corrosion or other defects are found in ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to "other ballast tanks of the same type"*. *(2023)* * Other ballast tanks of same type is to be applied as followings; a) aft peak & fore peak shall be considered as same type. b) In case other ballast tanks are not of identical construction, the additional several tanks are to be examined because the progression of corrosion is not only related to the construction type, and the corrosion prevention system and the history of usage of the tanks are to be considered. c) In case of water ballast hold, all water ballast holds are surveyed. 3) 〈same as the current Rule〉
〈hereinafter, omitted〉	〈hereinafter, same as the current Rule〉

Present	Amendments
Section 6 Double Skin Bulk Carriers	**Section 6 Double Skin Bulk Carriers**
601. ~ 602. 〈omitted〉	**601. ~ 602. 〈same as the current Rule〉**
603. Intermediate Survey	**603. Intermediate Survey**
1. General 〈omitted〉	**1. General 〈same as the current Rule〉**
2. Examination of ballast tanks	**2. Examination of ballast tanks**
The examination of ballast tanks in Intermediate Survey is to be in accordance with the follows.	The examination of ballast tanks in Intermediate Survey is to be in accordance with the follows.
5 years< age ≤ 10 years[1), 2), 3)]	5 years< age ≤ 10 years[1), 2), 3)]
1. Overall Survey of representative ballast tanks 2. Overall Survey and Close-up Survey of suspect areas identified at previous surveys	〈omitted〉
(NOTES) 1) 〈omitted〉. 2) Where POOR coating condition, corrosion or other defects are found in ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type. 〈newly added〉 3) 〈omitted〉	(NOTES) 1) 〈same as the current Rule〉. 2) Where POOR coating condition, corrosion or other defects are found in ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to "other ballast tanks of the same type"*. *(2023)* * Other ballast tanks of same type are to be applied as followings: a) aft peak & fore peak shall be considered as same type. b) In case other ballast tanks are not of identical construction, the additional several tanks are to be examined because the progression of corrosion is not only related to the construction type, and the corrosion prevention system and the history of usage of the tanks are to be considered. c) In case of water ballast hold, all water ballast holds are surveyed. 3) 〈same as the current Rule〉
〈hereinafter, omitted〉	〈hereinafter, same as the current Rule〉

Amendments of Classification Technical Rules

Guidance Relating to the Rules for the Classification of Steel Ships
(Part 1 Classification and Surveys)

Mar. 2023

- Main Amendments -

(1) Effective date : 1 April 2023 (Date of which the application for survey is submitted)

◉ Clarification for “Representative ballast spaces” and the acceptance of thickness measurement during TOC

- Added two(2) Internal Notes of IACS Survey Panel

(1) Effective date : 1 April 2023

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 2 ~ 3 〈omitted〉	**Section 2 ~ 3 〈same as the current Guidance〉**
Section 4 Classification Survey after Construction	**Section 4 Classification Survey after Construction**
401. ~ 402. 〈omitted〉	**401. ~ 402. 〈same as the current Guidance〉**
403. Classification Survey of ships classed by other classes or TOC(Transfer of Classification) ***(2020)*** **【See Rule】** 〈omitted〉	**403. Classification Survey of ships classed by other classes or TOC(Transfer of Classification)** ***(2020)*** **【See Rule】** 〈same as the current Guidance〉
1. ~ 3. 〈omitted〉	**1. ~ 3. 〈same as the current Guidance〉**
4. Classification Survey 〈omitted〉	**4. Classification Survey** 〈same as the current Guidance〉
(1) When a ship is classed by the Society as a results of transfer of class	(1) When a ship is classed by the Society as a results of transfer of class
(A) 〈omitted〉	(A) 〈same as the current Guidance〉
(a) Hull Classification Survey (i) 〈omitted〉 (ii) For vessels between 5 and 10 years of age, the survey is to include the scope of an Annual Survey and inspection of a representative number of ballast spaces.	(a) Hull Classification Survey (i) 〈same as the current Guidance〉 (ii) For vessels between 5 and 10 years of age, the survey is to include the scope of an Annual Survey and inspection of a representative number of ballast spaces*. *(2023)*
(iii) For vessels of 10 years of age and above but less than 20 years of age, the survey is to include the scope of an Annual Survey and inspection of a representative number of ballast spaces and cargo spaces, except for: *(2019)* ① ~ ② 〈omitted〉 〈note newly added〉	(iii) For vessels of 10 years of age and above but less than 20 years of age, the survey is to include the scope of an Annual Survey and inspection of a representative number of ballast spaces* and cargo spaces, except for: *(2023)* ① ~ ② 〈same as the current Guidance〉 * Note : Representative ballast tanks include the fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks.
(iv) ~ (ix) 〈omitted〉	(iv) ~ (ix) 〈same as the current Guidance〉

Present	Amendments
(x) In the context of applying (i) to (viii) above, as applicable, consideration may be given by the Society to the acceptance of thickness measurements taken by the losing society provided; ① if the Classification Survey is to be credited as a periodical survey for maintenance of class, they were carried out within the applicable survey window of the periodical survey in question. ② if the Classification Survey is not to be credited as a periodical survey for maintenance of class, they were carried out; - within 15 months prior to completion of Classification Survey when it is in the scope of a Special Survey, - within 18 months prior to completion of Classification Survey when it is in the scope of an Intermediate Survey. In ① and ② both cases, the thickness measurements are to be reviewed by the Society for compliance with the applicable survey requirements, and confirmatory gaugings are to be taken to the satisfactory of the Society. 〈Note newly added〉	(x) In the context of applying (i) to (viii) above, as applicable, consideration may be given by the Society to the acceptance of thickness measurements taken by the losing society provided; ① if the Classification Survey is to be credited as a periodical survey for maintenance of class, they were carried out within the applicable survey window of the periodical survey in question. ② if the Classification Survey is not to be credited as a periodical survey for maintenance of class, they were carried out; - within 15 months prior to completion of Classification Survey when it is in the scope of a Special Survey, - within 18 months prior to completion of Classification Survey when it is in the scope of an Intermediate Survey. In ① and ② both cases, the thickness measurements are to be reviewed by the Society for compliance with the applicable survey requirements, and confirmatory gaugings* are to be taken to the satisfactory of the Society. *(2023)* * Note : Where the scope of thickness measurements required by the Society is different from the scope of thickness measurements taken by the losing Society, additional thickness measurements by the difference are to be carried out together with the confirmatory gaugings.
〈hereinafter, omitted〉	〈hereinafter, same as the current Guidance〉

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Person in charge: PARK Jaesung

No : 2023-4-E
Date : 2023. 4. 7

To : All Surveyors and whom it may concern

Subject	**9.172 Notice for Amendments to KR Technical Classification Rules**
Application	**On or after 1st July 2023 (Refer to Effective date for specified in Par.1)**

1. Please be informed that 2023 Classification Technical Rules have been amended to reflect the Requests for Establishment/Revision of Classification Technical Rules as below, and you are kindly requested to apply these amendments on the relevant works.

= Below =

Classification Technical Rules	Effective date	Amendments
Guidance for Approval of Service Suppliers	On or after 1st July 2023 (Date of which application for survey is submitted)	Reflected IACS UR Z17 (Rev.18 Feb 2022) : To delete the requirement for an ISO/IEC accreditation for service suppliers for BWMS Commissioning Testing etc.

2. Furthermore, please be informed that these amendments will be included in 2024 edition on Classification Technical Rules which will be published in the first half of 2024.

Attachments: Amended Guidance for Approval of Service Suppliers -- 1 copy. (The End)

Amended Guidance for Approval of Service Suppliers

April 2023

- Main Amendments -

(1) Effective date : 1 July 2023 (Date of which the application for survey is submitted)

◉ Reflected IACS UR Z17(Rev.18 Feb 2022)

Main Reason for Change:

- To delete the requirement for an ISO/IEC accreditation for service suppliers for BWMS Commissioning Testing

History of Decisions Made:

- ISO/IEC 17025 accreditation is for a specific analysis method and suitable for analyses carried out in accordance with an international standard method in a laboratory.

- However, for BWMS commissioning testing, the ballast water sampling and subsequent indicative analysis of the samples is carried out on board the ship and does not require any laboratory work.

- There are currently also no international standard methods for sampling and indicative analysis. As a result, accreditation bodies are currently not offering an ISO/IEC 17025 accreditation specific to sampling and indicative analysis of ballast water on board a ship.

Present	Amendments
INTRODUCTION 〈omitted〉	INTRODUCTION 〈same as the current Guidance〉
Appendix Part A – Approval of Service Suppliers listed in IACS UR Z17	Appendix Part A – Approval of Service Suppliers listed in IACS UR Z17
1. ~ 11. 〈omitted〉	**1. ~ 11. 〈same as the current Guidance〉**
12. Firms engaged in measurements of Noise level Onboard Ships (Z17 Annex 1-14)	**12. Firms engaged in measurements of Noise level Onboard Ships (Z17 Annex 1-14)**
12.1 ~ 12.3 〈omitted〉	12.1 ~ 12.3 〈same as the current omitted〉
12.4 Equipment (1) ~ (3) 〈omitted〉	12.4 Equipment (1) ~ (3) 〈same as the current omitted〉
(4) Calibration Sound Calibrator and sound level meter shall be verified at least every two years by a national Standard laboratory or a competent laboratory accredited according to ISO 17025(2005), as amended. A record with a complete description of the equipment used shall be kept, including a calibration log. 〈hereinafter, omitted〉	(4) Calibration Sound Calibrator and sound level meter shall be verified at least every two years by a national Standard laboratory or a competent laboratory accredited according to ISO/IEC 17025:2017 ~~ISO 17025(2005)~~, as amended. *(2023)* A record with a complete description of the equipment used shall be kept, including a calibration log. 〈hereinafter, same as the current Guidance〉

Present	Amendments
16. Firms engaged in Commissioning Testing of Ballast Water Management Systems (BWMS) (Z17 Annex 1-18) *((2022)*	**16. Firms engaged in Commissioning Testing of Ballast Water Management Systems (BWMS) (Z17 Annex 1-18) *(2022)***
16.1 〈omitted〉	16.1 〈same as the current Guidance〉
16.2 Procedure	16.2 Procedure *(2023)*
(1) ~ (2) 〈omitted〉	(1) ~ (2) 〈same as the current Guidance〉
(3) Service Suppliers are to be accredited to relevant standards such as **ISO/IEC 17025** or equivalent, as applicable.	(3) ~~Service Suppliers are to be accredited to relevant standards such as **ISO/IEC 17025** or equivalent, as applicable.~~
(4) Service Suppliers are to be independent of the BWMS manufacturer or supplier including shipyards.	~~(4)~~ Service Suppliers are to be independent of the BWMS manufacturer or supplier including shipyards.
16.3 Operators 〈omitted〉	16.3 Operators 〈sane as the current Guidance〉
16.4 Equipment and facilities	16.4 Equipment and facilities *(2023)*
Equipment, procedures and methods for detailed analysis, where applicable, are to be in accordance with relevant International standard and/or accepted Industry standards.	Equipment, procedures and methods for detailed analysis, where applicable, are to be in accordance with relevant International standard and/or accepted Industry standards.
Laboratories conducting sample enumeration are to be certified to **ISO/IEC 17025** standard, or equivalent.	~~Laboratories conducting sample enumeration are to be certified to **ISO/IEC 17025** standard, or equivalent.~~
〈hereinafter, omitted〉	〈hereinafter, same as the current Guidance〉

