Effective Circular

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9.147 Notice for Amendments to the Rules and Guidance for the Classification of Ships Using Low-flashpoint Fuels

9.148 Notice for Amendment to the KR Technical Rules (Guidance for Smart Ship Infrastructure)

9.149 Notice for Amendment to the KR Technical Rules
(Rules and Guidance for Pt 1/Guideance for Remote Inspection Techniques)

9.150 Notice for Amendment to the KR Technical Rules
(Guidance for the Classification of Steel Ships Pt 5/
Guidance for Ships designed to Prevent the spread of Infectious Disease)

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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

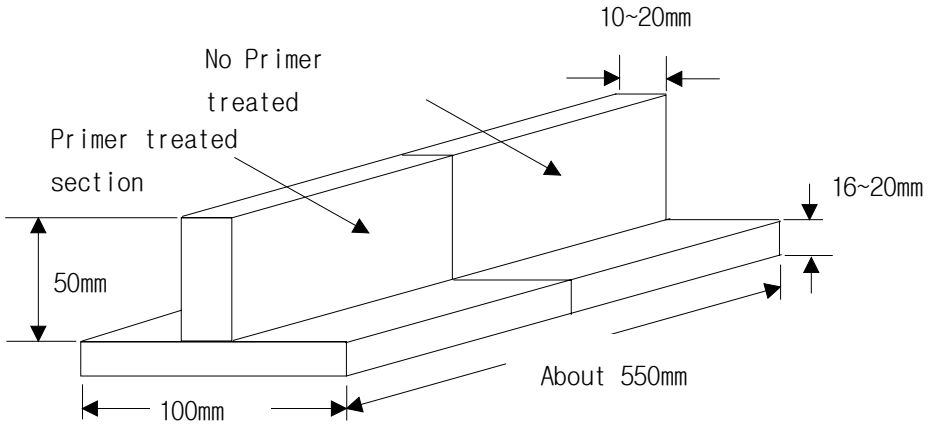
2). Filet Welding Test

(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
Technical Division

* *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.*

CIRCULAR

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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

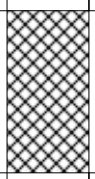
Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
1.1	Plan and conduct a passage and determine position	1. Determination of position shall be able by following equipment; ① GPS ② Radar ③ Gyro Compass (error within 1 degree is permitted) ④ Magnetic Compass			
		2. 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

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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

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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
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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:

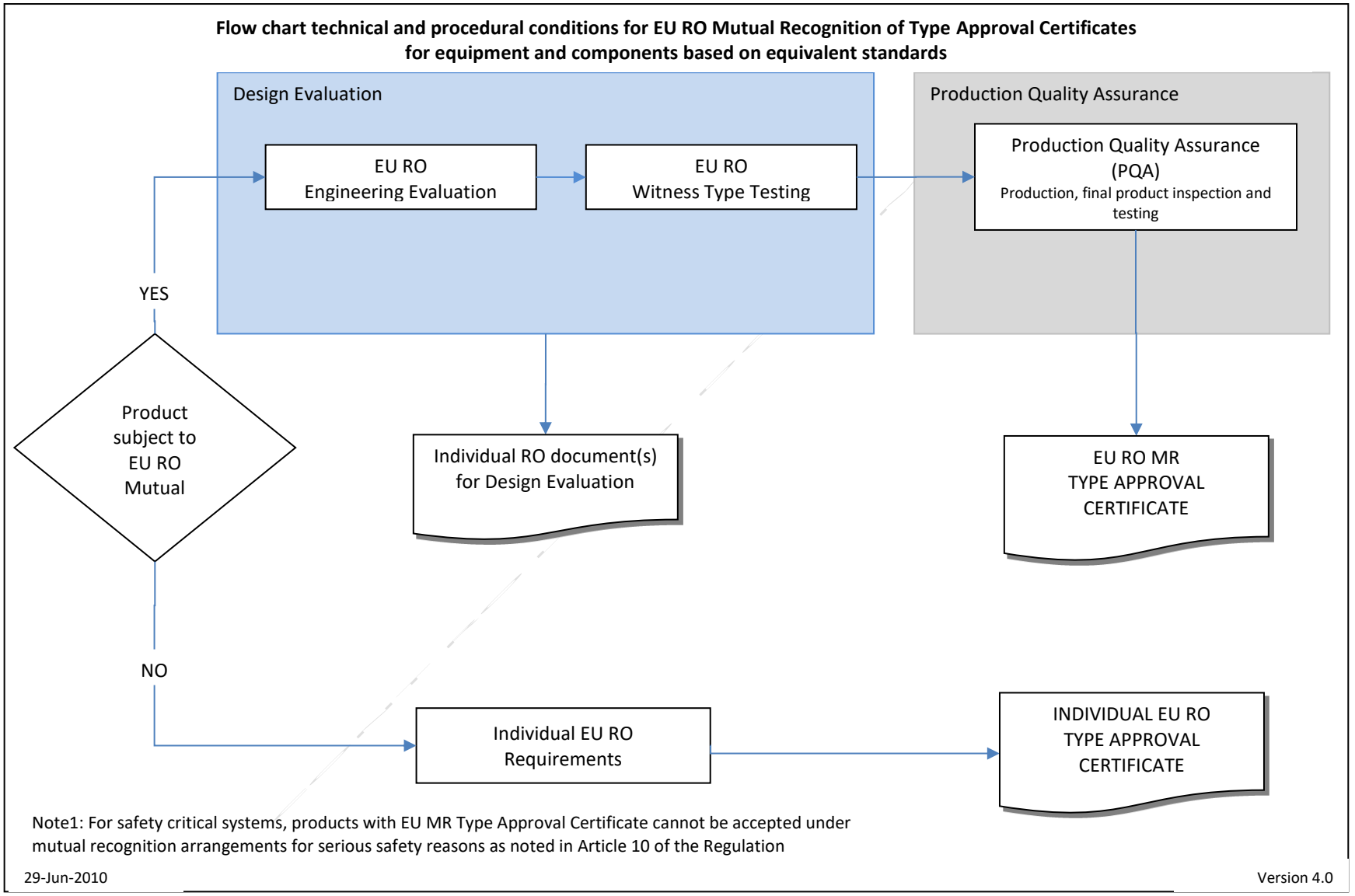
1) *Refer to the agreed MR Technical Requirements for additional MR TAC information that may be specifically applicable to certain products* - https://www.euromr.org/technical-requirements;
2) *List of MR TACs issued by the EU ROs can be found by https://www.euromr.org/links-to-mr-certificates.*
3) *As 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

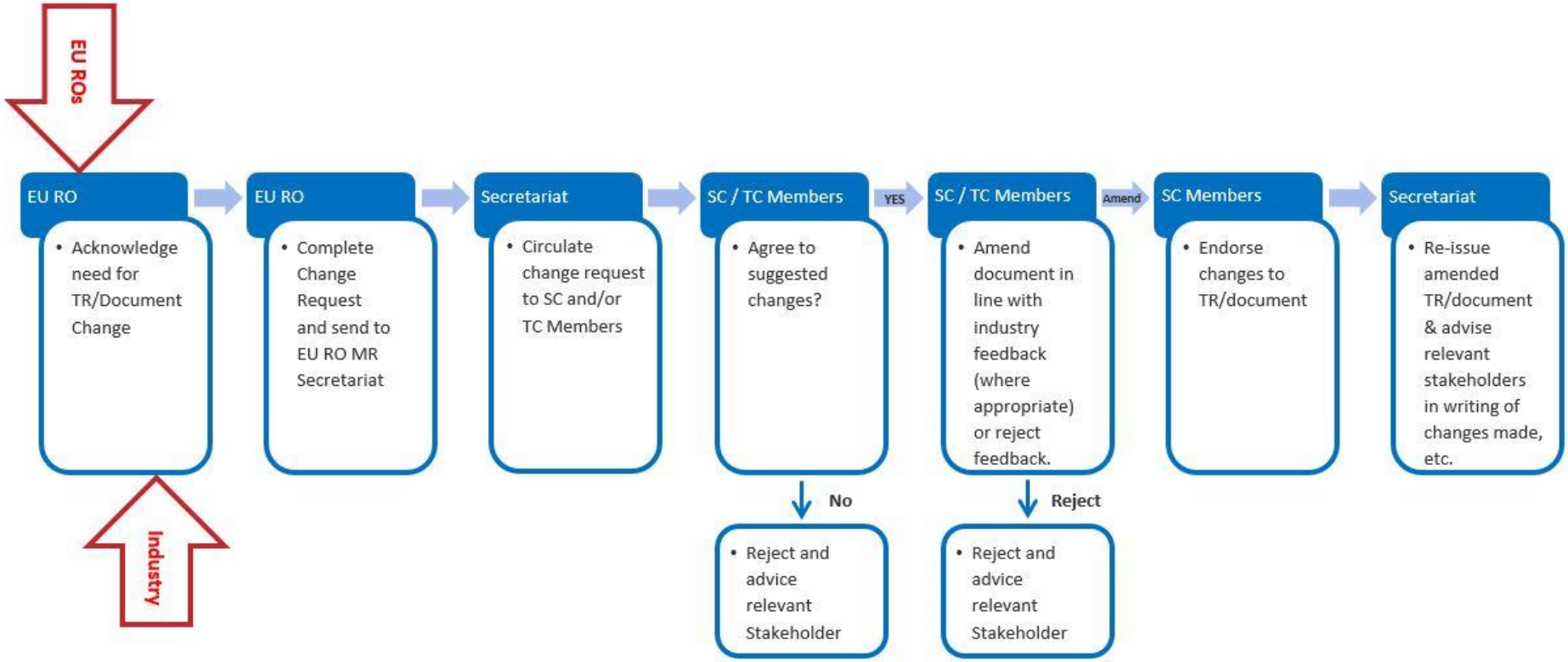


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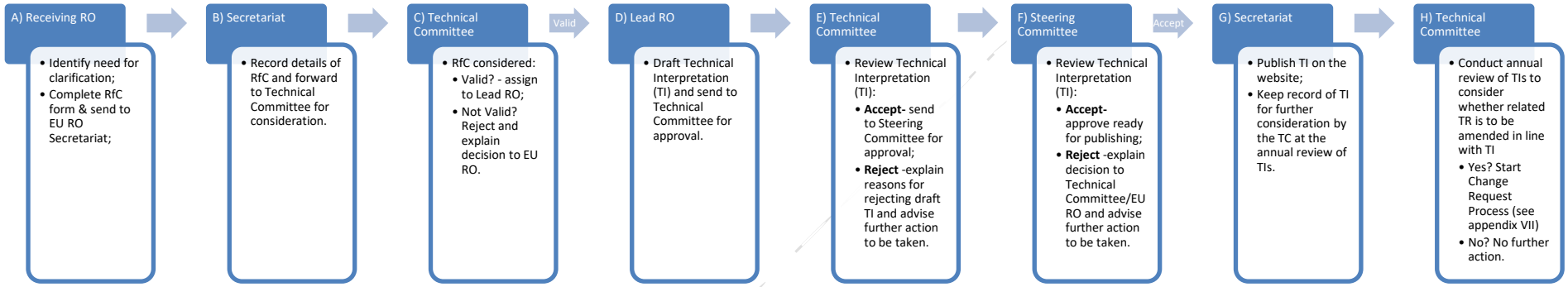
Figure 2 - EU RO MR Maintenance Process

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

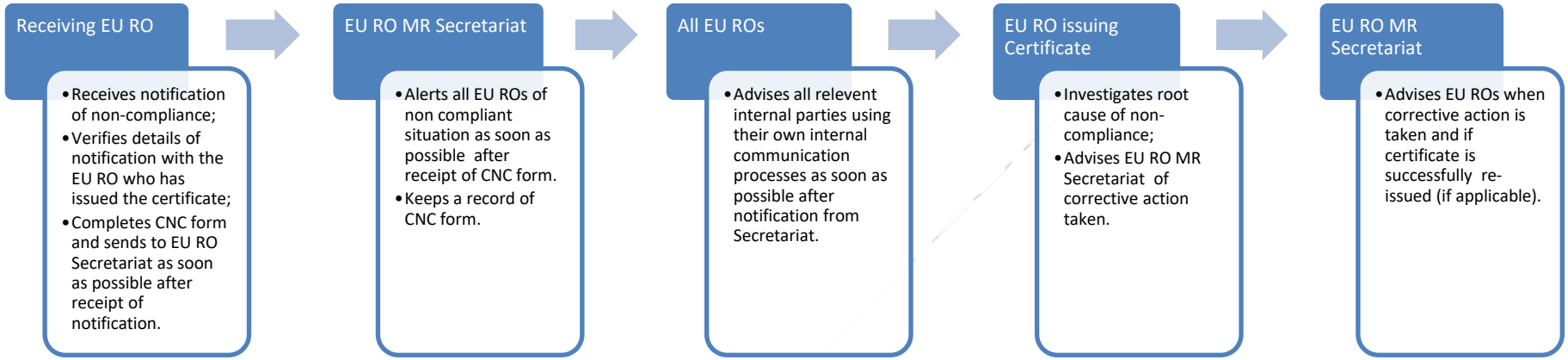
6. An annual review of TIs will be conducted by the EU RO MR Technical Committee in September each year to ensure ongoing relevance and a decision will be taken on each TI to as to whether the related Agreed Technical Requirement should be amended to incorporate the outcome of the TI – see step H) in 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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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

.
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'.

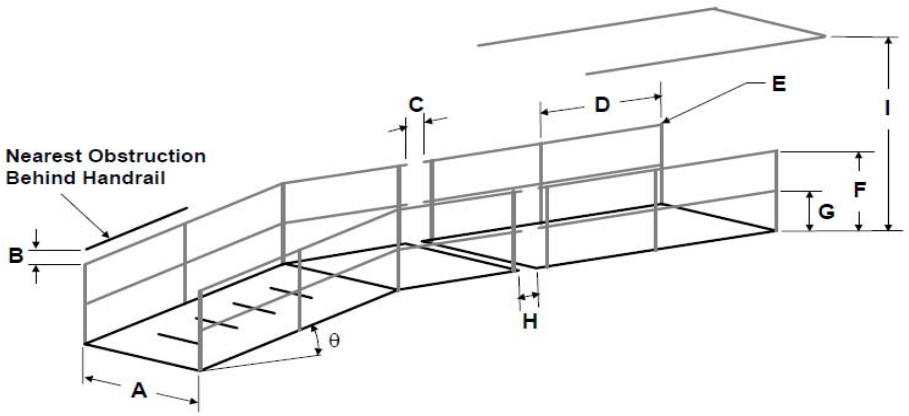
Figure 1 Walkway and Ramp Design

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)

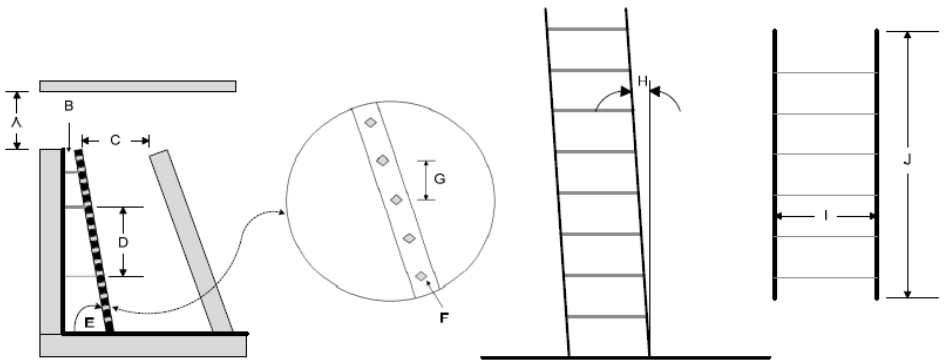


Figure 3 Staggered Vertical Ladder

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.

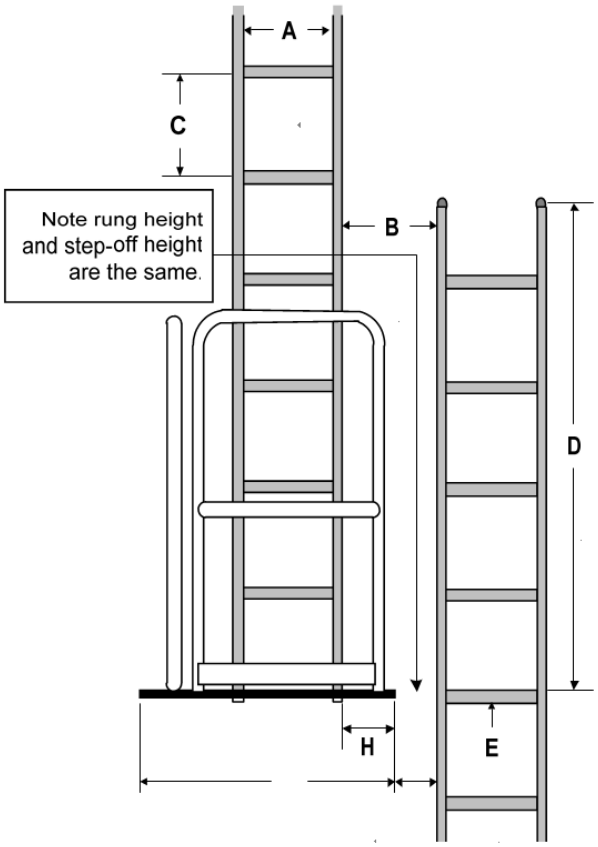


Figure 4 Vertical Ladders to Landings (Side Mount)*

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.

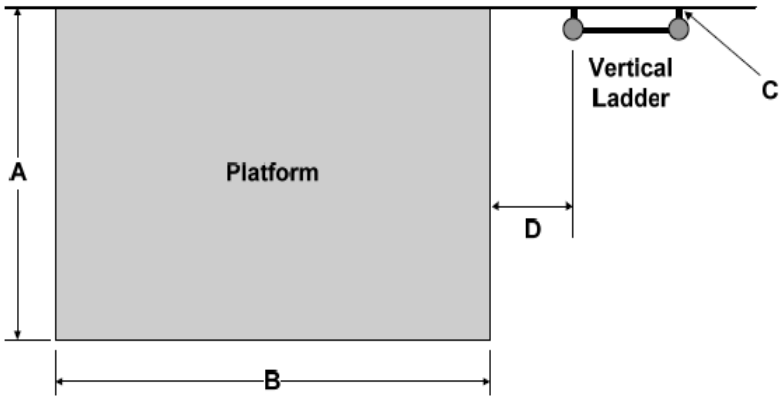
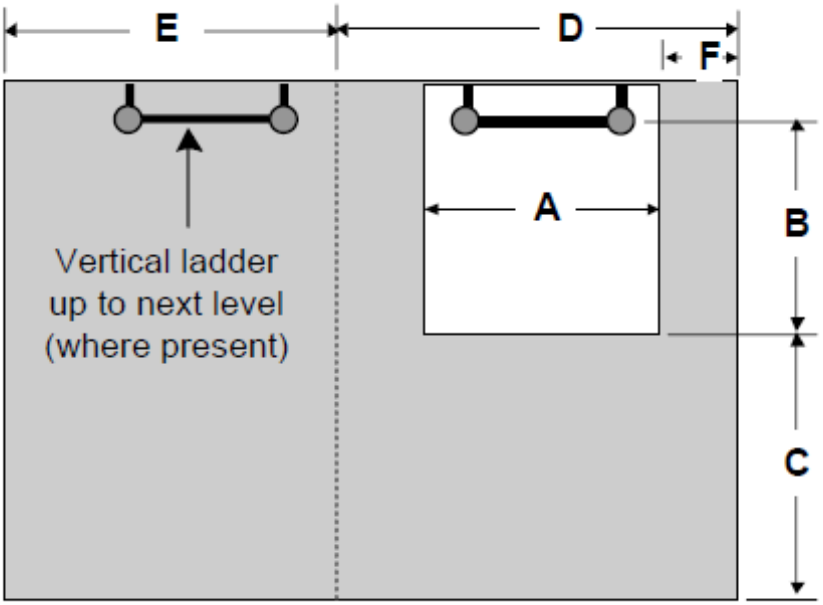


Figure 5 Vertical Ladders to Landings (Ladder through Platform)*

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

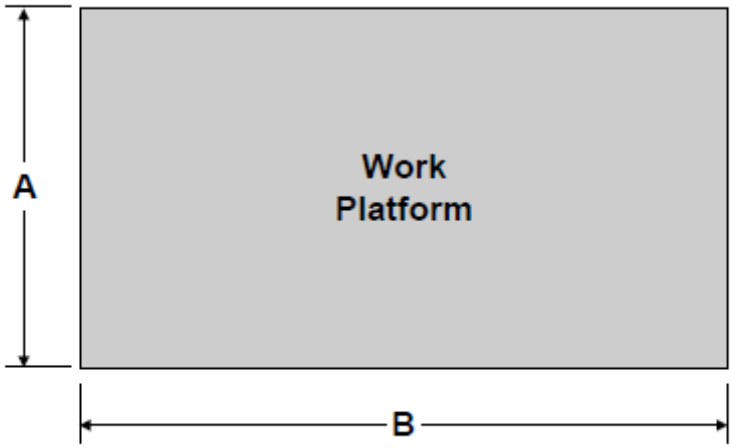


Work Platform

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 : 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 Jae-sung

No : 2021-1-E
Date : 2021. 1. 7

To : All Surveyors and whom it may concern

Subject	**9.137 Notice for Amendments to KR Technical Classification Rules (Rules for Part 1)**
Application	**1st Feb. 2021 (Date of which application for survey is submitted)**

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) To introduce the Procedural Requirements for Dual Classed Vessel to new ships. (Reflected the amendment to IACS PR 1B(Rev.6 Nov. 2020)

2. Furthermore, please be informed that these amendments will be included in 2022 edition on KR Classification Technical Rules which will be published in the first half of 2022.

Attachments
: Amendments of Rules for the Classification of Steel Ships Pt 1. --- 1 copy. (The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Jan. 2021

KR

- Main Amendments -

(1) Effective date : 1 Feb. 2021 (Date of which the application for survey is submitted)

◉ To reflect the revision of IACS PR1B(Rev.6 Nov. 2020).

(1) Effective date : 1 Feb. 2021

(Date of which application for survey is submitted)

Present	Amendment
# CHAPTER 1 CLASSIFICATION ## Section 1 General **101. Definitions** ***(2020)*** The definitions of terms used in **Ch 1, Ch 2** and **Ch 3** are to be as specified in the following, unless otherwise specified elsewhere. **1. ~ 4. 〈omitted〉** **5. Double Classed Vessel** means a vessel which is classed by two Societies and where each Society works as if it is the only Society classing the vessel, and does all surveys in accordance with its own requirements and schedule. (for existing ship only) **6. Dual Classed Vessel** means is a vessel which is classed by two Societies between which there is a written agreement regarding sharing of work. (for existing ship only) 〈hereafter, omitted〉	# CHAPTER 1 CLASSIFICATION ## Section 1 General **101. Definitions** ***(2020)*** The definitions of terms used in **Ch 1, Ch 2** and **Ch 3** are to be as specified in the following, unless otherwise specified elsewhere. **1. ~ 4. 〈same as the current Rules〉** **5. Double Classed Vessel** means a vessel which is classed by two Societies and where each Society works as if it is the only Society classing the vessel, and does all surveys in accordance with its own requirements and schedule. ~~(for existing ship only)~~ *(2021)* **6. Dual Classed Vessel** means is a vessel which is classed by two Societies between which there is a written agreement regarding sharing of work. ~~(for existing ship only)~~ *(2021)* 〈hereafter, same as the current Rules〉

Present	Amendment
Section 3 Classification Survey during Construction	**Section 3 Classification Survey during Construction**
301. ~ 309. 〈omitted〉	**301. ~ 309. 〈same as the current Rules〉**
〈newly added〉	**310. In Case of Dual Classed Vessel *(2021)*** 1. Each Society acts on behalf of the other Society in accordance with the trilateral agreement adopted by the two Societies and the shipyard. This agreement shall clearly define modalities such as submission of plans, rules to be applied, harmonizing and resolution of plan approval comments between societies; 2. Each Society is to perform review and approval of plans as appropriate in accordance with the trilateral agreement; 3. Each Society is to perform the survey during fabrication, construction and testing of the vessel in accordance with the trilateral agreement, and/or the bilateral agreement adopted by the two Societies, if any; 4. Each Society is to share information and records related to new construction such as plan approval including following up and closing of comments imposed, surveys, inspection, witnesses and tests etc., to perform the surveys and verify compliance with the relevant requirements; and 5. Each Society is to issue an Interim Certificate of Classification for the vessel upon satisfactory completion of new construction survey process.
〈hereafter, omitted〉	〈hereafter, same as the current Rules〉

Present	Amendment
〈Rule〉 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General 101. ~ 112. 〈omitted〉 113. Maintaining of dual classed vessel *(2019)* 【See Guidance】 1. In case of dual classed vessel, the Classification and Surveys should be maintained in accordance with the agreement adopted by the two Societies. 〈newly added〉 2. The procedures for maintaining(periodical surveys etc.) dual classed vessel are prescribed in the separate Instruction. 〈newly added〉	〈Rule〉 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General 101. ~ 112. 〈same as the current Rules〉 113. In case ~~Maintaining~~ of Ddual Cclassed Vvessel *(2021)* ~~【See Guidance】~~ 1. Each Society acts on behalf of the other Society in accordance with the bilateral agreement adopted by the two Societies. This agreement shall clearly define the scope of work of each Society. ~~In case of dual classed vessel, the Classification and Surveys should be maintained in accordance with the agreement adopted by the two Societies.~~ *(2021)* 2. Each Society is to review whether the work undertaken by other Society on its behalf has been completed as agreed. *(2021)* 3. The procedures for maintaining(periodical surveys etc.) dual classed vessel are prescribed in the separate Instruction. 4. Even though a Dual Classed Vessel that does not have a written agreement with other Society is treated as Double Classed Vessel. *(2021)*
〈Guidance〉 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General 101. 104. 106~110. 〈omitted〉 113. Maintaining of dual classed vessel *(2019)* 【See Rule】 1. Even though a dual classed vessel that does not have a written agreement with other Society is treated as double classed vessel.	〈Guidance〉 CHAPTER 2 PERIODICAL AND OTHER SURVEYS Section 1 General 101. 104. 106~110. 〈omitted〉 ~~113. Maintaining of dual classed vessel *(2019)* 【See Rule】~~ ~~1. Even though a dual classed vessel that does not have a written agreement with other Society is treated as double classed vessel.~~

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Person in charge: Park Jae-sung

No : 2021-3-E
Date : 2021. 3. 3

To : All Surveyors and whom it may concern

Subject	**9.139 Notice for Amendments to KR Technical Classification Rules (Surveys of Watertight Cable Transits)**
Application	**On or after 1st July 2021 (The contract date for ship construction)**

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

= Below =

1) To newly introduce Survey requirements for watertight cable transits
   - Reflected IACS UR Z28(New Oct. 2020)

2. Furthermore, please be informed that these amendments will be included in 2022 edition on KR Classification Technical Rules which will be published in the first half of 2022.