Present	Amendments
16.6 Reporting Service Suppliers are to provide reports detailing the results of sampling and analysis of ballast water and assessment of self-monitoring parameters during commissioning testing. The format is to be acceptable to Society. The report, as a minimum, will contain the following: (1) ~ (3) 〈omitted〉 (4) Operation required, e.g., ballasting, de-ballast, circulation, one pass, in tank, etc (5) Treatment rated capacity (TRC) in m3/h (6) Relevant performance parameters (e.g. TRO, UV dose, UVI, flow rate or other relevant performance parameter). (7) Alarms developed during operation. (8) Installation location. (9) Type Approval issued by and Certificate No (10) Date installed (11) Results of Sample analysis (12) Pump flow rate, ballast tanks and volume (13) Comments/Options : Filter and other major components, Process measurements. 〈hereinafter, omitted〉	16.6 Reporting *(2023)* Service Suppliers are to provide reports detailing the results of sampling and analysis of ballast water and assessment of self-monitoring parameters during commissioning testing. The format is to be acceptable to Society. The report, as a minimum, will contain the following: (1) ~ (3) 〈same as the current Guidance〉 (4) BWMS treatment mode of operation, e.g., high power, low power, single pass, IMO mode, USCG Mode, etc ~~Operation required, e.g., ballasting, de-ballast, circulation, one pass, in tank, etc~~ *(2023)* (5) Treatment rated capacity (TRC) in m3/h (6) Relevant performance parameters (e.g. TRO, UV dose, UVI, flow rate or other relevant performance parameter). (7) Alarms developed during operation. ~~(8) Installation location.~~ (8) ~~(9)~~ Type Approval issued by and Certificate No ~~(10) Date installed~~ (9) ~~(11)~~ Results of Sample analysis (10) ~~(12)~~ Pump and ballast tanks used for the commissioning test, including the flow rates and volumes of the ballasting and deballasting operations ~~Pump flow rate, ballast tanks and volume~~ *(2023)* (11) ~~(13)~~ Comments/Options : Filter and other major components, Process measurements. 〈hereinafter, same as the current Guidance〉

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No : 2023-5-E
Date : 2023.05.09

To : All Surveyors and who it may concern

Subject	**9.173 Notice for Amendments to the KR Technical Rules - Guidance for Prevention Systems of Pollution from Ships**
Application	**(Refer to Effective date for each KR Technical Rules specified in Par.1 and the attachment)**

1. Please be informed that the amendments have been made to the following KR Technical Rule 2022 as attachment to reflect Requests for Establishment/Revision of Classification Technical Rules. And you are kindly requested to apply the amendments on the relevant works according to effective date.

Amended KR Technical Rule	Effective Date	Amendments
Guidance for Prevention Systems of Pollution from Ships	1 Jun 2023 (Date of contract for ship construction or the application date for installation)	To reflect result of internal review ● Onboard Carbon Capture and Storage System (Ch.7) ● Onboard Carbon Capture and Storage System Ready Ships (Ch.8)

2. Furthermore, please be informed that the amendments will be included in 2023 edition for Rules and Guidance on KR Classification Technical Rules which is provided on the website.

Attachments :
Amendment for Guidance for Prevention Systems of Pollution from Ships. (The end)

Amendments to KR Tech. Rule

Guidance for Prevention Systems of Pollution from Ships

(Onboard Carbon Capture & Storage System)

2023. 05.

Machinery Rule Development Team

- Main Amendments -

(1) Request for Establishment of Classification Technical Rules
〈ships contracted for construction on or an application for installation or after 2023/06/01〉

◉ Establishing requirements for onboard carbon capture and storage system (Chapter 7)

◉ Establishing requirements for onboard carbon capture and storage system ready ship (Chapter 8)

CHAPTER 7 Onboard Carbon Capture and Storage system

Section 1 General

101. General

1. Carbon capture system could be classified according to three different capture routes.

(1) Post-combustion capture : Separation of carbon-dioxide(hereinafter CO2) from exhaust gas of fuel consumers

(2) Pre-combustion capture : CO2 removal from syngas obtained from gasification prior to its combustion in fuel consumers

(3) Oxy-combustion, Oxyfuel combustion : Combustion of the fuel in nearly pure oxygen and recycled exhaust gas to produce a flue gas with highly concentrated CO2 ready for further processing and purification to a desired CO2 specification

2. There are three general separation processes of CO2 capture that are integrated into the CO2 capture route such as separation with solvent/sorbent, membrane separation and Cryogenic distillation.

(1) Separation with solvent/sorbent : The separation is achieved by passing the CO2-containing gas in intimate contact with a liquid absorbent or solid sorbent that is capable of capturing the CO2

(2) Membrane separation : The membrane separation process is a gas separation technology that takes advantage of the differences in the membrane permeability rates among gas components. It is effective when the feed gas is at high pressure and contains a high-concentration CO2.

(3) Cryogenic distillation : A gas can be made into a liquid by a series of compression, cooling and expansion steps. Once in liquid form, the components of the gas can be separated in a flash or distillation column.

102. Application

1. This chapter is applied to Onboard Carbon capture and storage system(hereinafter OCCS system) by carbon separation with a solvent like **Fig.7.1.1** via capture routes of Post-combustion capture among **101.**

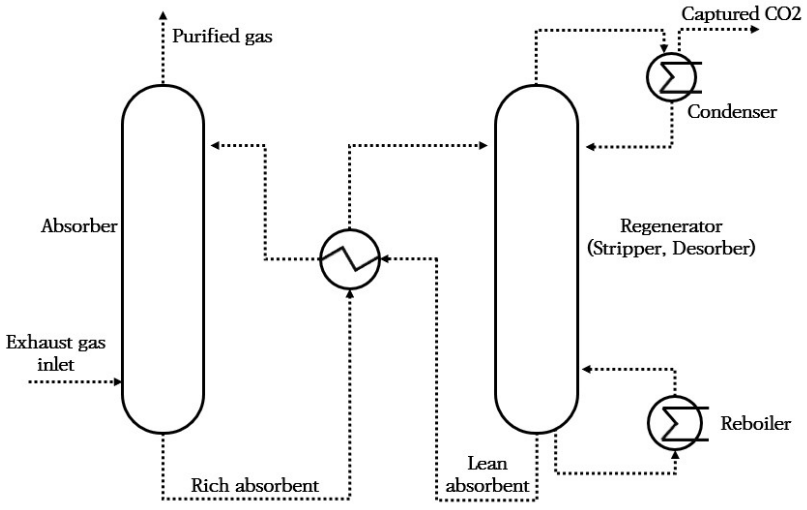

Fig 7.1.2 Schematic diagram of Post-combustion capture by carbon separation with Solvent

2. Ships installed OCCS system to reduce CO2 emission shall be complied with this chapter.

3. Carbon capture and storage system other than separation with solvent, may be approved after evaluation by the Society, provided that it can be demonstrated that the design represents an equal or better level of safety in this chapter.

4. This chapter is purposed to prevent the safety level of ships from deteriorating due to the in-

stallation of OCCS system, and approval of the system does not guarantee a minimum captured CO2 rate.

5. Apart from this chapter, waste and washwater generated from OCCS system shall be complied with the regulations in the Administration or port control to be disposed or discharged of.

103. Definitions

The definitions of terms are to follow Rules for the Classification of Steel Ships, unless otherwise specified in this chapter.

1. "**Absorber**" means the equipment to separate of CO2 from the exhaust gas of fuel consumers.
2. "**Absorbent**" means substance able to absorb by chemical absorption and physical absorption carbon from exhaust gas
   (1) The liquid solvent and solid sorbent are used as absorbents, however, the liquid solvent is referred to as an absorbent unless otherwise specified in this chapter.
   (2) Chemicals such as (Alkanol-) amine-based or NaOH are generally used in liquid absorbent. e.g. MEA(Monoethanolamine), DEA(Diethanolamine) and MDEA(Methyldiethanolamine) as an amines absorbent.
3. "**Desorption system**" means the equipment takes off CO2 from the absorbent. The system consists of a regenerator, heat exchangers, etc.
4. "**Fuel**" means a carbon-based fuel such as oil fuel, LNG, LPG, methanol or ethanol in this chapter.
5. "**Fuel consumer**" means machinery emits exhaust gas containing CO2 by combustion of consuming fuel such as internal combustion engine, boiler etc.
6. "**Regenerator**" means the equipment removes the CO2 from rich absorbent by heat. Rich absorbent is regenerated to lean absorbent. The regenerator can also be referred to as 'stripper' or 'desorber'.
   (1) 'Rich absorbent' means absorbent in CO2-loaded conditions extracted from the absorber. Rich absorbent is transferred to regenerator to release the captured carbon.
   (2) 'Lean absorbent' means absorbent in CO2-free conditions saturated CO2 is exhausted at regenerator. Lean absorbent is returned to the absorber to absorb the carbon of exhaust gas again.

104. Plans and Documents

1. The following plans and documents are to be submitted to the Society to install OCCS system on the ships. In addition, if deemed necessary by the Society, additional plans and documents other than those specified may be requested.

2. Plans and Documents for approval

(1) General arrangement of OCCS system
(2) Specification of OCCS system
(3) Analysis for compatibility with fuel consumers (incl. **404. 3** (2))
(4) Piping diagrams for carbon capture and storage system
(5) Wiring diagram for control, alarm and safety system
(6) Drawing of gas tanks including information on non-destructive testing of welds and strength and tightness testing of tanks
(7) Drawings of support and staying of gas tanks
(8) Specification of materials in gas tanks and gas piping systems
(9) Specifications of welding procedures for gas tanks
(10) Specification of stress relieving procedures for independent tanks type C
(11) Specification of design loads and structural analysis of gas tanks
(12) A complete stress analysis for gas tanks
(13) Specification of cooling-down procedure for gas tanks
(14) Arrangement and specifications of second barriers
(15) Drawings and specifications of gas tank insulation
(16) Arrangement of detection ends for gas detection, temperature measurement and pressure measurement
(15) Documentation detailing the effect on Stability (where necessary)
(16) Investigation table of electrical load analysis

3. Plans and Documents for reference

(1) Risk assessment
(2) Operation and maintenance manual
(3) MSDS for absorbent
(4) Strength calculation sheet for CO2 storage tank and structural supporter
(5) Calculation sheets of filling limits for CO2 storage tanks

105. Class Notation

1. **Table 7.1.1** shows the Class Notation of OCCS system, and the system installed for the purpose as above provisions of **102. 1** is basically given **CEmC-OCCS** notation of **Table 7.1.1**. In addition, **CEmC-OCCS(R)** and/or **(S)** may be additionally assigned if the relevant requirements are met.