Attachments:
1) Amendments of Rules for the Classification of Steel Ships Pt 1. --- 1 copy.
2) Amendments of Rules for MOU/MODU. --- 1 copy. (The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Mar. 2021

- Main Amendments -

(1) Effective date : 1 July 2021 (The contract date for ship construction)

◉ To reflect the revision of IACS Z28(New Oct 2020)

- A global unified standard is required to improve the installation and maintenance of Pressure-Rated MCT/Transit systems.

- In order to properly maintain Ship structures and promote vessel safety during water ingress, a better method is necessary to document and manage installation, maintenance, and repair of MCT/Transit systems.

(1) Effective date : 1 July 2021

(The contract date for ship construction)

Present	Amendment
CHAPTER 1 CLASSIFICATION **Section 1 ~ Section 2 〈omitted〉** **Section 3 Classification Survey during Construction** 301. ~ 305. 〈omitted〉 306. Tests **[See Guidance]** In the Classification Survey during Construction, hydrostatic, watertight and performance tests are to be carried out in accordance with the relevant part of the Rules. Also the control systems and measuring device after installation are to receive the necessary tests, as deemed necessary by the Society. 〈newly added〉	**CHAPTER 1 CLASSIFICATION** **Section 1 ~ Section 2 〈same as the current Rules〉** **Section 3 Classification Survey during Construction** 301. ~ 305. 〈same as the current Rules〉 306. Tests **[See Guidance]** In the Classification Survey during Construction, hydrostatic, watertight and performance tests are to be carried out in accordance with the relevant part of the Rules. Also the control systems and measuring device after installation are to receive the necessary tests, as deemed necessary by the Society. In addition, the survey of watertight cable penetrations(bulkheads and decks) is to be in accordance with the following. *(2021)* 1. Surveys of Watertight Cable Transits *(2021)* (1) Watertight cable transits are to be installed and maintained in accordance with the manufacturer's requirements and in accordance with the requirements of the relevant Type Approval certification. **(2)** Cable Transit Seal Systems Register (A) A Cable Transit Seal Systems Register (Register) is to be provided by the shipbuilder for all watertight cable transits fitted to the vessel. For an example of a register see Appendix 1-12-4 "Recommendatory Sample - Cable Transit Seal Systems Register". The Register can be in either a hard copy or digitized media. It is to include a marking / identification system, documentation referencing manufacturer manual(s) for each type of cable transit installed, the Type Approval certification for each type of transit system, applicable installation drawings, and a recording of each installed transit documenting the as built condition after final inspection in the shipyard. It is to include sections to record any inspection, modification, repair and maintenance.

Present	Amendment
	(B) The Register shall be reviewed by the attending Surveyor to confirm it contains a list of the watertight cable transits, applicable cable transit information and sections to maintain in-service maintenance and survey records. (C) For manned vessels the Register is to be held onboard of the vessel. For unmanned vessels, if a suitable storage location does not exist onboard, the Register may be held ashore. The Register is to be readily available for the attending surveyor. (3) For Installation and Maintenance of Watertight Cable Transits, it is to be confirmed that: (A) Cable transits have been installed, and where disrupted have been reinstated, in accordance with the manufacturer's requirements and in accordance with the requirements of Type Approval. (B) Where specified, appropriate specialized tools have been used.

Present	Amendment
# CHAPTER 2 PERIODICAL AND OTHER SURVEYS ## Section 1 General 〈omitted〉 ## Section 2 Annual Survey **201. Due range 〈omitted〉** **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) ~ (33) 〈omitted〉 〈newly added〉 (34) For ships provided with the equipment employed in the mooring of ships at single point mooring specified in **Pt 4, Ch 10, 101. 7** and assigned the additional class notation "EQ-SPM", the general function and deformation condition of this equipment employed in the mooring of ships at single point mooring and hull supporting structures are to be checked. *(2017)*	# CHAPTER 2 PERIODICAL AND OTHER SURVEYS ## Section 1 General 〈same as the current Guidances〉 ## Section 2 Annual Survey **201. Due range 〈same as the current Guidances〉** **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) ~ (33) 〈same as the current Guidances〉 (34) Surveys of Watertight Cable Transits *(2021)* (A) Watertight cable transits are to be installed and maintained in accordance with the manufacturer's requirements and in accordance with the requirements of the relevant Type Approval certification. (B) The owner is to maintain the Register to record any disruption (repair, modification or opening out and closing) to a cable transit or to record the installation of a new cable transit. (C) Cable transits have been installed, and where disrupted have been reinstated, in accordance with the manufacturer's requirements and in accordance with the requirements of Type Approval. (D) Where specified, appropriate specialized tools have been used. (E) The Register is to be reviewed to confirm it is being maintained and as far as practicable the transits are to be examined to confirm their satisfactory condition. (F) Where there are records entered since the last annual survey of any disruption to the cable transits or installation of new cable transits, the satisfactory condition of those transits is to be confirmed by review of records and, if deemed necessary, by examination. The results are to be recorded in the Register against the specific cable transit. (35) For ships provided with the equipment employed in the mooring of ships at single point mooring specified in **Pt 4, Ch 10, 101. 7** and assigned the additional class notation "EQ-SPM", the general function and deformation condition of this equipment employed in the mooring of ships at single point mooring and hull supporting structures are to be checked. *(2017)*

Present	Amendment
Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)	**Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)**
401. ~ 402. 〈omitted〉	**401. ~ 402. 〈same as the current Guidances〉**
403. Requirements of survey (2018)	**403. Requirements of survey (2018)**
1. The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, as required in (9), are in satisfactory condition and is fit for the intended purpose for the new period of class of 5 years to be assigned, ~.	**1.** The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, as required in (9), are in satisfactory condition and is fit for the intended purpose for the new period of class of 5 years to be assigned, ~.
(1) ~ (17) 〈omitted〉	(1) ~ (17) 〈same as the current Guidances〉
〈newly added〉	(18) Surveys of Watertight Cable Transits *(2021)* (1) The requirements for Special Survey may be undertaken by the attending Surveyor or by a firm approved as a service supplier according to the Guidance for Approval of Service Suppliers. (2) All transits are to be examined to confirm their satisfactory condition and the Register is to be reviewed to confirm it is being maintained. The Special Survey is to be recorded in the Register, in which a single record entry will be sufficient to record the survey of all transits. (3) From review of the Register, where there are records entered since the last special survey of any disruption to the cable transits or installation of new cable transits (except which are reviewed and examined at previous annual surveys), the satisfactory condition of those transits is to be confirmed by the attending Surveyor by review of records and examination of the transits; the results are to be recorded in the Register against each of those cable transits. (4) In case the cable transits have been examined by an approved service supplier, the attending surveyor is to review the Register in order to ascertain that it has been properly maintained by the owner and correctly endorsed by the service supplier.
(18) For ships provided with the equipment employed in the mooring of ships at single point mooring specified in **Pt 4, Ch 10, 101. 7** and assigned the additional class notation "EQ-SPM", the function and deformation condition of this equipment employed in the mooring of ships at single point mooring and hull supporting structures are to be closely checked and confirmed its satisfactory conditions. Where deemed necessary, non-destructive examinations may be required. *(2018)* **【See Guidance】**	(19) For ships provided with the equipment employed in the mooring of ships at single point mooring specified in **Pt 4, Ch 10, 101. 7** and assigned the additional class notation "EQ-SPM", the function and deformation condition of this equipment employed in the mooring of ships at single point mooring and hull supporting structures are to be closely checked and confirmed its satisfactory conditions. Where deemed necessary, non-destructive examinations may be required. *(2018)* **【See Guidance】**

Amended MOU/MODU Rules

(Part 2 Classification and Surveys)

Mar. 2021

- Main Amendments -

(1) Effective date : 1 July 2021 (The contract date for ship construction)

◉ To reflect the revision of IACS Z28(New Oct 2020)

- A global unified standard is required to improve the installation and maintenance of Pressure-Rated MCT/Transit systems.

- In order to properly maintain MOU structures and promote vessel safety during water ingress, a better method is necessary to document and manage installation, maintenance, and repair of MCT/Transit systems.

(1) Effective date : 1 July 2021

(The contract date for ship construction)

Present	Amendment
# CHAPTER 2 CLASSIFICATION AND SURVEYS ## Section 1 General 〈omitted〉 ## Section 2 Classification **201. ~ 203. 〈omitted〉** **204. Classification Survey during Construction** **1. ~ 3. 〈omitted〉** **4. Tests** At the Classification Survey during Construction, hydrostatic tests, leak tests, hose tests and performance tests, etc are to be carried out in accordance with the relevant requirements of this Rules. 〈newly added〉	# CHAPTER 2 CLASSIFICATION AND SURVEYS ## Section 1 General 〈same as the current Guidances〉 ## Section 2 Classification **201. ~ 203. 〈same as the current Guidances〉** **204. Classification Survey during Construction** **1. ~ 3. 〈same as the current Guidances〉** **4. Tests** At the Classification Survey during Construction, hydrostatic tests, leak tests, hose tests and performance tests, etc are to be carried out in accordance with the relevant requirements of this Rules. In addition, the survey of watertight cable penetrations(bulkheads and decks) is to be in accordance with the following. *(2021)* **(1)** Surveys of Watertight Cable Transits *(2021)* (A) Watertight cable transits are to be installed and maintained in accordance with the manufacturer's requirements and in accordance with the requirements of the relevant Type Approval certification. (B) watertight cable transit seal systems should be inspected in accordance with item 8.6, Table 1 of Annex 1-12, Guidance Pt 1. **(C)** Cable Transit Seal Systems Register (a) A Cable Transit Seal Systems Register (Register) is to be provided by the shipbuilder for all watertight cable transits fitted to the vessel. For an example of a register see Appendix 1-12-4 "Recommendatory Sample - Cable Transit Seal Systems Register". The Register can be in either a hard copy or digitized media. It is to include a marking/ identification system, documentation referencing manufacturer manual(s) for each type of cable transit installed, the Type Approval certification for each type of transit system, applicable installation drawings, and a recording of each installed transit documenting the as built condition after final inspection in the shipyard. It is to include sections to record any inspection, modification, repair and maintenance.

Present	Amendment
	(b) The Register shall be reviewed by the attending Surveyor to confirm it contains a list of the watertight cable transits, applicable cable transit information and sections to maintain in-service maintenance and survey records. (c) For manned vessels the Register is to be held onboard of the vessel or MOU. For unmanned vessels, if a suitable storage location does not exist onboard, the Register may be held ashore. The Register is to be readily available for the attending surveyor. (D) For installation and maintenance of Watertight Cable Transits, it is to be confirmed that: (a) Cable transits have been installed, and where disrupted have been reinstated, in accordance with the manufacturer's requirements and in accordance with the requirements of Type Approval. (b) Where specified, appropriate specialized tools have been used.

Present	Amendment
Section 3 Surveys	**Section 3 Surveys**
301. General 〈omitted〉	**301. General 〈same as the current Guidances〉**
302. Annual Survey	**302. Annual Survey**
1. ~ 2. 〈omitted〉	**1. ~ 2. 〈same as the current Guidances〉**
3. Hull, structure and equipment	**3. Hull, structure and equipment**
At each Annual Survey the exposed parts of the hull, deck, deck house, structures attached to the deck, derrick substructure, including supporting structure, accessible internal spaces, and the applicable parts listed below are to be generally examined and placed in satisfactory condition as found necessary. ~.	At each Annual Survey the exposed parts of the hull, deck, deck house, structures attached to the deck, derrick substructure, including supporting structure, accessible internal spaces, and the applicable parts listed below are to be generally examined and placed in satisfactory condition as found necessary. ~.
(1) All units	(1) All units
(A) ~ (L) 〈omitted〉	(A) ~ (L) 〈same as current Rules〉
〈newly added〉	(M) Surveys of Watertight Cable Transits *(2021)*
	(a) Watertight cable transits are to be installed and maintained in accordance with the manufacturer's requirements and in accordance with the requirements of the relevant Type Approval certification.
	(b) The owner is to maintain the Register to record any disruption (repair, modification or opening out and closing) to a cable transit or to record the installation of a new cable transit.
	(c) Cable transits have been installed, and where disrupted have been reinstated, in accordance with the manufacturer's requirements and in accordance with the requirements of Type Approval.
	(d) Where specified, appropriate specialized tools have been used.
	(e) The Register is to be reviewed to confirm it is being maintained and as far as practicable the transits are to be examined to confirm their satisfactory condition.
	(f) Where there are records entered since the last annual survey of any disruption to the cable transits or installation of new cable transits, the satisfactory condition of those transits is to be confirmed by review of records and, if deemed necessary, by examination. The results are to be recorded in the Register against the specific cable transit.