Table 7.1.1 Class Notation of OCCS system

No	Notation	Relevant requirements
1	CEmC-OCCS	All requirements of this chapter excluding the relevant requirements of item **2** and **3** of **Table 7.1.1**
2	CEmC-OCCS(R)	In addition to requirements of **CEmC-OCCS**, redundancy requirements (Provisions of **306.**)
3	CEmC-OCCS(S)	In addition to requirements of **CEmC-OCCS**, test and survey requirements (**308.** and **Table 7.8.1**)

105. Equivalency

The equivalence of alternative and novel features which deviate from or are not directly applicable to this chapter is to be in accordance with **Pt 1, Ch 1, 105.** of **Rules for the Classification of Steel Ships**.

Section 2 Goal and Functional Requirements

201. Goal

The goal of this chapter is to ensure the safety of ships and personnel in particular installations of OCCS system, by describing the design and construction of ships.

202. Functional Requirements

1. Installation and operation of OCCS system is to be compatible with the fuel consumers and is not to cause any adverse effects on performance.

2. The safety, reliability and dependability of the systems are to be equivalent to that achieved with comparable to conventional exhaust gas piping systems of oil-fuelled main and auxiliary machinery and exhaust gas treatment systems referred to **Ch 2 Sec. 2, Sec. 3** and **Ch 3 Sec.2** of this guidance.

3. The probability and consequences of hazards related to absorbent and captured CO2 are to be limited to a minimum through arrangement and system design, such as ventilation, detection and safety actions. In the event of leakage or failure of the risk reducing measures, necessary safety actions are to be initiated.

4. The design philosophy is to ensure that risk reducing measures and safety actions for OCCS system do not lead to an unacceptable loss of power.

5. Unintended accumulation of explosive, flammable or toxic gas concentrations is to be prevented.

6. System components are to be protected against external damages.

7. It is to be arranged for safe and suitable absorbent supply and storage arrangements capable of receiving and containing in the required state without leakage.

8. Piping systems, containment and over-pressure relief arrangements that are of suitable design, construction and installation for their intended application are to be provided.

9. Absorber, regenerator and related components are to be designed, constructed, installed, operated, maintained and protected to ensure safe and reliable operation.

10. OCCS system are to be designed to minimize the risks associated with the storage, handling, consumption, and disposal of hazardous or non-hazardous chemicals, and essential consumables like absorbent for the operation of the system. Appropriate personnel protective equipment, together with emergency treatment facilities, appropriate to the hazards concerned, are to be provided.

11. Suitable control, alarm, monitoring and shutdown systems are to be provided to ensure safe and reliable operation of OCCS system.

12. Leakage detection, and fire protection, detection and extinguishing arrangements are to be provided at the places where OCCS system is installed against possible hazards associated with the operation and/or stop of the systems.

13. The technical documentation is to permit an assessment of the compliance of the system and its components with the applicable rules, guidelines, design standards used and the principles related to safety, availability, maintainability and reliability.

14. A single failure in a technical system or component is to not lead to an unsafe or unreliable situation.

Section 3 Configuration

301. General

1. OCCS system are to be arranged that the pressure in exhaust gas pipes does not exceed the allowable back pressure recommended by fuel consumers manufacturer.

2. When a pre-scrubber is provided to adjust the temperature and humidity fitting to the optimal conditions of the absorption process and to remove SO2 in the exhaust gas, the chemical treatment piping, washwater piping and residue systems shall be complied with **207.** of **Ch 3 Sec.2** of this guidance. Unless regulations or conventions specified otherwise, washwater from pre-scrubber shall be complied with **Res.MEPC.307(73)** and **Res.MEPC.340(77)**.

3. OCCS system is to be so designed that it can withstand the loads corresponding to the static and dynamic inclination angles specified in **Ch 5, Sec 1, 103. 1** of **Rules for the Classification of Steel Ships**.

302. Risk Assessment

1. Risk assessment shall be conducted to determine whether the risks arising from the handling of absorbents and the storage of CO2 in OCCS system have dealt with effect on personnel, environment, and structural strength or integrity.

2. The risks shall be evaluated using acceptable and recognized risk assessment techniques. The evaluated risks shall be reduced to a reasonable level through elimination or mitigation measures.

3. The subject of risk assessment shall include at least:
   (1) Supply, storage, handling and unloading system(if installed) of absorbent
   (2) Compression, liquefaction, storage and unloading system of carbon storage system (if installed)

4. Expected risks shall include at least:
   (1) Leakage of absorbent
   (2) Leakage of CO2
   (3) Failure and malfunction of components of carbon capture and storage system

5. When assessing the expected risks, those should be considered at least:
   (1) Toxicity, flammability, and explosive properties of absorbent
   (2) The asphyxiation of CO2, especially when personnel on board are exposed

303. Stability

1. In the case of existing ships, data on light weight that is changed according to the installation of OCCS system is to be submitted, and if necessary, a revision of data related to stability may be requested.
2. For new ships, it is to be in accordance with **Pt 1, Ch 1, 307.** of **Rules for the Classification of Steel Ships.**

304. Compatibility with Fuel Consumers

1. The data are to be provided to confirm not to exceed the approved design limits of OCCS system with the whole operational range of fuel consumers.
2. The connected fuel consumers shall not be disturbed due to excessive back pressures or high temperatures due to operating OCCS system. Where necessary, considerations like extract fans will be given to maintain the operating condition of fuel consumers within the approved design limits.

305. By-pass Operation

1. A bypass arrangement of OCCS system or changeover system is to be installed to enable continued operation of the fuel consumers irrespective of the operation of fuel consumers. The following cases are also contained the not in operation of OCCS system:
   (1) Operation mode selection of OCCS system
   (2) Not in operation of absorbent circulation system; or,
   (3) Failure of OCCS system
2. The arrangement or system may not be installed when it is ensured the flow of exhaust gas is not restricted and there is no risk of a failure that results in the stop of fuel consumers.

306. Redundancy *(Only when the* "CEmC-OCCS(R)" *class notation is applied)*

1. A redundancy is to be ensured for major equipment of OCCS system such as pumps, fans, blowers, etc. and is to be arranged to operate the system continuously in rated capacity whichever one major equipment is failed.
2. To comply with **1.**, an alternative means can be considered per each equipment. The material is to be submitted demonstrating that the alternative means provides the reliability of the system and continuous operation of OCCS system, without compromising the vessel propulsion and maneuvering capability.
3. Where ships fitted with two or more identical OCCS systems, a common standby pump (for each essential system) capable of serving all the systems will be acceptable in lieu of providing individual standby pumps for each system.
4. When the major equipment is failed, standby equipment are to be automatically started and put into service. This failure is to be alarmed at the remote-control station(s) such as the bridge or engine control station.

307. Prevention of Flooding

1. Washwater of pre-scrubber or absorbent of absorber is to be prevented from ingress into fuel consumers.
2. Alarm and shutdown arrangements are to be provided to prevent an abnormal rise of absorbent level in the absorber of carbon capture system.

308. OCCS system Equipment

1. **Pumps/Blowers/Compressor**
   (1) When the "**CEmC-OCCS(S)**" class notation is applied, equipment required for continuous operation of OCCS system, such as absorbent transfer pumps, lean absorbent supply pumps, rich absorbent regenerating pumps, CO2 pump/compressor and blowers are certified in accordance

with the relevant requirements of **Pt 5, Ch 1, 210** & **Ch 6. Sec.14** of **Rules for the Classification of Steel Ships**.

2. Heat Exchangers

(1) Where provided, heat exchangers are to comply with the requirements specified in **Pt 5 Ch 5, Sec. 3** of the **Rules for the Classification of Steel Ships**. However, a regenerator does not consider as a kind of heat exchanger.

3. Electrical Systems

For items not specified in this Section, the relevant requirements specified in **Pt 6** of the **Rules for the Classification of Steel Ships** apply.

(1) Electrical Motors and controlgears for motors
When the "**CEmC-OCCS(S)**" class notation is applied, motors and controlgears for motors are to be certified in accordance with the relevant requirements specified in **Pt 6** of the **Rules for the Classification of Steel Ships**.

(2) Circuit Protection Devices
Circuit breakers are to be installed for miscellaneous OCCS system electrical loads and are to be compatible with the prospective short circuit current level calculated at the switchboards.

Section 4 Carbon Capture System

401. General

1. Pipings of carbon capture system are to comply with **Ch 6 Pt 5** of the **Rules for the Classification of Steel Ships**, unless specified in this section otherwise.

2. The material for absorber, regenerator, absorbent storage tank and components of carbon capture system like heat exchangers, pipe fittings, pumps, valves is to be selected taking into account the the corrosive characteristics of the absorbent and working pressure and temperature of them.

402. Absorber

1. Absorbent injection system

(1) Injection control system
The amount of injected absorbent is to be appropriately controlled depending upon the load of fuel consumers or quantity of carbon emissions in consideration of the temperature of the exhaust gas at the inlet of absorber.

2. Devices for monitoring amount of injected absorbent

Device for monitoring the amount of injected absorbent when using the carbon capture system are to be provided at least one of the monitoring stations for at least one place among a bridge if a bridge control system is installed, engine control room, or machine control side.

3. Safety and alarm devices

The absorbent injection system is to be provided with safety and alarm devices to prevent the injection of absorbent when the temperature at the exhaust gas outlet of fuel consumers or the inlet of carbon capture system exceeds the preset level.

403. Exhaust Gas Piping System

1. General

(1) The sections of carbon capture system that are subjected to absorbent (e.g. the interior reaction chamber or absorbent piping/nozzles, etc.) are to be constructed of suitable corrosion resistant materials.

(2) Exhaust gas piping systems after carbon capture system are to be of a corrosion resistant material such as stainless steel or to be coated with a suitable corrosion resistant materials.

2. Safety and alarm devices

(1) Valves used in the carbon capture system are to comply with the relevant requirements specified in **Pt 5, Ch 6** of the **Rules for the Classification of Steel Ships**. The valves are to be constructed of corrosion resistant materials.
(2) Where bypass arrangements for carbon capture system are provided to comply with **305. 1.**, the bypass arrangement or changeover system is to be fail safe manner.
(3) Valves are to be installed in accessible locations, clear of or protected from obstructions, moving equipment, and hot surfaces, in order to permit regular inspection and periodic servicing.

3. Interconnection of exhaust gas piping

(1) Exhaust gas pipes from fuel consumers are generally to be routed separately and not interconnected.
(2) However, interconnected exhaust piping systems to a common carbon capture system may be accepted when complied with the followings:
(A) The materials are to be submitted with **104. 2** to demonstrate that the OCCS system is capable of accommodating the maximum combined exhaust flows of all the connected fuel consumers for the worst case scenario for that particular ship arrangement and operational profile.
(B) The specific means are to prevent the passage of exhaust gases to other fuel consumers or spaces.
(C) In case of dual fuel and/or gas only internal combustion engines which are required to have their own independent exhaust piping, carbon capture system with a common exhaust gas piping is to be accepted by Flag Administration.

4. Insulation

Hot surfaces of OCCS system and their associated equipment or systems likely to come into contact with the crew during operation are to be suitably guarded or insulated. Where the surface temperatures are likely to exceed 220°C and where any leakage, under pressure or otherwise, of fuel oil, lubricating oil, or other flammable liquid is likely to come into contact with the OCCS system or exhaust pipes, these surfaces are to be suitably insulated with non-combustible materials that are impervious to such liquids.

404. Absorbent Piping System

1. General

(1) Absorbent piping systems are to be arranged taking into account the corrosiveness, explosiveness, combustibility and impact on human life of the absorbent.
(2) Absorbent piping and venting systems are to be independent from the other piping system.
(3) Absorbent piping systems are not to pass through accommodation spaces, service spaces or control stations.
(4) Supply, transfer, and loading lines for absorbent systems are not to be located over boilers or in close proximity to steam piping, exhaust systems, hot surfaces required to be insulated, or other sources of ignition. Valves are to be in positions accessible to periodical inspection and maintenance.
(5) Absorbent piping systems are to be classified into Class I piping specified in **Pt 5, Ch 6** of **the Rules for the Classification of Steel Ships** regardless of temperature and pressure of working media. However, vent and drain pipes can be regarded as Class III.
(6) Absorbent piping systems are to be all welded as possible. In case of the flanged connections are to be screened or otherwise suitably protected to avoid absorbent spray or leakage.
(7) The remote-controlled isolation valves are to be installed between each component of absorbent piping system such as absorber, regenerator, etc.
(8) In case of loss of power, the remote-controlled valves are to be fail-closed, or to be kept in their position when a measure is arranged to close the valves.
(9) The remote-controlled valves are to be indicated their position open/close clearly and to be arranged with open/close indicator at the remote-control stations.
(10) The pipe leading to the overflow tank is to be installed top on nor near the top of the tanks. If it does not possible, the non-return valve is to be installed on the piping system.

2. Material

(1) Absorbent piping systems, absorbent waste/overflow tank, drip tray and other components contacting to absorbents are to be of a corrosion resistant material such as stainless steel or to be

coated with a suitable corrosion resistant materials.

3. Drip tray

(1) Drip tray is to be installed for places where are a risk of leakage from relevant components such as pumps, filter, heat exchangers, flanges and valves.
(2) Drain pipes leading to the overflow tank or alarm system are to be arranged at the drip tray. The non-return valve is to be installed on the drain pipe.

4. Ventilation system

(1) If a absorbent tank is installed in a closed compartment, the area is to be served by an effective mechanical supply and exhaust ventilation system is independent from the ventilation system of accommodation, service spaces, or control stations. Warning notices requiring the ventilation of spaces prior to entrance shall be provided outside the compartment adjacent to each point of entry and inside the compartment.
(2) The capacity of ventilation system is as following standard per absorbent. The capacity is changeable based on the risk assessment in accordance with **302.** taking into account the toxicity, flammability, and explosive nature of the absorbent.
(A) Sodium hydroxide (NaOH): 6 air changes per hour
(B) Monoethanolamine (MEA), N-methyldiethanolamine (MDEA): 30 air changes per hour
(C) Diethanolamine (DEA): 45 air changes per hour
(3) The outlet of ventilation system for compartment where the storage tank is located is to terminate in a safe location on the open deck and the tank venting system is to be arranged to prevent entrance of water into the tank.
(4) Where an absorbent tank is located within an engine room, providing an effective movement of air in the vicinity of the tank, the ventilation system for the engine room can be replaced with the ventilation system complied with (1) to (3). If a dedicated ventilation system is provided, the system is to be operated continuously except when the storage tank is empty completely.
(5) When absorbent storage tank is formed as an integral tank, the ventilation system in (1) is to be provided to spaces which is the enclose and adjacent to the tank with possible leak points (e.g. manhole, fittings) from this tank. And the system is to be operatable outside of the spaces.
(6) In addition to (5), when absorbent piping systems pass through spaces normally accessed by a person, the ventilation system in (1) is to be provided for spaces even if the spaces are not in the adjacent area. However, the ventilation system is not required if the piping system is made of steel or other equivalent material with melting point above 925 degrees C and with fully welded joints.

405. Absorbent Storage Tank

1. The absorbent 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. In cases where such valves are provided below top of tank, they are to be arranged with quick acting shutoff valves which are to be capable of being remotely operated from a position accessible even in the event of absorbent leakages.

2. The storage tank is to be located within the engine room or the enclosed compartments except for locating on open deck.

3. The material of absorbent storage tank is to be complied with **404. 2.**

4. The venting system is to be provided suitable for the absorbent and are to terminate in a safe location on the open deck and the tank venting system is to be arranged to prevent entrance of water into the tank.

5. The storage tank is to be protected from temperatures applicable to the particular concentration absorbent.

6. Where absorbent 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 segregated by cofferdams, void spaces, pump rooms, empty tanks or other similar spaces so as to not be located adjacent to accommodation, cargo spaces containing cargoes which react with chemical treatment fluids in a hazardous manner as well as any food

stores, oil tanks and fresh water tanks.

(3) These tanks are to be designed and constructed as per the structural requirements in accordance with **Pt 3 Ch 15** of the **Rules for the Classification of Steel Ships** for a deep tank construction.

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

7. The absorbent storage tank is to be provided with temperature and level monitoring arrangements. A high temperature and high/low level alarm system be provided.

8. Drain trays of adequate size led to the overflow tank are to be provided under the absorbent storage tank.

9. The absorbent tanks are to be arranged so that they can be emptied of the fluids.

10. Loading of absorbent

(1) When absorbent is loaded by the dedicated manifold, piping system is to be connected from manifold to the storage tank. The isolation valve is to be provided at the manifold.

(2) When the manifold is arranged, the drip tray is to have a sufficient capacity to ensure that the maximum amount of spill according to the risk assessment can be handled.

(3) The tray is to be fitted with a drain valve to enable rain water to be drained over the ship's side.

406. Regenerator(Stripper, Desorber)

Interior pipes of regenerator is to be complied with **Pt 5, Ch 5, 120.** of the **Rules for the Classification of Steel Ships**.

407. Overflow or Waste absorbent Tank

1. The material of overflow or waste absorbent tank is to be complied with **404. 2.**

2. The absorbent waste tank is to be independent from other tanks, except in cases where these this tank is also used as the overflow tanks.

3. The vent piping of the overflow or waste absorbent tanks are to be complied with 405. 4.

4. The overflow tank is to be arranged with a high level alarm.

5. Sounding arrangements are to be provided for the absorbent waste tank in accordance with **Pt 5, Ch 6, 203.** of the **Rules for the Classification of Steel Ships**.

408. Absorbent Leakage Detection

When absorbent leakage is detected in accordance with **404. 3.** (2), an alarm is to be initiated at the remote control location such as bridge control system and engine control room and at the local control location.

409. Fire Protection and Extinction

1. Where absorbor, desoprtion system or absorbent storage tank are installed in spaces other than engine-room, in determining fire integrity of divisions to adjacent spaces, the each space is to be categorized and applied **Pt 8, Ch 7, Sec. 1** of the **Rules for the Classification of Steel Ships** as follows:

(1) for ships carrying more than 36 passengers;

(A) In case of amine-based absorbents, "⑪ Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk" in **Pt 8 Ch 7**, **102. 3** (2) (B) of the **Rules for the Classification of Steel Ships**,

(B) In case of NaOH as absorbents, "⑩ Tanks, voids and auxiliary machinery spaces having little or no fire risk" in **Pt 8, Ch 7, 102. 3** (2) (B) of the **Rules for the Classification of Steel Ships**, or

(C) Other than (A) and (B), it is to be determined by the Society.

(2) for ships carrying not more than 36 passengers and cargo ships: "⑦ Other machinery spaces" in **Pt 8, Ch 7**, **102. 4** (2) (B), **Pt 8, Ch 7**, **103. 3** (2) (B) and **Pt 8, Ch 7**, **104. 2** (2) (B) of the **Rules for the Classification of Steel Ships**.

2. Fire Fighting

(1) The spaces where the absorbent storage tanks are installed is to be provided two(2) sets of portable fire-extinguisher complied with FSS code taken into account the flammability and explosiveness of the absorbent. However, the fire extinguisher can be omitted when fixed fire exinguishing systems are arranged.

(2) When fixed fire-extinguishing systems are arranged in the spaces where the absorbent storage tanks are installed, the following systems may be considered for the spaces:

(A) Fixed high-expansion foam fire-extinguishing system complying with FSS code suitable for extinguishing amine-based absorbent, or

(B) Fixed pressure water-spraying fire-extinguishing system complying with FSS code

Section 5 Carbon Storage System

501. General

1. Equipment for CO2 storage system such as compressors, coolers, separators, and dryers is to be located in a dedicated space or compartment.

2. Spaces where CO2 liquefaction system or piping systems are arranged which are located below deck or where access from the open deck is not provided, are to be fitted with a mechanical ventilation system designed to take exhaust air from the bottom of the space and to be sized to provide at least 30 air changes per hour.

3. Devices for continuously monitoring of CO2 accumulation is to be installed in spaces or compartment where CO2 liquefaction system or piping systems pass.

4. It should be provided to monitor the purity of collected CO2 as possible.

502. CO2 Piping System

1. Liquefied carbon dioxide piping systems may be applied on Ch 7, Sec 3 of Rules for the Classification of Ships Using Low-flashpoint Fuels.

2. The (gaseous) CO2 piping systems are regarded as Class I piping systems complied with **Pt 5, Ch 6** of **the Rules for the Classification of Steel Ships**.

3. The CO2 piping systems are to be independent from the other piping system.

4. The CO2 piping systems for storage, transferring and unloading containing liquefied CO2 storage tank are not to pass through accommodation spaces, service spaces or control stations.

5. In case of loss of power, the remote-controlled valves are to be fail-closed, or to be kept in their position when a measure is arranged to close the valves.

6. The remote-controlled valves are to be indicated their position open/close clearly and to be arranged with open/close indicator at the remote-control stations.