Present	Amendment
303. Special survey **1. ~ 3. 〈omitted〉** **4. Special Survey No. 1** (1) Hull, structure and equipments (A) All units The following parts are to be examined: (a) ~ (o) 〈omitted〉 〈newly added〉	**303. Special survey** **1. ~ 3. 〈same as the current Guidances〉** **4. Special Survey No. 1** (1) Hull, structure and equipments (A) All units The following parts are to be examined: (a) ~ (o) 〈same as the current Guidances〉 (p) Surveys of Watertight Cable Transits *(2021)* (i) The requirements for Special Survey may be undertaken by the attending Surveyor or by a firm approved as a service supplier according to the Guidance for Approval of Service Suppliers. (ii) All transits are to be examined to confirm their satisfactory condition and the Register is to be reviewed to confirm it is being maintained. The Special Survey is to be recorded in the Register, in which a single record entry will be sufficient to record the survey of all transits. (iii) From review of the Register, where there are records entered since the last special survey of any disruption to the cable transits or installation of new cable transits (except which are reviewed and examined at previous annual surveys), the satisfactory condition of those transits is to be confirmed by the attending Surveyor by review of records and examination of the transits; the results are to be recorded in the Register against each of those cable transits. (iv) In case the cable transits have been examined by an approved service supplier, the attending surveyor is to review the Register in order to ascertain that it has been properly maintained by the owner and correctly endorsed by the service supplier.

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Person in charge: Jung Jae-hun

No : 2021-4-E
Date : 2021. 4. 08

To : All Surveyors and whom it may concern

Subject	**9.140 Notice for Amendments to the KR Technical Rules (Guidance for Approval of Manufacturing Process and Type Approval,Etc. / Pt.7 Ships of Special Services / Pt.1 Classification and Surveys)**
Application	**8th April 2021 (the date of which application for survey is submitted)**

1. Please be informed that the partial amendments have been made to the 'Guidance for Approval of Manufacturing Process and Type Approval, Etc./Pt.7 Ships of Special Services/Pt.1 Classification and Surveys', as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) The Ships with the special feature notation HHS or HHT are to be subjected to the Rules for reinforced securing arrangements.

2. Furthermore, please be informed that these amendments will be included in 2022 edition for Rule and Guidance.

Attachments : Circular 9.140(E) ----- 1 copy. (The End)

Amendments of the Guidance

Guidance for Approval of Manufacturing Process and Type Approval, Etc.
Pt.7 Ships of Special Services
Pt.1 Classification and Surveys

2021. 04

Hull Rule Development Team

- Main Amendments -

(1) 08. 04. 2021 (date of which application for survey is submitted)

◉ Ships with the special feature notation HHS or HHT are to be subjected to the Rules for reinforced securing arrangements.

Present

CHAPTER 2 APPROVAL OF MANUFACTURING PROCESS

Section 25 Securing Devices

2501. 〈omit〉

2502. Type tests

Table 3.25.2 Test Loads and Test Modes

Item No	Description	Required test modes	Recommended minimal in kN		
			SWL	Proof load	Breaking load
6					
7	Twistlock (single)	Shear load	200	300	400
		Tensile load	250	375	500
		Compression load (bottom)	1200	1400	1600
10	Midlock	Shear load	200	300	400
		Tensile load	250	375	500
		Compression load (bottom)	1200	1400	1600
11	Pedestal socket	Pull-out load	250	375	500
		Tangential load	200	300	400
		Compression load	1200	1400	1600

2503. 〈omit〉

Amendment

CHAPTER 2 APPROVAL OF MANUFACTURING PROCESS

Section 25 Securing Devices

2501. 〈same as current〉

2502. Type tests

Table 3.25.2 Test Loads and Test Modes *(2021)*

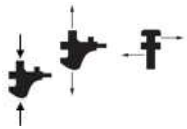
Item No	Description	Required test modes	Recommended minimal in kN		
			SWL	Proof load	Breaking load
6					
7	Twistlock (single)	Shear load	210	315	420
		Tensile load	250	375	500
		Compression load (bottom)	1200	1400	1600
10	Midlock	Shear load	210	315	420
		Tensile load	250	375	500
		Compression load (bottom)	1200	1400	1600
11	Pedestal socket	Pull-out load	250	375	500
		Tangential load	210	315	420
		Compression load	1200	1400	1600

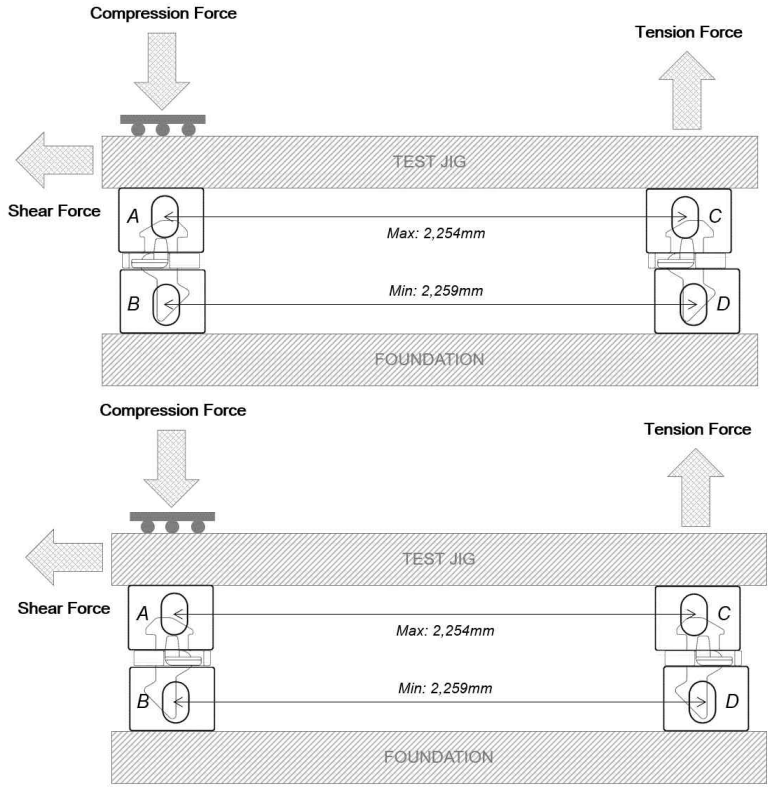
2503. 〈same as current〉

Present	Amendment
〈newly added〉	**2504. Test requirements of additional special feature notation HHS (High Holding Securing)** ***(2021)*** 1. For a ship with **HHS** of additional special feature notation, type tests to determine the breaking or proof loads are to be carried out on at least two samples of each twistlock (manual, semi-automatic, full automatic), midlock and pedestal scoket. The test loads are in accordance with **Table 3.25.4**. 2. Performance of full automatic twistlock is to be tested in both directions for at least three products and the test equipments should be constructed as shown in **Fig. 3.25.2.** Performance of manual and semi-automatic twistlock is to be tested for at least three products and the test equipments should be constructed as shown in **Fig. 3.25.3.** The test loads applied in the function test are to be as given in **Table 3.25.5** 3. In the 2nd step of the function test, the vertical clearance ($\delta v_{\max}$) between the twistlock and the corners of the container is not be more than 15mm, and the value of the vertical clearance measured in the function test can be applied to the evaluation of securing strength. 4. The corner casting material used in the function test should have a mechanical property of RSC480A (or SCW480) or less, and a certificate equivalent to EN 10204 TYPE 3.2 should be submitted for the corner casting material. 5. There should be no permanent deformation other than surface indentation in twistlock and the twistlock should not be detached from the corner casting during the test.
〈newly added〉	**2505. Test requirements of additional special feature notation HHT (High Holding Twistlock)** ***(2021)*** 1. For a ship with **HHT** of additional special feature notation, only the requirements for twistlock and midlock are satisfied among the requirements of **2504**. above.

Present	Amendment
〈newly added〉	

Table 3.25.4 HHS/HHT - Test Loads and Test Modes

Item No	Description	Required test modes		Recommended minimal in kN		
				SWL	Proof load	Breaking load
1	Twistlock (single)		Shear load	210	315	630
			Tensile load	250	375	750
			Compression load (bottom)	1200	1800	2400
2	Midlock		Shear load	210	315	630
			Tensile load	250	375	750
			Compression load (bottom)	1200	1800	2400
3	Pedestal socket		Pull-out load	250	375	750
			Tangential load	210	315	630
			Compression load	1200	1800	2400

Present	Amendment
〈newly added〉	 Fig. 3.25.2 Configuration of HHS test equipments (fully automatic twistlock)

Present	Amendment
〈newly added〉	Table 3.25.5 HHS/HHT - Twistlock function test load

	Shear (kN)	Compression (kN)	Tension (kN)	Duration time (min.)
Step 1	150	350	50	2
Step 2	150	350	250	2
Step 3	150	350	300	2
Step 4	150	350	500	2

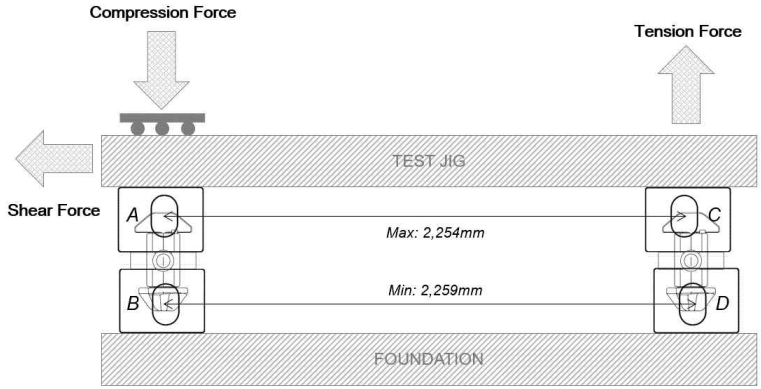


Fig. 3.25.3 Configuration of HHS test equipments (semi-automatic twistlock)

Present	Amendment
〈correction〉 2502. 6 operational test 2503. operation test 2503. 2 operating test Table 3.25.3 operation test 2503. 3 operational test 2503. 3 (1) operation test 2503. 3 (2) operating test 2503. 4 operating test Table operation test	〈correction〉 operational test / operation test / operating test → Function test

Present	Amendment
〈Guidance〉 **Annex 7-2 Guidance for the Container Securing Arrangements** **1. ~ 7. 〈omit〉** **8. Determination and application of forces** (1) ~ (4) 〈omit〉 (5) Resultant forces in an lashed condition (A) 〈omit〉 (B) The resultant forces in the containers are not to exceed the allowable values given in (6). ~ 〈omit〉 δv_{max} : vertical separation of twistlock between corner castings, generally 20 mm. Note 1 In case of fully automatic twistlocks, a functional test report should be submitted to the Society. Where the vertical separation on the test report exceeds 20 mm, the actual value should be applied. 〈omit〉 **9. 〈omit〉**	**〈Guidance〉** **Annex 7-2 Guidance for the Container Securing Arrangements** **1. ~ 7. 〈same as current〉** **8. Determination and application of forces** (1) ~ (4) 〈same as current〉 (5) Resultant forces in an lashed condition (A) 〈same as current〉 (B) 〈same as current〉 δv_{max} : vertical clearance of twistlock between corner castings, generally 20 mm. For a ship with **HHS**(High Holding Securing) or **HHT**(High Holding Twistlock) of additional special feature notation, it should be satisfied with the requirements(δv_{max} =15mm) of **Ch 3, 2504** or **2505** of 「**Guidance for Approval of Manufacturing Process and Type Approval, etc.**」 Also this can be applied to calculation. *(2021)* Note 1 In case of ~ vertical clearance on the ~ 〈same as current〉 〈same as current〉 **9. 〈same as current〉**

Present

〈Guidance〉

〈ANNEX〉

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature 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)	(20) : 〈omit〉 (20-1) : 〈omit〉 (20-2) : 〈omit〉 (20-3) : 〈omit〉 (20-4) : 〈omit〉

Amendment

〈Guidance〉

〈ANNEX〉

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature 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) : 〈same as current〉 (20-1) : 〈same as current〉 (20-2) : 〈same as current〉 (20-3) : 〈same as current〉 (20-4) : 〈same as current〉 (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**

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No : 2021-5-E
Date : 2021. 4. 28

To : All Surveyors and whom it may concern

Subject	9.141 Guidance for Remote Survey
Application	1st May 2021 (Date of which application for survey is submitted)

1. Please be informed that the "Guidance for Remote Survey" has been newly established, and you are kindly requested to apply these amendments on the relevant works.

2. Please note that this guidance will be effective from 1st May 2021 (Date of which application for survey is submitted)

---------- Below ----------

1) To define application, preparation, procedure and notation requirement for Remote Survey.

Attachments : Guidance for Remote Survey ---------- 1 Copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

2021

Guidance for Remote Survey

KR

2021

Guidance for Remote Survey

GC-38-E

KR

APPLICATION OF "GUIDANCE FOR REMOTE SURVEY"

1. Unless expressly specified otherwise, the requirements in the Guidance apply to remote survey for which the application for Classification Survey is submitted to the Society on or after 1 May 2021.

CONTENTS

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 shall 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 shall 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.
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**. ⚓

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.

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 shall 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. ⚓

CHAPTER 3 PREPARATION

Section 1 General

101. General

1. This chapter provides the matters to be prepared on the ship before remote survey.
2. This chapter describes equipment and communication requirements used for remote survey, and qualifications of remote survey supporter.
3. For cyber security purposes, remote survey equipment should be independent of the ship's main communication system.
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 shall 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 shall be discussed with the Society in advance.