7. The CO2 pipings are to be at least 0.8 m inboard

503. CO2 storage tanks

1. Arrangement of CO2 storage tanks

(1) CO2 storage tanks are to be located in open decks, a dedicated CO2 tank room or compartment.

(2) The requirements of **Ch 5, 302.** of **Rules for the Classification of Ships Using Low-flashpoint Fuels** are to be applied to protect CO2 storage tanks from external damage due to collision or grounding.

2. Design of CO2 storage tanks

(1) Liquefied CO2 storage tanks are to be independent tank type C designed in accordance with **Ch 6** of **Rules for the Classification of Ships Using Low-flashpoint Fuels.**

(2) Portable liquefied CO2 storage tanks are to comply with **Ch 6, Sec 5** of **Rules for the**

Classification of Ships Using Low-flashpoint Fuels as well as (1) above.

(3) The CO2 storage tanks and pressure relief devices are to be designed to prevent venting of CO2 except in emergency situations.

(4) The liquid level indicating device, pressure monitoring device and temperature indicating device of the CO2 storage tank are to be installed and controlled in accordance with the relevant requirements in **Pt 7, Ch 5, Sec 13** of **Rules for the Classification of Steel Ships**.

(5) Each CO2 storage tank is to be monitored for its state of charge and protected from overfilling. The high liquid level alarm device is to be operated at a position that does not exceed the filling limit, and the emergency stop specified in table 7.6.1 is to activate remotely controlled valves to close CO2 supply pipe connected to the storage tank.

(6) The pressure of the liquefied CO2 storage tank is to be maintained at least 0.05 MPa above the triple point for the CO2 mixture. The “triple point” for pure CO2 occurs at 0.52 MPa absolute and -56.5 °C.

(7) The liquefied CO2 tanks' pressure and temperature are to be maintained at all times within their design range by means acceptable to the Society, e.g. by one of the following methods. The pressure and temperature control system is to be capable of withstanding the full vapour pressure, taking into account the conditions in which all CO2 storage tanks are filled and the ship's operating profile.
   (A) reliquefaction of CO2 vapours
   (B) liquid CO2 cooling
   (C) pressure accumulation

(8) If the reference temperature of the CO2 storage tank complies with the requirements defined in **Pt 7, Ch 5, 1501. 3** of **Rules for the Classification of Steel Ships**, the maximum filling limit of CO2 stroage tanks are not to be greater than 98% at reference temperature.

(9) All materials used for liquefied CO2 storage tanks and piping systems are to be suitable for the lowest temperatures that may occur in service. This lowest temperature refers to the saturation temperature of CO2 at the set pressure of the automatic safety device.

(10) The CO2 storage system design is to take into account the composition of CO2, impurities and water content, including the effect on the “triple point” of CO2 and corrosiveness.

(11) Detailed operating and maintenance manuals are to be provided with overall operating procedures between dry-docking of CO2 storage tanks and associated compression, cooling and liquefaction system. Operating procedures are to include at least cooling down, unloading, gas freeing, pressure/temperature control, emergency shutdown, maintenance and inspection.

504. CO2 Leakage Detection

1. At least two sets of CO2 detectors are to be arranged in an enclosed space where there is a possibility of leakage of CO2

2. If carbon dioxide is detected in excess of 1%, an alarm is to be initiated at the remote control location such as bridge control system and engine control room and at the local control location.

3. At least two sets of portable CO2 detection devices are to be provided on board.

Section 6 System Design

601. General

1. The control system of carbon capture and storage system may consist of an integrated system or independent control systems.

2. The control system shall be designed so that a single failure of the control system does not affect personnel safety and ship safety.

602. Control and monitoring systems

1. Automatic control, monitoring, alarm and safety systems shall be installed on carbon capture and storage system to ensure that the design parameters are not exceeded under all operating conditions of fuel consumers, and OCCS system. For ships assigned with the notation for automatic and remote control systems in accordance with **Pt 9, Ch 3** of **Rules for the Classification of Steel**

Ships, the alarm and monitoring systems shall be integrated with the ship's centralized monitoring and control systems.

2. Temperature, pressure, and flow in OCCS system and related systems shall be controlled and monitored as follows:

(1) Local control and monitoring systems shall be provided for safe operation, maintenance and effective control in case of emergency or remote control failure.

(2) The control system shall be designed to identify failures of process systems and equipment. The control and monitoring systems shall comply with the requirements of **Pt 9, Ch 3, 302. 4** of **Rules for the Classification of Steel Ships**.

(3) For the safe and effective operation of the OCCS system, the necessary parameters shall be displayed on the local and at the remote control location, including the followings:

(A) The operating status of the pumps, fans, blowers and motors of the carbon capture and storage system

(B) Level indication of absorber and absorbent storage tanks

(C) Level indication for CO2 storage tank of carbon storage system

(D) Pressure indication for CO2 storage tank of carbon storage system

(E) Level indication of CO2 storage tanks for carbon storage system

(F) Parameters required for the safe operation of OCCS system

3. Each control, monitoring, and safety system shall be powered via a separate circuit. Each of these circuits shall be protected against short circuit and monitored for power failures.

603. Emergency Stop System

1. An emergency stop system shall be installed that operates independently of the control and alarm systems. The emergency stop system shall have the following functions:

(1) A means shall be provided for indicating the parameter that causes the emergency stop.

(2) When an emergency stop is triggered, an alarm shall be initiated at the normal control location and at the local control location.

(3) If the operation of an equipment or device is stopped due to an emergency stop, the equipment or device shall not automatically restart before being manually reset.

2. Monitoring and safety systems shall be in accordance with **Table 7.6.1**.

Table 7.6.1 Monitoring and safety functions for OCCS system

Parameters	Display	Alarm activated	Automatic Shutdown
Fan/blower motors for OCCS system (when installed)	Run	Stop	
By-pass or changeover valve of carbon capture system(when installed)	Position		
Exhaust gas temperature after absorber (except if dry running can be used)	●	H	●(HH)
Differential pressure across absorber		H	●(HH)
Pump for carbon capture system	Run	Stop	
Pressure for carbon capture system		L	
Level in absorber		H	●(HH)
Temperature of absorbent storage tank	●	H	
Level of absorbent storage tank	●	L/H	
Level of drip tray for onboard carbon capture ans storage system		H	
Level of absorbent overflow tank		H	
Pump/Compressor for carbon storage system	Run	Stop	
Level of CO2 storage tank	●	H	●(HH)
Pressure for liquefied CO2 storage tank	●	L/H	●(LL/HH)
Temperature for liquefied CO2 storage tank	●	L/H	●(LL/HH)
power supply fail of control, alarm, monitoring or safety device	-	Fail	

Section 7 Safety and Personnel Protective Equipment.

701. For the protection of crew members, the vessel shall have on board suitable protective equipment consisting of aprons, gloves with long sleeves, boots, coveralls of chemical-resistant material, and chemical safety goggles or face shields or both. And, the quantity to be supplied is to be at least two sets.

702. Eyewasher and safety showers are to be provided near the manifold for loading absorbent and unloading CO2 and the process fluid transfer pump. If several manifolds are installed on the same deck, one could be installed if the manifold can be easily accessed to eyewasher and safety shower from the manifold.

Section 8 Survey

801. General

1. This section is applied to inspection for installation of OCCS system.

802. Production and Installation Survey

1. Inspection and verification that the foundations and attachments of the principal components of the OCCS system are in accordance with the approved plans and particulars.

2. Piping systems are to be examined and tested in accordance with **Pt 5, Ch 6, Sec. 14** of the **Rules for the Classification of Steel Ships**.
3. Electrical equipment are to be examined and tested in accordance with **Pt 6, Ch 1** of the **Rules for the Classification of Steel Ships**.
4. Following tests may be incorporated with the tests required by **Pt 5, Ch 2, 211.** of the **Rules for the Classification of Steel Ships**.
5. Instrumentation is to be tested to confirm proper operation as per its predetermined set points.
6. Pressure relief and safety valves installed on the unit are to be tested.
7. Control system and shutdowns are to be tested for proper operation.
8. The components of the OCCS system are to be tested and inspected in accordance with **Table 7.7.1**.

Table 7.8.1 Test and Survey for components of OCCS system

No.	Components	Type approval	Test and Survey
1	Carbon-dioxdie emission monitoring system	●(6)	
2	Control panel for OCCS system	●(6)	●
3	Pump (incl. motors and controlgears for motors(1),(2)		●
4	Compressor/Blower (incl. motors and controlgears for motors)(1),(2)		●
5	Absorber, Regenerator body(1),(3),(7)		●
6	Heat exchanger(4)		●
7	Abosbent storage tank, absorbent waste tank, overflow tank(1),(5)		●

Note.
(1) For the applicable class notation '**CEmC-OCCS(S)**' in **Table 7.1.1**
(2) Components for the continual operation of the OCCS system are to be tested in accordance with the requirements specified in **Pt 5, Ch 6 & Pt 6** of the **Rules for the Classification of Steel Ships**.
(3) The entire length of both longitudinal and circumferential welded joints and exhaust gas pipe or wash water pipe joints on scrubber body are to be subjected to liquid penetrant testing(PT). Where considered necessary by the Surveyor, additional non-destructive test may be required.
(4) It shall be inspected based on the **Rules for the Classification of Steel Ships** of **Pt 5 Ch 5 Sec 3**.
(5) Storage tank that do not form part of the hull are to be subjected to a hydraulic test at a head pressure of 2.5 m on the tank top plate, together with the attachment after manufacture.
(6) Where equipment specified in **Guidance relating to the Rules for the Classification of Steel Ships Pt 6, Ch 1** and **Ch 2, 301.1** is installed, Regardless of class notation, the type approval product is to be installed.
(7) When ships install scrubber without by-pass arrangement of carbon capture system required in **305.** pre-scrubber body(when applied) is to be performed non-destructive examinations irrespective of notation in **104.**

803. Annual Survey

The annual survey of ships installed with OCCS system is to be included the followings:

1. External examination of all components, including absorber and desorption system etc.
2. Performance test of the instrumentation, control, monitoring, and safety equipment including indicators and alarms.
3. Performance test of Changeover devices of exhaust gas pipes and the corresponding indicator
4. Operation test of Remote control valves for absorbent or CO2 storage tanks

5. General examinations of safety and protective equipment
6. Performance test of eyewash and decontamination showers
7. Warning notices as per **404. 4.**
8. Performance test of extract fan (refer to **304. 2.**)

804. Intermediate Survey

Requirements as required by the Annual Survey in **803.** above are to be surveyed.

805. Special Survey

In addition to all the requirements for Annual Survey in **803.**, the following items are to be surveyed.

1. Opening up examination of pumps, exhaust fans and blowers
2. Internal examination of absorbent storage tank and absorber
3. Operation test of absorbent injection control valves
4. Internal examination of CO2 storage tank
5. Visual inspection of CO2 storage tanks and insulation in way of chocks, supports, keys and other parts which consist of the foundation of tanks. (Removal of insulation may be required in order to verify the condition of the tank or the insulation itself if found necessary by the Surveyor)
6. Non-destructive inspection of the main structural members, tank shell and highly stressed parts, if deemed necessary by the Surveyor. (However, for type C tanks, this does not mean that non-destructive testing can be dispensed with totally.)
7. Tightness tests of all CO2 storage tanks
8. A hydraulic or hydro-pneumatic test where findings of **4** to **7** or an examination of the voyage records raises doubts as to the structure integrity of CO2 storage tanks. (For integral tanks and for independent tank type A and B, the test pressure is to be carried out in accordance with proper pressure based on design of each tank. For independent tank type C, the test pressure is not to be less than 1.25 times the MARVS.)
9. At every other special survey (i.e., 2nd, 4th, 6th, etc) all independent CO2 storage type C are to be either:
   (1) Hydraulically or hydro-pneumatically tested to 1.25 times MARVS, followed by non-destructive testing in accordance with (C), or
   (2) Subjected to a thorough, planned non-destructive testing. This testing is to be carried out in accordance with a programme specially prepared for the tank design. (At least 10 % of the length of the welded connections in each of the above mentioned areas is to be tested. This testing is to be carried out internally and externally as applicable. Insulation is to be removed as necessary for the required non-destructive test.)
10. Visual inspection as far as practicable of all storage tank spaces and insulation, secondary barriers(if appicable) and tank supporting structures ⚓

CHAPTER 8 Onboard Carbon capture and storage system Ready Ships

Section 1 General

101. General

1. This Chapter applies to ships which are prepared for conversion with the design or the partial installation related with OCCS system mentioned in **Ch 7** during the new building phase or in-service.

2. This Chapter contains levels of readiness for OCCS system and requirements applicable thereto, and the scope of preparation is defined by the agreement between the shipowner and the shipbuilder.

3. This Chapter defines ready levels of OCCS system in three steps.

4. The definitions of terms in this chapter are to be as specified in **Ch.7 103**.

102. Class Notation

1. General

(1) The class notations specified in **2.~4.** may be assigned depending on the ready levels for OCCS system.

(2) The requirements for each class notation in this Section are to comply with **Sec 3**.

2. OCCS Ready D(A)

(1) **OCCS Ready D(A)** as an additional special feature notation may be assigned to ships whose OCCS system concept design is prepared for evaluation of the basic suitability.

(2) **OCCS Ready D(A)** is not to be assigned to ships having **OCCS Ready D**.

3. OCCS Ready D

OCCS Ready D as an additional special feature notation may be assigned to ships for which the generic design is prepared.

4. OCCS Ready I

(1) **OCCS Ready I** as an additional special feature notation may be assigned to ships for which parts of the systems are installed with the detailed design in addition to the generic design.

(2) In assignment of the **OCCS Ready I**, the characters corresponding to the installed items may be assigned in the bracket one or a combination of them in addition to **OCCS Ready I**. The characters corresponding to the installed items are as follows:
- (A) Absorbent storage Tank - AT
- (B) Structural Reinforcement for AT - SRat
- (C) CO2 storage Tank - CT
- (D) Structural Reinforcement for CT - SRct
- (E) Absorbent System - AS
- (F) Absorber - AB
- (G) Regenarator - RG
- (H) Pre-scrubber - PS
- (I) CO2 system - CX
- (J) Risk Assessment - RA

(3) For example, OCCS Ready I(AT, SRct) may be assigned to the ship on which Absorbent storage tank with structural reinforcement for OCCS system are installed.

Section 2 Requirements for Ready Levels

201. General

1. This Section prescribes plans to be submitted and consideration for preparing(refer to **205.**) OCCS system. The design and installation of structures and systems are to be in accordance with applicable requirements in **Ch 7**.

2. Drawing approval and survey for OCCS system ready are not accepted as Drawing approval and survey for conversion of the system. When the ship is converted, drawing approval and survey are to be carried out in accordance with **Ch 7** in force at the time of the ship conversion. Approved Drawings and certifications from new building stage may be used as reference for conversion.

202. General Level that fits Concept Design Review (OCCS Ready D(A))

1. Plans and documents required for an Approval in Principle (AIP) are to be submitted for **OCCS Ready D(A).** List of plans and documents to be submitted may be mediated after consultation with the Society.
2. The plans and documents required in this Section is to be marked "OCCS Ready" to separate them from the normal plans and documents of new building.

203. General Level that fits the preparation of a Generic Design (OCCS Ready D)

1. This paragraph prescribes plans and documents to be submitted for **OCCS Ready D**. The detail requirements for designs are to be in accordance with applicable requirements in Ch 7.
2. The plans and documents required in this paragraph is to be marked "OCCS Ready" to separate them from the normal plans and documents of new building.
3. Where parts of plans and documents required in this paragraph are not available, alternative documents may be accepted by the Society's review.
4. Plans and documents
   (1) General arrangement of ship
   (2) Arrangement, installation, layout of the OCCS system
   (3) Arrangement of machinery space where OCCS system are installed
   (4) Arrangement and capacity of tanks for absorbent, CO2 and washwater, etc (if applicable)
   (5) Arrangement of exhaust gas system
   (6) Documentation detailing the effect on electric load
   (7) Documentation detailing the effect on Load Line and Stability
   (8) Documentation of risk identification

204. Level that fits the Installation of Parts of Systems (OCCS Ready I)

1. Plans and documents

(1) OCCS Ready I includes the approval of the detailed drawings and the installation of the specific equipment mounted on the ship and is classified as a separate system as shown below. However, if approved by the Society, the some modifications may be made depending on the type of equipment.
   (A) Absorbent storage Tank - AT
   (B) Structural Reinforcement for AT - SRat
      - Hull plans showing the foundation and attachments of accessories to the vessel's structure, including scantlings, welding details, and foundation details of principal components
   (C) CO2 storage Tank - CT
   (D) Structural Reinforcement for CT - SRct
      - Hull plans showing the foundation and attachments of accessories to the vessel's structure, including scantlings, welding details, and foundation details of principal components
   (E) Absorbent System - AS
      - Detailed drawings of carbon capture system and related equipment including piping diagram and fittings and tank(s)
   (F) Absorber - AB
   (G) Regenarator - RG
   (H) Pre-scrubber - PS
   (I) CO2 system - EX
      - Detailed drawings of CO2 storage system and related equipment including piping diagram and fittings and tank(s)
   (J) Risk Assessment - RA
      - Documents of risk assessment

205. Consideration for preparing OCCS system

1. The engine casings are to be designed and arranged considering size of absorber, regenerator and monitoring system.
2. The machinery space are to be designed and arranged considering related carbon capture and storage system and tanks if applicable.
3. The sea suction and overboard discharge outlets are to be designed considering installation of absorbent system, CO2 storage system, washwater system(when pre-scubber is provided) and related component if applicable.
4. In calculating the capacity of the generator and switch board, the electric load/switch board that is increased/added due to the installation of OCCS system are to be considered and reflected in the submitted plans and/or documents in **203.** and **204.**
5. The effects of stability and load line due to the installation of OCCS system are to be considered and reflected in the drawings submitted in **203.** and **204.**
6. Ships for which parts of the systems are installed with the detailed design, an additional risk assessment should be conducted in accordance with **302.** of **Ch 7** depending on installed equipment or systems.
7. In the calculation of fire extinguishing agents for fixed fire extinguishing systems for machinery space, the increase or decrease in the volume of the machinery is to be considered due to the installation of OCCS system.
8. Consideration is to be given to fire extinguishing equipment which is required to be installed or maintained in the machinery space due to installation of OCCS system.

Section 3 Survey

301. Classification survey during construction

The shop test and onboard test are to be in accordance with **Ch 7**.

302. Periodical surveys

Periodical surveys in application of this Section, the general condition of the relevant systems installed on board is to be examined visually at periodical surveys for the vessels having **OCCS Ready I** notation. The systems are to be surveyed and evaluated for the condition at time of conversion, and the scope of test will be defined depending on time elapsed from new building and maintenance level of the systems.

CIRCULAR

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No : 2023-7-E
Date : 2023. 5. 23

To : All Surveyors and whom it may concern

Subject	**9.175 Notice for Amendments to the KR Technical Rules (Guidance Pt.1 Annex 1-1 and Pt.7 Annex 7-12)**
Application	**30th May 2023 (the date of which application for survey is submitted)**

1. Please be informed that 2022 Classification Technical Rules have been amended to reflect the Requests for Establishment/Revision of Classification Technical Rules as below, and you are kindly requested to apply these amendments on the relevant works.

Classification Technical Rules	Effective date	Amendments
Guidance Pt.1 Annex1-1 Guidance Pt.7 Annex7-12	On or after 30th May 2023	Annex 1-1 New Notation added. Annex 7-12 Liquefaction of Ore Bulk Cargo: New requirements for cargoes that can be liquefied when the moisture content contained in the cargo exceeds a certain value have been established.

2. Furthermore, please be informed that these amendments will be included in 2023 edition for Rule and Guidance.

Attachments: (Circular) Pt7 Annex12(Liquefaction) --------- 1 copy. (The End)

Amendments of the Guidance

Pt. 1 Classification and Surveys

Annex 1-1 Class Notation

Pt. 7 Ships of Special Service

Annex 7-12 Liquefaction of Ore Bulk Cargo

2023. 05.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments

(1) Bulk cargo liquefaction

- When ore bulk cargo is transported, if the moisture content (MC) contained in the cargo exceeds a specific value (TML), the cargo may be liquefied. This can seriously affect the structural strength and stability of the ship.
- Establish specific requirements for loading cargoes that can be liquefied
  (cargoes that convert to a stable state after liquefaction / cargo that does not convert to a stable state after liquefaction)

2. Main contents : refer to main text

(1) Requirements for the loading of cargoes that may be liquefied

(2) Addition of stability and structural strength requirements

(Examples of liquefied materials: -1 : Iron concerate, Iron ore fine -2: Bauxite fine, Nickel ore)

3. Reference

(1) IMSBC Code Group A

Present

〈Guidance〉 - Pt 1

Annex 1-1 Class Notation

Ship Types	Special Feature Notations		Remarks
7. Ore Carrier 'ESP'(16) *(2018)*	A		(16) : The notation "ESP" shall be assigned to ships which are constructed generally with single deck, two longitudinal bulkheads and a double bottom throughout the cargo length area and intended primarily to carry ore cargoes in the centre holds only. (Typical midship sections are given in **Fig 4**)
	no MP*1)	GRAB[X]*2)	

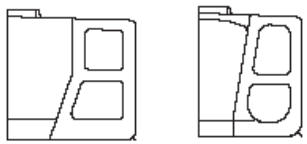


Fig 4 Typical midship sections of Ore Carrier 'ESP'

*1) : This notation shall be assigned to ships has not been designed for loading and unloading in multiple ports as **Pt 7 Annex 7-10** of the Guidance.