202. Quality of Informations and Communications

1. The quality of videos and photos should be satisfactory to the surveyor.
2. Communication for remote survey is based on using the Internet. Communication quality suitable for remote survey shall be maintained without communication problems such as communication interruption or significant time delay.
3. The quality of the remote survey information should be sufficient to judge the condition of the hull structure and machinery equipment.
4. If possible, the date, time and place should mark in the transmitted remote survey information to verify the validation.

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. ⚓

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 shall 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)

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 shall 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
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

Section 3 Remote Survey Supporter

301. General

1. The remote survey supporter shall 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. ⚓

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 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 shall 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. ⚓

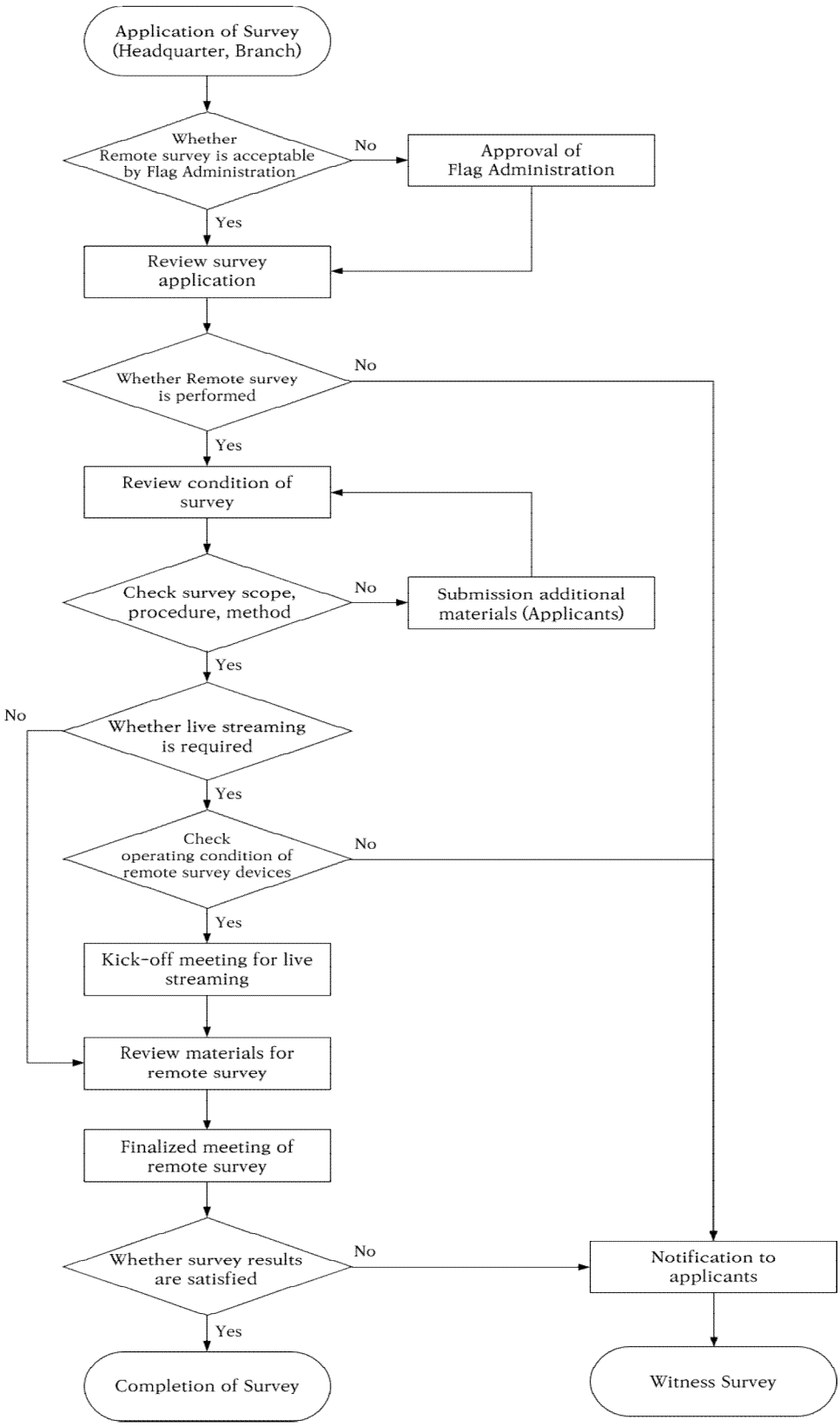

Fig. 1 Flow chart of remote survey procedure

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)

GUIDANCE FOR REMOTE SURVEY

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No : 2021-6-E
Date : 2021. 4. 29

To : All Surveyors and whom it may concern

Subject	**9.142 Notice for Amendments to the KR Technical Rules (Pt.3 Hull Structures / Pt.8 Fire Protection and Fire Extinction)**
Application	**Pt.3 : On or after 1st July 2021 (the contract date for ship construction) or On or after 1st January 2022 (in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction) or On or after 1 July 2024 (delivered)** **Pt.8 : On or after 1st May 2021 (the contract date for ship construction)**

1. Please be informed that the partial amendments have been made to the 'Pt.3 Hull Structures / Pt.8 Fire Protection and Fire Extinction', as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Pt.3 Hull Structures : To introduce the requirements for IACS UI SC156 Rev.2
2) Pt.8 Fire Protection and Fire Extinction : To introduce the requirements for MSC.1/cir1634

2. Furthermore, please be informed that these amendments will be included in 2022 edition for Rule and Guidance.

Attachments : Circular 9.142(E) ----- 1 copy. (The End)

Amendments of the Rules / Guidance

Pt. 3 Ship Structure
Pt. 8 Protection and Fire Extinction

2021. 4

Hull Rule Development Team

- Main Amendments -

1. Application
   - Pt.3 Hull Structure (IACS UI SC 156)
     : On or after 1st July 2021 (the contract date for ship construction)
     or On or after 1st January 2022 (in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction)
     or On or after 1 July 2024 (delivered)

   - Pt.8 Fire Protection and Fire Extinction (MSC.1/cir1634)
     : On or after 1st May 2021 (the contract date for ship construction)

Present	Amendment
⟨Pt.3 Rules⟩	⟨Pt.3 Rules⟩
# CHAPTER 14 WATERTIGHT BULKHEADS	# CHAPTER 14 WATERTIGHT BULKHEADS
## Section 4 Watertight Doors	## Section 4 Watertight Doors
401. ~ 403. ⟨omit⟩	401. ~ 403. ⟨same as current⟩
404. Control	404. Control
1. Watertight doors are categorized as the following (1) to (4) corresponding to its purpose and frequency of use. (1) Normally Closed at sea : Kept closed at sea but may be used if authorised. To be closed again after use. (2) Permanently Closed at sea : The time of opening such doors in port and of closing them before the ship leaves port shall be entered in the log-book. ~~(3) Normally Open at sea : May be left open provided it is always ready to be immediately closed.~~ (4) Used at sea : In regular use, may be left open provided it is ready to be immediately closed.	1. Watertight doors are categorized as the following (1) to (3) corresponding to its purpose and frequency of use. (1) Normally Closed at sea : Kept closed at sea but may be used if authorised. To be closed again after use. (2) Permanently Closed at sea : The time of opening such doors in port and of closing them before the ship leaves port shall be entered in the log-book. Should such doors be accessible during the voyage, they shall be fitted with a device to prevent unauthorised opening. (3) Used at sea : Kept closed. but may be opened during navigation when authorized by the Society to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door shall be immediately closed after use.
2. ~ 4 ⟨omit⟩	2. ~ 4 ⟨same as current⟩
405., 406. ⟨omit⟩	405., 406. ⟨same as current⟩

Present	Amendment
407. Source of power	**407. Source of power**
1. The remote controls, indications and alarms required in **404.** to **406.** are to be operable in the event of main power failure. Failure of the normal power supply of the required alarms shall be indicated by an audible and visual alarm.	**1.** The remote controls, indications and alarms required in **404.** to **406.** are to be operable in the event of main power failure. For passenger ships, failure of the normal power supply of the required alarms shall be indicated by an audible and visual alarm at the central operating console at the navigation bridge. For cargo ships, failure of the normal power supply of the required alarms shall be indicated by an audible and visual alarm at the navigation bridge.
2. 〈omit〉	**2.** 〈same as current〉
3. 〈omit〉	**3.** 〈same as current〉

Present	Amendment

Table 3.14.5 Doors in Internal Watertight Bulkheads and External Watertight Boundaries in Cargo Ships

A. Door in Internal Watertight Bulkheads

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Used	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/13-1.2 and 22.3 MARPOL I/28.3 ICLL66+A.320 1988 Protocol to ICLL66 IBC, and IGC	
	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/13-1.3, 22.3 and 24.4	See Note 1
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/13-1.4, 24.3 and 24.4 SOLAS II-1/13-1.4, 13-1.5, 22.2, 24.3 and 24.4	See Notes 3 + 4
(2) At or above	Used	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/13-1.2 and 22.3 MARPOL I/28.3 ICLL66+A.320 1988 Protocol to ICLL66 IBC, and IGC	See Notes 2 + 5
	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/13-1.3, 22.3 and 24.4	See Note 1
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/13-1.4, 13-1.5, 24.3 and 24.4	See Notes 3 + 4

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of ~~quick acting or~~ single action type.
2. Under **ICLL66**, doors separating a main machinery space from a steering gear compartment may be hinged quick acting type provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.
3. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook, in case of doors in watertight bulkheads subdividing cargo spaces.
4. Doors shall be fitted with a device which prevents unauthorized opening.
5. Under **MARPOL**, hinged watertight doors may be acceptable in watertight bulkhead in the superstructure.
6. Passenger ships which have to comply with **SOLAS II-1/14.2** require an indicator on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.
7. Refer to the Explanatory Note to Regulation **17.1** of **Res.MSC.429(98)** regarding sliding watertight doors with a reduced pressure head and sliding semi-watertight doors.

Present	Amendment

Table 3.14.5 Doors in Internal Watertight Bulkheads and External Watertight Boundaries in Cargo Ships

A. Door in Internal Watertight Bulkheads

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Used	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/10, 13-1.2, 16.2 and 22.3 MARPOL I/28.3 ICLL66+A.320 1988 Protocol to ICLL66 IBC, and IGC	
	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/10, 13-1.3, 16.2, 22.3 and 24.4	See Note 1
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/10, 13-1.4, 16.2, 24.3 and 24.4 SOLAS II-1/10, 13-1.4, 13-1.5, 16.2, 22.2, 24.3 and 24.4	See Notes 3 + 4
(2) At or above	Used	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/10, 13-1.2, 16.2 and 22.3 MARPOL I/28.3 ICLL66+A.320 1988 Protocol to ICLL66 IBC, and IGC	See Notes 2 + 5
	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/10, 13-1.3, 16.2, 22.3 and 24.4	See Note 1
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/10, 13-1.4, 13-1.5, 16.2, 24.3 and 24.4	See Notes 3 + 4

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of single action type.
2. Under **ICLL66**, doors separating a main machinery space from a steering gear compartment may be hinged single action type provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.
3. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook, in case of doors in watertight bulkheads subdividing cargo spaces.
4. Doors shall be fitted with a device which prevents unauthorized opening.
5. Under **MARPOL**, hinged watertight doors may be acceptable in watertight bulkhead in the superstructure.
6. Passenger ships which have to comply with **SOLAS II-1/14.2** require an indicator on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.
7. Refer to the Explanatory Note to Regulation **17.1** of **Res.MSC.429(98)** regarding sliding watertight doors with a reduced pressure head and sliding semi-watertight doors.

Present	Amendment

B. Door in External Watertight Boundaries below equilibrium or intermediate waterplane

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Perm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15.9, 15-1.2, 15-1.3, 15-1.4, 22.6, 22.12 and 24.1	See Notes 2 + 3
(2) At or above	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15-1.2	See Note 1
	Perm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15-1.2 and 15-1.4	See Notes 2 +3

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of ~~quick acting or~~ single action type.
2. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
3. Doors shall be fitted with a device which prevents unauthorized opening.

Present	Amendment

B. Door in External Watertight Boundaries below equilibrium or intermediate waterplane

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Perm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15.9, 15-1.2, 15-1.3, 15-1.4, 22.6, 22.12 and 24.1	See Notes 2 + 3
(2) At or above	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15-1.2	See Note 1
	Perm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/15-1.2 and 15-1.4	See Notes 2 +3

Notes:

Type

- Power operated, sliding or rolling — POS
- Power operated, hinged — POH
- Sliding or Rolling — S
- Hinged — H

1. If hinged, this door shall be of single action type.
2. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
3. Doors shall be fitted with a device which prevents unauthorized opening.