*2) : This notation shall be assigned to ships with holds designed for loading/unloading by grabs having a maximum specific weight up to [X] tons in compliance with the requirements of **Pt 7, Ch 2, 101. 2** of the Guidance.

Amendment

〈Guidance〉 - Pt 1

Annex 1-1 Class Notation

Ship Types	Special Feature Notations	Remarks
7. Ore Carrier 'ESP'(16) *(2018)*	no MP*1) GRAB[X]*2) LIQBC-1*3), LIQBC-2*4) *(2023)*	(16) : same as current

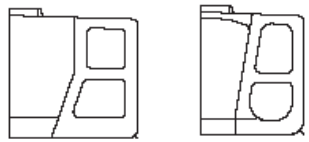


Fig 4 Typical midship sections of Ore Carrier 'ESP'

*1) : This notation shall be assigned to ships has not been designed for loading and unloading in multiple ports as **Pt 7 Annex 7-10** of the Guidance.

*2) : This notation shall be assigned to ships with holds designed for loading/unloading by grabs having a maximum specific weight up to [X] tons in compliance with the requirements of **Pt 7, Ch 2, 101. 2** of the Guidance.

*3),*4) : to ships designed (specially constructed or equipped) to carry solid bulk cargoes (cargoes in Group A of the IMSBC code) that may liquefy during voyage, in accordance with **Pt 7, Annex 7-12** of the Guidances *(2023)*

	Establishment

〈Guidance〉 - Pt 7

Annex 7-12 Liquefaction Ore Bulk Cargoes

1. General

(1) Application

This Annex applies to Ore carriers specially constructed to transport solid bulk cargoes that may liquefy during voyage when transporting cargoes whose moisture content(MC) exceeds thetransportable moisture limit (TML). Ships that meet the requirements of this Annex are assigned additional special feature notations LIQBC-1 or LIQBC-2. It is subject to the Flag Administration's decision for compliance with the requirements to specially constructed ore cargo ships according to the IMSBC Code. The Society will issue a certificate accordingly, if authorised by the Administration.

(2) Cargo liquefaction types are divided into two types:

(A) Cargoes resettled in stable condition after cargo liquefaction: It occurs in cargoes with a mixture of fine and large particles, and liquefaction occurs most often immediately after departure. The liquefaction state is a transient state that usually lasts for a limited time. After a cargo is stable, it is unlikely to re-liquefy. (e.g. iron ore fines)

(B) Cargoes that are not re-established in a stable condition after cargo liquefaction: It occurs on very fine clay-like cargoes, and liquefaction can occur days or weeks after departure. After the cargo is liquefied, it is not well stabilized (e.g. bauxite fines)

(3) Ships designed for cargo liquefaction are to comply with the requirements of this Annex in addition to the relevant requirements in **Pt 3** and **Pt 7, Ch 2.**

(4) Definitions used in this Annex are;

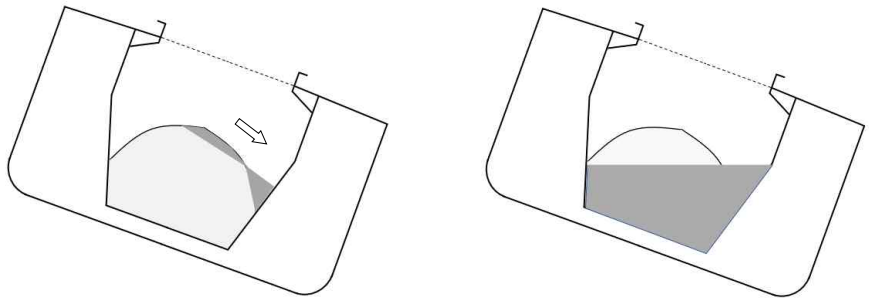
(A) solid bulk cargo : Cargo other than liquid or gas, which generally means a material composed of a combination of particles, granules, or slightly larger pieces of uniform composition which is loaded directly into the cargo space of a ship without any intermediate form of containment.

(B) IMSBC-A cargo : any solid bulk cargo which may liquefy if shipped at a moisture content in excess of their transportable moisture limit (TML)

(C) moisture content (MC) : the portion of water, ice or other liquid in the cargo sample. Percentage of total moisture content to the total mass of the sample

(D) transportable moisture limit (TML): the maximum moisture content of the cargo which is considered safe for carriage in ships

(5) In order to transport cargoes exceeding the permitted water limit, the following data must be submitted to the Society for approval:

	Establishment
	(A) Longitudinal / transverse sections and other plans indicating the weight, density, etc. of the cargo to be considered. (B) Distribution and stability calculations of cargo handling equipment, cargo and liquids in tanks; (C) Other materials deemed necessary by the Society **2. Stability** (1) Loading manual In the loading manual, the cargo characteristics including the design cargo density are to be stated. And in the loading manual, the following is to be included: "When loading cargoes other than design cargoes, compliance with regulations shall be verified through an approved loading guidance." (2) Loading conditions: (A) For liquefied cargo designs, loading conditions according to the design scenario is to be included in the loading manual. Where applicable, the requirements of (3) and (4) are tol be complied with. (a) Design scenarios - liquefaction : the cargo acts as a dense, viscous fluid - shifting : the cargo slides during heavy rolling  **Fig 1 Design scenario : shifting (left), liquefaction (right)** (B) Loading computer The ships are to be equipped with a loading computer capable of verifying the design scenarios and additional require-ments as given in (3) and (4) as applicable.

	Establishment
	(3) Intact stability (A) Shift scenario : the cargo is assumed to shift at an angle of 25 degrees. The requirements of stability for this scenario are to be in compliance with **Grain Code** (International Code for the Safe Carriage of Grain in Bulk, **IMO Res. MSC.23(59)**). (B) Liquefaction scenario : the cargo is assumed to be a liquid and full free surface of the cargo is to be considered. The requirements of stability for this scenario are to be in compliance with the **Part A Ch 2 of IMO IS Code (**International Code on Intact Stability**).** (4) Damage stability (A) For ships assigned LIQBC-2 notation, all stowed holds are assumed to be liquid with a free surface. Where applicable, it shall be calculated according to the GM limit curve based on the damage stability requirements of S**OLAS Reg II-1/6** to **7-3, Reg. II-1/9.8** and **Reg. XII/4.** (B) In addition to (A) above, for ships with reduced freeboard, the GM limit curve is to take into account the above requirements of **SOLAS** with the assumed deepest subdivision draft at the assigned reduced freeboard. (C) In addition to (A) and (B) above, the GM used to demonstrate compliance with the damage stability requirements of **Reg. 27 of ICLL** is to be equal to or less than that applied at the deepest subdivision draft in the GM limit curve calculation.

	Establishment

3. Hull Strength

(1) Cargo loads

(A) For hull strength evaluation, the cargo loads due to the liquefied design cargo are to be calculated in accordance with (B). The design density (γ) of cargo in the liquefied state of each cargo hold is to be given in the Classification Certificate. The design cargo density is to be considered more than the value given below. and The angle of repose is taken as 0 degrees.

	Density of cargo γ ($\mathrm{ton/m^3}$)
LIQBC-1	γ_{design}
LIQBC-2	M' / V_H (≥ 1.0)

M' : Cargo weight of the cargo hold. The following formula is applied.

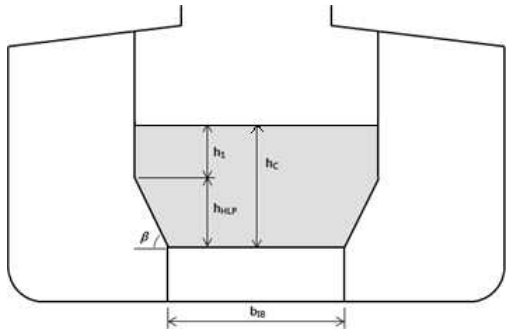
$$M' = M + \frac{1}{n} Min(3000,\ 0.1M)\ \ (t)$$

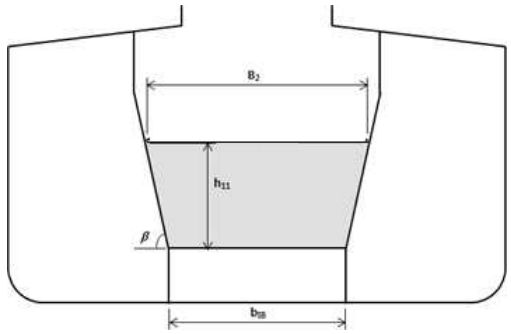
M : Maximum permissible bulk cargo weight of the cargo hold (t)

n : Minimum number of loading in one cargo hold

V_H : Volume, in m^3, of cargo hold up to level of the intersection of the main deck with the hatch coaming excluding the volume enclosed by hatch coaming.

γ_{design} : for LIQBC-1, the cargo density is to be presented by the designer. When the cargo density is not constant, the minimum and maximum value are to be determined by considering the range of cargo density.

	Establishment
	(B) LIQBC-1 The load of cargo on the inner wall of the cargo hold is given by the following formula. • For **Fig 2**  **Fig 2 Assumed cargo surface** $h_C = h_{HPL} + h_1$ Where; h_{HPL} : Vertical distance between inner bottom plate and top intersection of hopper tank and inner plate(m) h_1 : Vertical distance(m) is as follows; $h_1 = \frac{M'}{\gamma B_H l_H} - \frac{B_H + b_{IB}}{2 B_H} h_{HPL} + \frac{V_{TS}}{B_H l_H}$ B_H : Breadth of cargo hold(m) l_H : Length of cargo hold(m) b_{IB} : Breadth of double bottom(m) V_{TS} : The total volume(m^3) of the transverse stool at the bottom of the transverse bulkhead within the cargo hold length, l_H considered. In this volume, the volume of the portion of the hopper tank passing through the transverse bulkhead is excluded.

	Establishment
	• For **Fig 3**  **Fig 3 Assumed cargo surface** $h_C = h_{11}$ Where; h_{11} : Vertical distance(m) is as follows; $$h_{11} = h_{HPL}\left(\frac{B_2 - b_{IB}}{B_H - b_{IB}}\right)$$ $$B_2 = \sqrt{\frac{\frac{1}{l_H}\left(\frac{M'}{\rho_c} + V_{TS}\right) + \frac{1}{2}\left(\frac{h_{HPL}\, b_{IB}^2}{B_H - b_{IB}}\right)}{\frac{1}{2}\left[\left(\frac{h_{HPL}}{B_H - b_{IB}}\right)\right]}}$$

	Establishment

(C) LIQBC-2

The load of cargo on the inner wall of the cargo hold is given by the following formula.

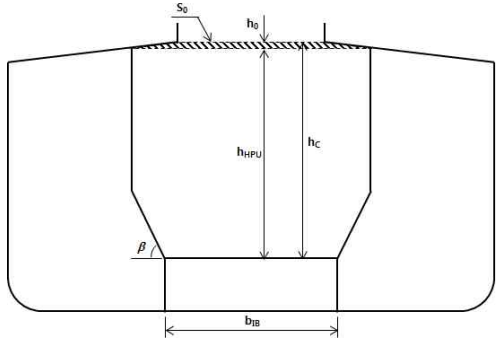


Fig 4 Assumed cargo surface

$$h_c = h_{HPU} + h_0$$

where;

$$h_0 = \frac{S_A}{B_H}$$

$$S_A = S_o + \frac{V_{HC}}{l_H}$$

h_{HPU} : Vertical distance (m) between inner bottom and lower intersection of top side tank and side shell or inner side

S_o : Shaded area (m^2) above the lower intersection of top side tank and side shell or inner side and up to the upper deck level

V_{HC} : Volume (m^3) enclosed by the hatch coaming

	Establishment
	(2) Longitudinal bulkhead platings (A) The thickness of longitudinal bulkhead plating and hopper plating are not to be less than the value obtained from following: $t = CS\sqrt{Kh_c} + 1.5 \quad (\mathrm{mm})$ where: S = length of the shorter side of the panel enclosed by stiffeners, etc. (m) h_c = When considering cargo liquefaction, the vertical distance from the bottom of the panel to the top of the cargo at the center line (m). C = coefficient obtained from the following formula. However, in no case is it to be less than 3.2. $C = 4.25\, C_1 \sqrt{\gamma}$ C_1 = coefficient obtained from the following formula where $1 \le \frac{l}{S} < 3.5 \quad C_1 = \left(0.11\frac{l}{S} + 0.615\right)$ where $3.5 \le \frac{l}{S} \qquad C_1 = 1$ l = length of the longer side of the panel enclosed by stiffeners, etc. (m)

	Establishment
	(3) Stiffeners The section modulus of stiffeners attached to longitudinal bulkheads is to be in accordance with the requirements in the following (A) and (B). (A) The section modulus of longitudinal stiffeners is not to be less than the value obtained from the following formula: $Z = 104\gamma\, CSh_c l^2 \quad (\mathrm{cm}^3)$ where: S : spacing of longitudinal stiffeners (m). h_c : when considering cargo liquefaction, vertical distance from the center of the stiffener under consideration to the top of the cargo at the center line (m). l : length of longitudinal stiffener between transverse webs (m). $C = \dfrac{K}{24 - \alpha K}$ α = α_1 or α_2 as given below $\alpha_1 = 15.0\, f_D \left(\dfrac{y - y_B}{Y'} \right) \quad \text{for} \quad y > y_B$ $\alpha_2 = 15.0\, f_B \left(\dfrac{y_B - y}{y_B} \right) \quad \text{for} \quad y \le y_B$ f_B , y : specified in **Ch. 2, 303. 2.** of the Rule y_B, Y' and f_D : specified in **Ch. 2, 303. 2.** of the Rules (B) The section modulus of transverse stiffeners is not to be less than that obtained from the following formula : $Z = 7.5\gamma\, KSh_c l^2 \quad (\mathrm{cm}^3)$ where: S = spacing of transverse stiffeners (m). h_c = when considering cargo liquefaction, vertical distance from the center of the stiffener under consideration to the top of the cargo at the center line (m). l = distance between the supports of stiffeners (m).

	Establishment
	(4) Transverse bulkhead and stool in ore cargo hold (A) The thickness of bulkhead plating is not to be less than the value obtained from the following formula; $t = 3.6\,CS\sqrt{K\gamma h_c} + 2.5 \quad (\mathrm{mm})$ where: S = spacing of stiffeners. (m). h_c = when considering cargo liquefaction, the vertical distance from the bottom of the panel to the top of the cargo at the center line (m). C = coefficients determined according to values of L as specified below : C = 1.0 where L is 230 m and under, C = 1.07 where L is 400 m and above. For intermediate values of L, C are to be obtained by linear interpolation. (B) Section modulus of bulkhead stiffeners is not to be less than that obtained from the following formula : $Z = 5.6\,C_1C_2C_3\gamma KSh_cl^2 \quad (\mathrm{cm}^3)$ where: h_c = when considering cargo liquefaction, the vertical distance from the center of the stiffener under consideration to the top of the cargo at the center line (m). C_1 = in accordance with C of (A) C_2 = as determined from **Table 1** according to the fixity condition of stiffener ends C_3 = 1.0 for longitudinal stiffener = 1.2 for vertical stiffener S and l = as specified in **Pt 3, Ch 14, 303.**

	Establishment

Table 1 Coefficient C_2

One end of stiffener / The other end of stiffener	Connection be hard bracket	Connection be soft bracket	Supported by rule girder or lug connection	Snip
Connection be hard bracket	0.70	1.15	0.85	1.30
Connection be soft bracket	1.15	0.85	1.30	1.15
Supported by rule girder or lug connection	0.85	1.30	1.00	1.50
Snip	1.30	1.15	1.50	1.50

1. Connection by hard bracket is a connection by bracket to the double bottoms or to the adjacent members, such as longitudinals or stiffeners in line, of the same or larger sections, or a connection by bracket to the equivalent members mentioned above. (See **Fig 5** (a))
2. Connection by soft brackets is a connection by bracket to the transverse members such as beams or equivalent thereto. (See **Fig 5** (b))

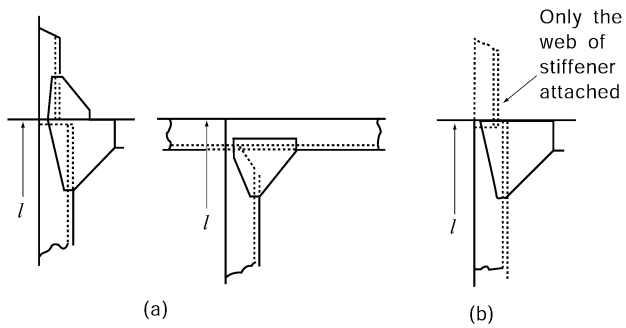


Fig 5 Types of end connection

	Establishment

(5) Corrugated bulkheads

(A) The thickness of plates of corrugated bulkheads is not to be less than that obtained from the following formula:

$$t = 0.0036 C S_1 \sqrt{\gamma h_c K} + 2.5 \quad (\mathrm{mm})$$

where:

S_1 = breadth of face part and web part, respectively (mm), indicated as a and b in **Fig 6.**

C = coefficient given below:

Face part: $C = \dfrac{1.4}{\sqrt{1 + \left(\dfrac{t_w}{t_f}\right)^2}}$

Web part: $C = 1.0$

t_f , t_w = thickness of plates of face part and web part, respectively (mm).

h_c : when considering cargo liquefaction, vertical distance from the bottom of the panel to the top of the cargo at the center line (m).

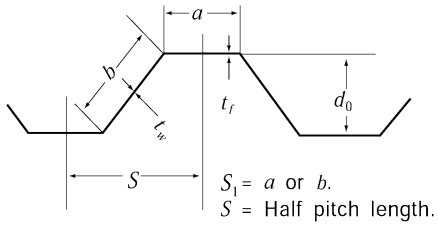


Fig 6 Measurement of S

	Establishment

(B) The section modulus per half pitch of corrugated bulkheads is not to be less than that obtained from the following formula:

$$Z = 7CKS\gamma h_c l^2 \quad (\mathrm{cm}^3)$$

where:

S = half pitch length of the corrugation (m). (See **Fig 6**)

l = length between the supports (m), as indicated in **Fig 7.**

h_c = when considering cargo liquefaction, the vertical distance from the center of the stiffener under consideration to the top of the cargo at the center line (m).

C = coefficient given in **Table 2,** according to the type of end connection. As for bulkheads with lower stools of which the width in longitudinal direction at the lower end, d_H is less than 2.5 times of web depth of the bulkhead, d_0 (See **Fig 7**), the measurement of $l$and the values of C are to be at the discretion of the Society.

Table 2 Values of C

Col.	Upper end / Lower end	Supported by Girders	Welded directly to deck	Welded to stool efficiently supported by ship structure
(1)	Supported by girders or welded directly to deck or inner bottoms	1.00	1.50	1.35
(2)	Welded to stool efficiently supported by ship structure	1.50	1.20	1.00

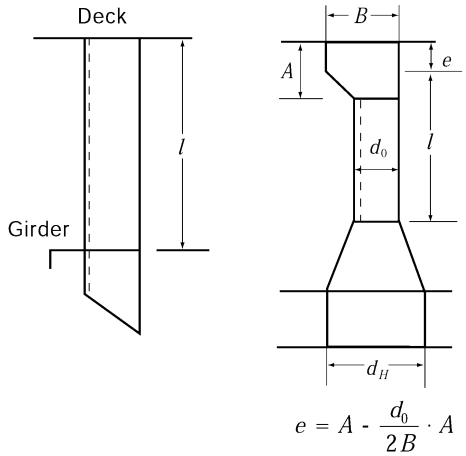


Fig 7 Measurement of l

As an alternative evaluation method for determining the required section modulus of corrugated bulkheads, strength evaluation through cargo hold structure analysis presented in Annex 7-10 is possible. At this time, in order to evaluate the strength of the corrugated bulkhead, a dummy beam element with a cross-sectional area of 1 mm^2 should be modeled at the location where the web and face plate of the corrugated bulkhead meet.

	Establishment
	(C) The thickness of plates at end parts for 0.2 l in line with l is not to be less than that obtained from the following formulae : Thickness of web part : $t = 41.7\frac{CKS\gamma h_c l}{d_0} + 2.5$ (mm) It is not to be less than that obtained from the following formula : $t_{\min} = 0.174 \sqrt[3]{\frac{CS\gamma h_c l b^2}{d_0}} + 2.5$ (mm) Thickness of the face part except the upper end part of vertically corrugated bulkheads: $t_f = \frac{0.012a}{\sqrt{K}} + 2.5$ (mm) where: S, h, C and l : as specified in (B) d_0 : depth of corrugation (mm). a and b : breadth of face part and web part respectively (mm)

	Establishment
	4. Finite element analysis (1) Strength assessment The finite element analysis is to be performed in accordance with **Annex 7-10** Guidance for Direct Strength Assessment of Ore Carriers, including additional load combinations for cargo liquefaction. This additional load combination includes all cargo loading combinations in which liquefaction cargoes are loaded in lieu of solid bulk cargoes. (2) Buckling strength for plating, stiffeners and overall stiffened panels. it is to be calculated in accordance with **Annex 7-10** Guidance for Direct Strength Assessment of Ore Carriers, taking into account the additional design loads. ⚓