Present	Amendment
⟨Pt.3 Guidance⟩ # CHAPTER 14 WATERTIGHT BULKHEADS ## Section 4 Watertight Doors	⟨Pt.3 Guidance⟩ # CHAPTER 14 WATERTIGHT BULKHEADS ## Section 4 Watertight Doors
401. ~ 403. ⟨omit⟩	401. ~ 403. ⟨same as current⟩
404. Control	404. Control
1. Where it is necessary to operate the power unit for remote operation of the watertight door required by **404.** of the Rules, means to operate the power unit are also to be provided at remote control stations. The operation of such remote control is to be in accordance with **SOLAS II-1/13.8.1** to **13.8.3.** For tankers, where there is a permanent access from a pipe tunnel to the main pump room, the watertight door shall be capable of being manually closed from outside the main pump room entrance in addition to the requirements above.	1. Where it is necessary to operate the power unit for remote operation of the watertight door required by **404.** of the Rules, means to operate the power unit are also to be provided at remote control stations. The operation of such remote control is to be in accordance with **SOLAS II-1/13.8.1** to **13.8.3.** For tankers, where there is a permanent access from a pipe tunnel to the main pump room, in accordance with **SOLAS II-2/4.5.2.4** the watertight door shall be capable of being manually closed from outside the main pump room entrance in addition to the requirements above.
2. With respect to the provisions of **404. 2** of the Rules, for passenger ships, the angle of list at which operation by hand is to be possible is 15 degrees ~~or the maximum angle of heel during intermediate stages of flooding, whichever is the greater~~.	2. With respect to the provisions of **404. 2** of the Rules, for passenger ships, the angle of list at which operation by hand is to be possible is 15 degrees.
3. ~ 5. ⟨omit⟩	3. ~ 5. ⟨same as current⟩
6. With respect to the provisions of **404.** of the Rules, where a watertight door is located adjacent to a fire door, both doors are to be capable of independent operation, remotely if required and from both sides of the each door. Watertight doors may also serve as fire doors but need not be fire-tested notwithstanding the fire resistance of the division in which the watertight doors are fitted. However, such doors fitted above the bulkhead deck on passenger ships shall be tested to the FTP Code in accordance with the division they are fitted. If it is not practicable to ensure self-closing, means of indication on the bridge showing whether these doors are open or closed and a notice stating 'To be kept closed at sea' can be alternative of the self-closing.	6. With respect to the provisions of **404.** of the Rules, where a watertight door is located adjacent to a fire door, both doors are to be capable of independent operation, remotely if required and from both sides of the each door. Watertight doors may also serve as fire doors but need not be fire-tested if fitted on cargo ships or if fitted below the bulkhead deck on passenger ships. However, such doors fitted above the bulkhead deck on passenger ships shall be tested to the FTP Code in accordance with the fire rating of the division they are fitted in. If it is not practicable to ensure self-closing, means of indication on the bridge showing whether these doors are open or closed and a notice stating 'To be kept closed at sea' can be alternative of the self-closing.

Present	Amendment
7. ~ 9. 〈omit〉	**7. ~ 9. 〈same as current〉**
	10. Locking device for closing apparatus itself or a box of operation device by the key is acceptable as "a device which prevents unauthorized opening" required in **408. 2** of the Rules.
406. Alarm	**406. Alarm**
1. 〈omit〉	**1. 〈same as current〉**
2. 〈omit〉	**2. 〈same as current〉**
3. All watertight doors, including sliding doors, operated by hydraulic door actuators, either a central hydraulic unit or independent for each door is to be provided with a low fluid level alarm or low gas pressure alarm, as applicable or some other means of monitoring loss of stored energy in the hydraulic accumulators. This alarm is to be both audible and visible and shall be located on the central operating console at the navigation bridge.	**3.** All watertight doors, including sliding doors, operated by hydraulic door actuators, either a central hydraulic unit or an independent hydraulic unit for each door is to be provided with a low fluid level alarm or low gas pressure alarm, as applicable or some other means of monitoring loss of stored energy in the hydraulic accumulators. This alarm is to be both audible and visible and shall be located on the central operating console at the navigation bridge. For passenger ships this alarm is to be both audible and visible and shall be located on the central operating console at the navigation bridge. For cargo ships, this alarm shall be both audible and visible and should be located at the navigation bridge.
407. 〈omit〉	**407. 〈same as current〉**
~~**408. Notice**~~	
~~Locking device for closing apparatus itself or a box of operation device by the key is acceptable as "a device which prevents unauthorized opening" required in **408. 2** of the Rules.~~	
409. 〈omit〉	**409. 〈same as current〉**
412. Test	**412. Test**
1. Doors which are not immersed by an equilibrium or intermediate waterplane but become intermittently immersed at angles of heel in the required range of positive stability beyond the equilibrium position are to be hose tested.	**1.** Doors above freeboard or bulkhead deck, which are not immersed by an equilibrium or intermediate waterplane but become intermittently immersed at angles of heel in the required range of positive stability beyond the equilibrium position are to be hose tested.
2. Pressure Testing	**2.** Pressure Testing
(1) 〈omit〉	(1) 〈same as current〉
(2) The following acceptable leakage criteria should apply ~~to~~	(2) The following acceptable leakage criteria should apply
- Doors with gaskets No leakage	- Doors with gaskets No leakage
- Doors with metallic sealing Max leakage 1 liter/min.	- Doors with metallic sealing Max leakage 1 liter/min.
3. 〈omit〉	**3. 〈same as current〉**

Present	Amendment

Table 3.14.3 Doors in Internal Watertight Bulkheads and External Watertight Boundaries in Passenger Ships

A. Door in Internal Watertight Bulkheads

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Norm. Closed	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/13.4, 13.5.1, 13.5.2,13.6, 13.7.1,13.8.1, 13.8.2, 22.1, 22.3 and 22.4	Certain doors may be left open, see SOLAS II-1/22.3 and IMO MSC. 1/Circ.1564
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/13.9.1, 13.9.2, 14.2, 22.2 and 22.5	See Notes 3 + 4 + 6
(2) At or above	Norm. Closed	POS, POH	Yes	Yes	Yes (local)	No	SOLAS II-1/17.1 and 22.3	See Note 7
		S, H	No	Yes	Yes (remote)	Yes	SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.6 and 23.8	See Note 1
		S, H	No	Yes	Yes (remote)	Yes	SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 22.7 and 23.3 to 23.5	Doors giving access to below Ro-Ro Deck
	Perm. Closed	S, H	No	Yes	Yes (remote)	Yes		See Notes 1 + 3 + 4

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of ~~quick acting or~~ single action type.
2. Under ICLL66, doors separating a main machinery space from a steering gear compartment may be hinged quick acting type provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.
3. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook, in case of doors in watertight bulkheads subdividing cargo spaces.
4. Doors shall be fitted with a device which prevents unauthorized opening.
5. Under MARPOL, hinged watertight doors may be acceptable in watertight bulkhead in the superstructure.
6. Passenger ships which have to comply with SOLAS II-1/14.2 require an indicator on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.
7. Refer to the Explanatory Note to Regulation 17.1 of Res.MSC.429(98) regarding sliding watertight doors with a reduced pressure head and sliding semi-watertight doors.

Present	Amendment

Table 3.14.3 Doors in Internal Watertight Bulkheads and External Watertight Boundaries in Passenger Ships

A. Door in Internal Watertight Bulkheads

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Used	POS	Yes	Yes	Yes (local)	No	SOLAS II-1/10, 13.4, 13.5.1, 13.5.2,13.6, 13.7.1,13.8.1, 13.8.2, 16.2, 22.1, 22.3 and 22.4	For doors that are used, see SOLAS II-1/22.3 and IMO MSC. 1/Circ.1564
	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/10, 13.9.1, 13.9.2, 14.2, 16.2, 22.2 and 22.5	See Notes 3 + 4 + 6
(2) At or above	Used	POS, POH	Yes	Yes	Yes (local)	No	SOLAS II-1/10, 16.2, 17.1 and 22.3	See Note 7
		S, H	No	Yes	No	Yes		See Note 1
		S, H	No	Yes	Yes (remote)	Yes	SOLAS II-1/17-1.1.1, 17-1.1.2, 17-1.1.3, 23.6 and 23.8	Doors giving access to below Ro-Ro Deck
	Perm. Closed	S, H	No	Yes	Yes (remote)	Yes	SOLAS II-1/17-1.1.1, 17-1.1.2, 17-1.1.3, 22.7 and 23.3 to 23.5	See Notes 1 + 3 + 4

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of single action type.
2. Under ICLL66, doors separating a main machinery space from a steering gear compartment may be hinged single action type provided the lower sill of such doors is above the Summer Load Line and the doors remain closed at sea whilst not in use.
3. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook, in case of doors in water-tight bulkheads subdividing cargo spaces.
4. Doors shall be fitted with a device which prevents unauthorized opening.
5. Under MARPOL, hinged watertight doors may be acceptable in watertight bulkhead in the superstructure.
6. Passenger ships which have to comply with SOLAS II-1/14.2 require an indicator on the navigation bridge to show automatically when each door is closed and all door fastenings are secured.
7. Refer to the Explanatory Note to Regulation 17.1 of Res.MSC.429(98) regarding sliding watertight doors with a reduced pressure head and sliding semi-watertight doors.

Present	Amendment

B. Door in External Watertight Boundaries below equilibrium or intermediate waterplane

Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/15.9, 22.6 and 22.12	See Notes 2 + 3
(2) At or above	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/17.1 and 22.3 MSC.Circ.541	See Note 1
		S, H	No	Yes	Yes (Remote)	Yes	SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.6 and 23.8	Doors giving access to below Ro-Ro Deck
	Perm. Closed	S, H	No	Yes	Yes (Remote)	Yes	SOLAS II-1/17-1.1, 17-1.2, 17-1.3, 23.3 and 23.5	See Notes 2 + 3

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of ~~quick acting or~~ single action type.
2. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
3. Doors shall be fitted with a device which prevents unauthorized opening.

Present	Amendment

B. Door in External Watertight Boundaries below equilibrium or intermediate waterplane

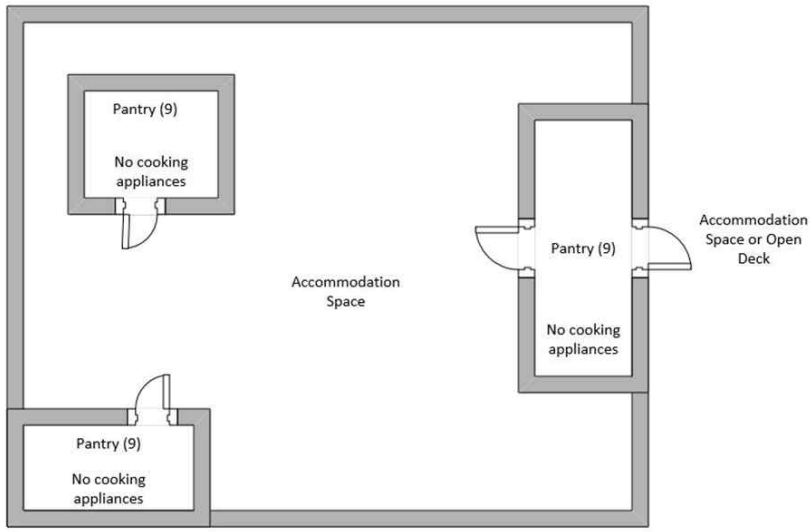
Position relative to bulkhead or freeboard deck	1. Frequency of Use while at sea	2. Type	3. Remote Closure	4. Remote Indication	5. Audible or Visual Alarm	6. Notice	7. Regulation	8. Comments
(1) Below	Perm. Closed	S, H	No	No	No	Yes	SOLAS II-1/15.9, 22.6 and 22.12	See Notes 2 + 3
(2) At or above	Norm. Closed	S, H	No	Yes	No	Yes	SOLAS II-1/17.1 and 22.3 MSC.Circ.541	See Note 1
		S, H	No	Yes	Yes (Remote)	Yes	SOLAS II-1/17-1.1.1, 17-1.1.2, 17-1.3, 23.6 and 23.8	Doors giving access to below Ro-Ro Deck
	Perm. Closed	S, H	No	Yes	Yes (Remote)	Yes	SOLAS II-1/17-1.1.1, 17-1.2, 17-1.3, 23.3 and 23.5	See Notes 2 + 3

Notes:

Type

- Power operated, sliding or rolling POS
- Power operated, hinged POH
- Sliding or Rolling S
- Hinged H

1. If hinged, this door shall be of single action type.
2. The time of opening such doors in port and closing them before the ship leaves port shall be entered in the logbook.
3. Doors shall be fitted with a device which prevents unauthorized opening.

Present	Amendment
⟨Pt.8 Guidance⟩ **CHAPTER 7 CONTAINMENT OF FIRE** **Section 1 Thermal and Structural Boundaries** 102. Passenger ships 1. ~ 5. ⟨omitted⟩ ⟨newly added⟩	⟨Pt.8 Guidance⟩ **CHAPTER 7 CONTAINMENT OF FIRE** **Section 1 Thermal and Structural Boundaries** 102. Passenger ships 1. ~ 5. ⟨same as the present⟩ 6. In applying **102.3** (2) (B) ⑨ of the Rules, "Isolated pantries containing no cooking appliances in accommodation spaces" are pantries enclosed in an accommodation space and are only accessible from accommodation spaces and/or open deck. For the purpose of this categorization, "accommodation space" is as defined in **103. 1** of the Rules. These pantries should not have communicating openings to spaces other than accommodation spaces, such as "main galley" in category ⑫ (see **Fig 8.7.1** of the Guidance).  Fig 8.7.1 Example of isolated pantries containing no cooking appliances in accommodation spaces

CIRCULAR

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Person in charge: PARK Jaesung

No : 2021-7-E
Date : 2021. 5. 3

To : All Surveyors and whom it may concern

Subject	**9.143 Notice for Amendments to KR Technical Classification Rules (Type approval requirements for cable passing through watertight bulkheads and deck newly added etc.)**
Application	**On or after 1st July 2021 (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 "Guidance for Approval of Manufacturing Process and Type Approval, Etc." as below and you are kindly requested to apply these amendments on the relevant works.

= Below =

1) Adding additional requirements for In-water Survey in lieu of Socking Survey at Special Survey
2) Updating requirements of Remote Survey
   - Due to the establishment of Guidance of Remote Survey
3) Follow-up measures for IACS UR Z23(Rev.7, Oct 2020), etc.
   - Adding type approval requirements for cables passing through watertight bulkheads and deck etc.

2. Furthermore, please be informed that these amendments will be included in 2022 edition on KR Classification Technical Rules which will be published in the first half of 2022.

Attachments:
1) Amendments of Rules/Guidance for the Classification of Steel Ships Pt 1. --- 1 copy.
2) Amendments of Guidance for Approval of Manufacturing Process and Type Approval, Etc. --- 1 copy. (The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

May 2021

- Main Amendments -

(1) Effective date : 1 July 2021 (Date of which the application for survey is submitted)

◉ Adding additional requirements for In-water Survey in lieu of Docking Survey at Special Survey

◉ Updating requirements of Remote Survey
- Due to the establishment of 「Guidance of Remote Survey」

(1) Effective date : 1 July 2021

(Date of which application for survey is submitted)

Present	Amendment
〈Rule〉 **CHAPTER 2 CLASSIFICATION** **Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)** **403. Requirements of survey *(2018)*** **1.** The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, ~ (1) The vessel is to be placed in a drydock or upon a slipway and all items of **603.** are to be examined. However ships subject to the "Extended Dry-docking Interval System" specified in **605.**, this examination can be carried out in accordance with **605.** 〈newly added〉	〈Rule〉 **CHAPTER 2 CLASSIFICATION** **Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)** **403. Requirements of survey *(2018)*** **1.** The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, ~ (1) The vessel is to be placed in a drydock or upon a slipway and all items of **603.** are to be examined. However ships subject to the "Extended Dry-docking Interval System" specified in **605.**, this examination can be carried out in accordance with **605.** 【See Guidance】 *(2021)*
〈Guidance〉 **CHAPTER 2 CLASSIFICATION** **Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)** **403. Requirements of survey *(2018)*** **1. ~ 2.** 〈omitted〉 〈newly added〉 **3.** ~ 10. 〈omitted〉	〈Guidance〉 **CHAPTER 2 CLASSIFICATION** **Section 4 Special Survey (Hull, Equipment and Fire-extinguishing Appliances)** **403. Requirements of survey *(2018)*** **1. ~ 2.** 〈same as the current Guidances〉 **3.** In application to 403. 1 (1) of the Rules, in case that all of the following conditions are satisfied, it may be replaced by In-water Survey in lieu of Docking Survey. 【See Rules】 *(2021)* (1) Approval by the relevant flag state (2) In case previous bottom survey between Special Surveys was carried out at dry dock and the next scheduled bottom survey between Special Surveys to be carried out at dry dock. (3) Completion of the entire scope of Special Survey including internal examination of spaces, thickness measurement, gauging of chain cables and repairs when defects are found. Note: However, the following ships are to be excluded. 1) Ships which Docking Survey is to be carried every year. 2) General dry cargo ships, Liquefied gas carriers and ships subject to the enhanced survey programme(ESP) 3) Ships subject to Korean Ship Safety Act **4.** ~~**3.**~~ ~ **11.** ~~**10.**~~ 〈same as the current Guidances〉

Present	Amendments
Section 11 Remote Survey *(2019)*	**Section 11 Remote Survey *(2019)***
1101. Remote Survey	**1101. Remote Survey *(2021)***
1. Application	**1. Application *(2021)***
(1) At the request of the Owner, Remote Survey may be applied to the ships engaged on international voyages. And its application may be restricted depending on flag state administration, purpose and condition of the ships. Especially the ships subject to Korean Ship Safety Act are not applied.	(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**. ~~At the request of the Owner, Remote Survey may be applied to the ships engaged on international voyages.~~ But ~~And~~ its application may be restricted depending on ~~flag state administration,~~ purpose and condition of the ships. ~~Especially the ships subject to Korean Ship Safety Act are not applied.~~
(2) Passenger ships, submersibles, nuclear ships, hydrofoils, air cushion vehicles and high speed crafts are to be excluded from Remote Survey.	(2) Especially the ships subject to Korean Ship Safety Act shall be approved by the Minister of the Ministry of Oceans and Fisheries(MOF), ~~Passenger ships, submersibles, nuclear ships, hydrofoils, air cushion vehicles and high speed crafts are to be excluded from Remote Survey.~~
(3) 〈omitted〉	(2) ~~(3)~~ 〈same as the current Rules〉
2. Type of Remote Survey	**~~2. Type of Remote Survey~~**
Remote Survey is available for the following items and additional Remote Survey is possible if accepted by the Society. (1) Continuous Machinery Survey (2) Three(3) month extension of Shaft Survey (3) Three(3) month extension of Boiler Survey (4) Minor Damage Survey (5) Outstanding COC(Condition of Class) or confirming the repairing deficiencies or corrective actions.	~~Remote Survey is available for the following items and additional Remote Survey is possible if accepted by the Society.~~ ~~(1) Continuous Machinery Survey~~ ~~(2) Three(3) month extension of Shaft Survey~~ ~~(3) Three(3) month extension of Boiler Survey~~ ~~(4) Minor Damage Survey~~ ~~(5) Outstanding COC(Condition of Class) or confirming the repairing deficiencies or corrective actions.~~
3. Condition of Remote Survey	**2. ~~3.~~ Condition of Remote Survey *(2021)***
(1) In relation to the “Minor Damage Survey” of 2., (4) above, identified structural damages or statutory items may require authorization from flag state administration if Surveyor will not attend. 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) ~~In relation to the “Minor Damage Survey” of 2., (4) above, identified structural damages or statutory items may require authorization from flag state administration if Surveyor will not attend.~~ 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) In relation to the “Outstanding COC(Conditions of Class) or confirming the repairing deficiencies or corrective actions” of 2., (5) above, the some items related to Statutory shall be authorized by flag state administration.	~~(2) In relation to the “Outstanding COC(Conditions of Class) or confirming the repairing deficiencies or corrective actions” of 2., (5) above, the some items related to Statutory shall be authorized by flag state administration.~~
(3) ~ (5) 〈omitted〉	(2) ~~(3)~~ ~ (4) ~~(5)~~ 〈same as the current Rules〉

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

(Part 1 Classification and Surveys)

May 2021

- Main Amendments -

(1) Effective date : 1 July. 2021 (Date of which the application for survey is submitted)

◉ Adding “Ice II“ & “Remote“ Notation (Additional Special Feature Notations)

(1) Effective date : 1 July 2021

(Date of which application for survey is submitted)

Present

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

〈omitted〉

(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〉	
IC	to ships where IC Classification of Ice Strengthening specified in **Ch 1** of the **Guidance for Ships for Navigation in Ice** is applied.
ID	to ships where ID Classification of Ice Strengthening specified in **Ch 1** of the **Guidance for Ships for Navigation in Ice** is applied.
〈newly added〉	
〈omitted〉	
ISPM(0), ISPM(1), ISPM(2), ISPM(3) *(2020)*	to ships operating the integrated software process specified in the **Guidance for Integrated software Process Management**
〈newly added〉	

Amendments

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

〈omitted〉

(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 the current Guidances〉	
IC	to ships where IC Classification of Ice Strengthening specified in **Ch 1** of the **Guidance for Ships for Navigation in Ice** is applied.
ID	to ships where ID Classification of Ice Strengthening specified in **Ch 1** of the **Guidance for Ships for Navigation in Ice** is applied.
Ice II *(2021)*	to ships where II Classification of Ice Strengthening specified in **Ch 1** of the **Guidance for Ships for Navigation in Ice** is applied.
〈same as the current Guidances〉	
ISPM(0), ISPM(1), ISPM(2), ISPM(3) *(2020)*	to ships operating the integrated software process specified in the **Guidance for Integrated software Process Management**
Remote *(2021)*	to ships comply with the requirement specified in Ch 4 of the **Guidances for Remote Survey**

(2) Effective date : 1 July. 2021 (The contract date for ship construction)

◉ Follow-up measures for IACS UR Z23(Rev.7 Oct 2020)

- Cable penetration sealing system passing through watertight bulkheads and decks

(2) Effective date : 1 July 2021

(The contract date for ship construction)

Present

Annex 1-12 Hull Survey for Classification Survey during Construction

〈omitted〉

Appendix 1-12-3 Ship Construction File Form Example

Ship Construction File

〈omitted〉

4. Details of equipment forming part of the watertight and weather tight integrity of the ship(e.g. overboard discharges, air pipes, ventilators 〈newly added〉)

List of Drawings or Copies of Certificates

Serial No.	DWG/Cert. No.	Title of DWG/Certificate	Box No.

(Note: Details(drawings, copies of certificates, etc.) of the relevant equipments are attached, or kept at specified box)

〈newly added〉

〈herein after, omitted〉

Amendments

Annex 1-12 Hull Survey for Classification Survey during Construction

〈same as the current Guidances〉

Appendix 1-12-3 Ship Construction File Form Example

Ship Construction File

〈same as the current Guidances〉

4. Details of equipment forming part of the watertight and weather tight integrity of the ship(e.g. overboard discharges, air pipes, ventilators, cable transit sealing systems) *(2021)*

1) List of Drawings or Copies of Certificates

Serial No.	DWG/Cert. No.	Title of DWG/Certificate	Box No.

(Note: Details(drawings, copies of certificates, etc.) of the relevant equipments are attached, or kept at specified box)

2). A cable transit sealing systems register (refer to Appendix 1-12-5) *(2021)*

〈herein after, same as the current Guidances〉

Amendments of the Guidance for Approval of Manufacturing Process and Type Approval, Etc.

May 2021

- Main Amendments -

(1) Effective date : 1 July 2021 (The contract date for ship construction)

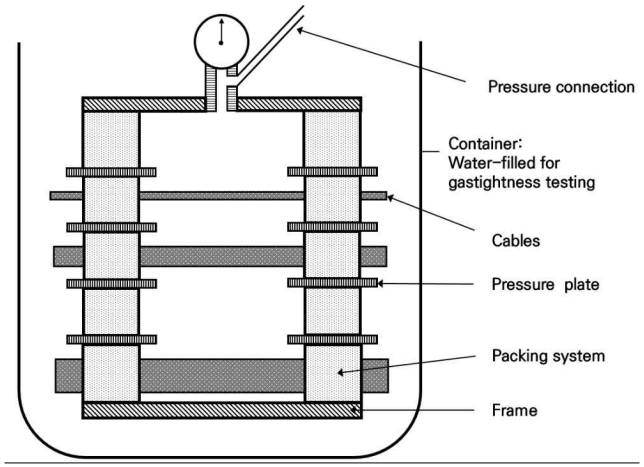
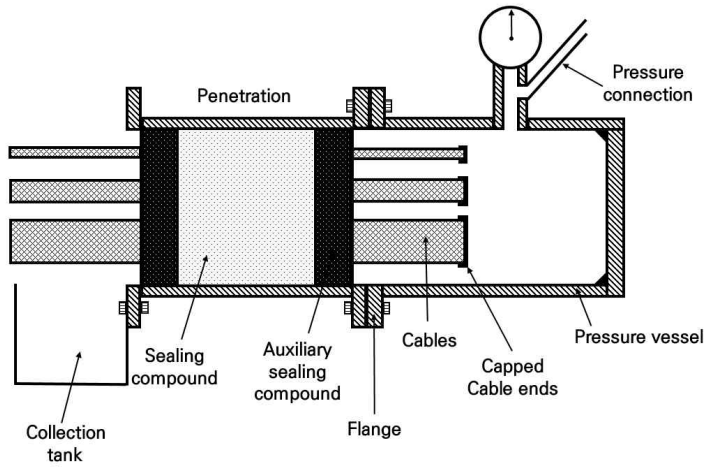
◉ Follow-up measures for IACS UR Z23(Rev.7 Oct 2020)

- Type approval requirements for cables passing through watertight bulkheads and decks is newly added.

(1) Effective date : 1 July 2021

(The contract date for ship construction)

Present	Amendment
# CHAPTER 3 TYPE APPROVAL Section 1 ~ Section 37 〈omitted〉 〈newly added〉	# CHAPTER 3 TYPE APPROVAL Section 1 ~ Section 37 〈same as the current Guidances〉 **Section 38 Cable Transits through watertight bulkheads and decks *(2021)*** **3801. Application** 1. The requirements in this Section apply to tests and inspection for the type approval of cable transits which cables pass through watertight bulkheads and decks in accordance with the requirements in **Pt 6, Ch 1, 508. 1** of the Rules. **3802. Data to be submitted** The following reference data are to be submitted to the Society in addition to those specified in 102. (1) Product details and scope of service (2) Detail drawing of penetration and test layout including type and cross-section of the cables, distance between cables, distance between cable and the sleeve, thickness and length of the sleeve etc. (3) In case of compound system, the mixture ratio of the main composition (4) Work and maintenance manual **3803. Type tests** (1) cable selection The transit(s) is to be tested incorporating a range of different type of cables and is to be provided with an assembly which represents a practical situation which may be found on ships.

Present	Amendment
〈newly added〉	(2) Preparation of the specimens Specimens are prepared in accordance with the manufacturer's installation and work instructions and tests shall be conducted with specimens of minimum and maximum fill for each minimum and maximum size based on the cross-sectional area. The arrangement of watertightness and gastightness tests is to be in accordance with Figs. 1 and 2.  Fig. 1 Arrangement for testing the watertightness and gastightness of a packing system  Fig. 2 Arrangement for testing watertightness and gastightness of a sealing compound system

Present	Amendment
〈newly added〉	(3) Watertightness testing Cable transits through watertight bulkheads or decks are to be so constructed that they are capable of withstanding a hydraulic test pressure conforming to the following conditions. Step 1 : the specimen shall be tested for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 1.0 bar, No leaks are to be allowed during this test. Step 2 : the specimen shall be tested for an additional 30 minutes against the design pressure (minimum 2.5 bar) of the installation site. The quantity of water leakage shall not exceed 1 liter. A hydrostatic pressure is to be not less than 1.5 times the nominal pressure. (4) Airtightness test If gastightness is required for the cable transits, it is to be so constructed that they are cable of withstanding for a period of at least 30 minutes under hydraulic pressure equal to the test pressure minimum 30 mbar. No leaks are to be allowed during this test and air is to be allowed as the test medium.

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Person in charge : Choi Dae-gon

No : 2021-8-E
Date : 2021.05.28

To : All Surveyors and who it may concern

Subject	**9.144 Notice for Amendments to the KR Technical Rules (Guidance for Approval of Manufacturing Process and Type Approval, Etc., Anti-corrosive Paints)**
Application	**01 June 2021 (the date of application for certification of products)**

1. Please be informed that the partial amendments have been made to the "Guidance for Approval of Manufacturing Process and Type Approval, Etc.", as below and you are kindly requested to apply the amendments on the relevant works.

- Below –

(1) Updating test methods and acceptance criteria for Type Approval of Anti-corrosive Paints

2. Furthermore, please be informed that the amendments will be included in 2022 edition for Rules and Guidance on KR Classification Technical Rules which will be published in the first half of 2022.

Attachments : Amendment for Guidance for Approval of Manufacturing Process and Type Approval, Etc. --- 1 copy. (The end)

AMENDMENTS FOR OTHER GUIDANCE

(Guidance for Approval of Manufacturing Process and Type Approval, Etc.)

2021.05.

Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 June 2021 (the date of application for certification of products)

◉ To reflect Request for Establishment/Revision of Classification Technical Rules(To reflect ISO)

Present	Amendment
CHAPTER 1 ~ CHAPTER 2 <Omitted>	**CHAPTER 1 ~ CHAPTER 2** <Same as the present Guidance>
CHAPTER 3 TYPE APPROVAL	**CHAPTER 3 TYPE APPROVAL**
Section 1 ~ Section 2 <Omitted>	**Section 1 ~ Section 2** <Same as the present Guidance>
Section 3-1 Anti-corrosive Paints	**Section 3-1 Anti-corrosive Paints**
301. Application The requirements in this Section apply to tests and inspections for the type approval of primer coating or marine heavy duty coating upon request.	**301. Application** **1.** The requirements in this Section apply to tests and inspections for the type approval of primer coating or marine heavy duty coating upon request. **2.** If anti-corrosive paints are used in the area where cathodic protection is applied, additional tests may be required to evaluate the effect of cathodic protection. *(2021)* **3.** The requirements in this Section are not applicable to the type approval of **Section 30 Protective Coating Systems for Ballast Tanks** and **Section 33 Protective Coating Systems for Cargo Oil Tanks**. *(2021)*
302. Data to be submitted The following reference data are to be submitted to the Society in addition to those specified in **102.** (1) In-house inspection department, claim handling organization and inspection facilities (2) Reference materials and data relating to the manufacturing process and quality control system: Blending details of key components (including the content of aluminium), matters relating to mixing and storage procedures. (3) Matters relating to packaging, packing and shipment. (4) Instructions for the application of the paint for which brand approval is made: Surface preparation, required thickness of coat, painting procedure, and matters relating to drying process and multiple coatings. (5) In-house test results and real ship service experience of the paint brand for which approval is made. Approval certificates issued by other authorities, if any. (6) Matters relating to falling ball impact test and explosion test.	**302. Data to be submitted** The following reference data are to be submitted to the Society in addition to those specified in **102.** *(2021)* (1) Compositions for every brand of products, including: (a) Product name and identification mark and/or number (b) Materials, components and composition of the coating system, colours (c) Material Safety Data Sheet (2) Manufacturer's instructions and recommendations for use (including Surface preparations, Mixing and agitation, Number and nominal dry film thickness of coat, Method of application, Drying and overcoating method, Limitations and Storage, etc.) (3) Marking of the products including Manufacturer's name or equivalent, Type designation, Lot No. and date of manufacture, Storage condition

Present	Amendment
303. Type tests	**303. Type tests**
1. Test coupons	**1. Test coupons**
(1) ~ (2) <Omitted>	(1) ~ (2) <Same as the present Guidance>
(3) **Surface treatment, primer paint and coating** The surface treatment and painting are to be carried out in accordance with the instruction submitted under the provisions **302.** (4). The film thickness of paint is to be of the minimum recommended by the manufacturer.	(3) **Surface treatment, primer paint and coating** The surface treatment and painting are to be carried out in accordance with the instruction submitted under the provisions **302.** (2). The film thickness of paint is to be of the minimum recommended by the manufacturer.
2. Test details and acceptance criteria	**2. Test details and acceptance criteria**
(1) Approval test for the paint of the brand under approval application are to be carried out in the presence of the Surveyor at the manufacturing plant and approval test items are to be as given in **Table 3.3.1.**	(1) Approval test for the paint of the brand under approval application are to be carried out in the presence of the Surveyor at the manufacturing plant and approval test items are to be as given in **Table 3.3.1.**
(2) The testing procedures and acceptance criteria are to be as given in **Table 3.3.1**. However, in case where these requirements are found impracticable due to special type of paints, separate considerations may be given.	(2) The testing procedures and acceptance criteria are to be as given in **Table 3.3.1**. However, in case where these requirements are found impracticable due to special type of paints, separate considerations may be given.
~~(3) Gasoline immersion test, salt water/gasoline immersion test and salt water/crude oil immersion test may not be required for the paint used for sea water ballast tanks.~~	(3) <Deleted>
(4) During execution of the corrosion resistance tests, the Surveyor may attend and make investigation necessary for verification.	(3) During execution of the corrosion resistance tests, the Surveyor may attend and make investigation necessary for verification.
304. <Omitted>	**304. <Same as the present Guidance>**

<Present>

Table 3.3.1 Test details and acceptance criteria of anti-corrosive paints (continued)

Kind	Test item	Testing procedures	acceptance criteria
Corrosion resistance test	Hot water immersion test	Fill a container with tap water and heat it to a temperature 80 ± 5 °C and keep the test coupon immersed in it continuously for 168 hours and then take it out and examine the condition of the paint. If there is no abnormality, the test coupon is to be examined after being left for 2 hours. The film thicknesses of paint before and after immersion are to be measured with colour photographs taken.	The acceptance criteria for the corrosion resistance tests are to be as given in **Table 3.3.2.**
	Alternate salt water immersion test	After immersing in a 3 % salt water solution under room temperature for a period of 168 hours (7 days), the test coupon is to be taken out and left in air for 168 hours. Taking this as one cycle, the test coupon is to be subjected to 2 such cycles consecutively. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken. *(2021)*	
	Alternate gasoline/salt water immersion test	Two tanks respectively filled with 3 % salt water solution and gasoline are to be prepared and the test coupon is to be immersed in either of them for a period of 168 hours (7 days) and then taken out and immersed in the other tank for another 168 hours. Considering this as one cycle, the process is to be repeated for 2 cycles. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken.	
	Alternate salt water/crude oil immersion test	Tests similar to gasoline/salt water immersion test are to be carried out with 3 % salt water solution and crude oil. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken. *(2021)*	
	Salt water spray test (KS D 9502 or the equivalent International Standards)	Continuous test with salt water spray is to be carried out for a period of 360 hours or more. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken.	
Real ship tests		(A) The paints, which have passed the paint film performance tests successfully, are to be subjected to real ship tests. For the real ship and specific painting areas, the manufacturer may give instructions after obtaining approval of the Society. The painting procedures and surface treatment are to be as instructed by the document under the provision **302.** (4), and after application of the paints, visual inspection of paint coat, taking color photographs are to be carried out in the presence of the Surveyor. In ships having a post-painting period of two years, visual inspection, and taking of colour photographs are to be carried out at time of drydocking in the presence of the Surveyor. (B) If the paint has been applied to a ship which has already been put into service 2 years or more, this paint may be regarded as test sample in (A). (C) The primer coating does not require real ship tests.	Standard blistered or peeled off area of the paint coat is to be 1 % or less of the total painted area.

<Amendment>

Table 3.3.1 Test details and acceptance criteria of anti-corrosive paints (continued)

Kind	Test item	Testing procedures	acceptance criteria
Corrosion resistance test	Hot water immersion test	Fill a container with tap water and heat it to a temperature 80 ± 5 °C and keep the test coupon immersed in it continuously for 168 hours and then take it out and examine the condition of the paint. If there is no abnormality, the test coupon is to be examined after being left for 2 hours. The film thicknesses of paint before and after immersion are to be measured with colour photographs taken.	The acceptance criteria for the corrosion resistance tests are to be as given in **Table 3.3.2.**
	Alternate salt water immersion test	After immersing in a 3 % salt water solution under room temperature for a period of 168 hours (7 days), the test coupon is to be taken out and left in air for 168 hours. Taking this as one cycle, the test coupon is to be subjected to 2 such cycles consecutively. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken. *(2021)*	
	Alternate gasoline/salt water immersion test	Two tanks respectively filled with 3 % salt water solution and gasoline are to be prepared and the test coupon is to be immersed in either of them for a period of 168 hours (7 days) and then taken out and immersed in the other tank for another 168 hours. Considering this as one cycle, the process is to be repeated for 2 cycles. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken.	
	Alternate salt water/crude oil immersion test	Tests similar to gasoline/salt water immersion test are to be carried out with 3 % salt water solution and crude oil. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken. *(2021)*	
	Salt water spray test (KS D 9502 or the equivalent International Standards)	Continuous test with salt water spray is to be carried out for a period of 360 hours or more. Colour photographs and paint film thickness measurements before immersion and on completion of the test are to be taken.	
Real ship tests		(A) The paints, which have passed the paint film performance tests successfully, are to be subjected to real ship tests. For the real ship and specific painting areas, the manufacturer may give instructions after obtaining approval of the Society. The painting procedures and surface treatment are to be as instructed by the document under the provision **302.** (2), and after application of the paints, visual inspection of paint coat, taking color photographs are to be carried out in the presence of the Surveyor. In ships having a post-painting period of two years, visual inspection, and taking of colour photographs are to be carried out at time of drydocking in the presence of the Surveyor. (B) If the paint has been applied to a ship which has already been put into service 2 years or more, this paint may be regarded as test sample in (A). (C) The primer coating does not require real ship tests(Only for products that have already been approved). *(2021)*	Standard blistered or peeled off area of the paint coat is to be 1 % or less of the total painted area.

NOTES: *(2021)*

(1) If real ship tests are not carried out, instead of this **Table 3.3.1**, **Table 3.3.3** and **Table 3.3.4** are to be applied as the testing procedure and acceptance criteria for anti-corrosive paints. In this case, the following requirements are to be satisfied.

(a) Three test specimens for each test item specified in **Table 3.3.3** and **Table 3.3.4** are to be prepared. The dimensions of test specimens not specified in **Table 3.3.3** and **Table 3.3.4** are to be 150 mm × 75 mm × 3 mm. Appropriate protection are to be applied to the edges and the backs of the specimens.

(b) Three specimens are to be tested for each test and two of the three test specimens are to be in compliance with the requirements specified in **Table 3.3.3** and **Table 3.3.4**.

<New>_Table 3.3.3 & Table 3.3.4

Table 3.3.3 Test details and acceptance criteria for the peel resistance of anti-corrosive paints *(2021)*

Test item	Testing procedures	Acceptance criteria	Others
Cross-cut test	**ISO 2409:2020**	Classification 0 to 2	The test should be carried out only if the dry film thickness of the paint system is less than or equal to 250 µm.
Pull-off test for adhesion	**ISO 4624:2016**	1) Minimum pull-off value of 2.5 MPa for each measurement 2) 0 % adhesive failure between steel/metalized steel respectively and the first coat (unless pull-off values are at least 5 MPa)	The test should be carried out only if the dry film thickness of the paint system is greater than 250 µm.
Cupping test	(1) **ISO 1520:2006** (2) Dimension of test specimen : 100 mm × 90 mm × 0.8 mm (3) Each test specimen is to be tested using 6 mm depth of indentation.	Peeling-off area is to be within 1.0 cm^2.	
Falling ball impact test	(1) Dimension of test specimen : 200 mm × 100 mm × 4 mm (2) A mild steel test specimen coated on one side is to be fixed on a steel base with the painted surface facing upwards and subjected to falling ball impact test with a weight of 300 g dropped thrice from a height of 2.4 m. Thereafter the condition of the paint surface is to be checked after leaving the test panel at room temperature for a period of one hour.	No cracks No peelings	
Bend test	(1) **ISO 1519:2011** (2) Dimension of test specimen : 150 mm × 50 mm × 0.3 mm	No cracks No peelings	

Table 3.3.4 Test details and acceptance criteria for the corrosion resistance of anti-corrosive paints *(2021)*

Test item	Testing procedures	Assessment methods	Acceptance criteria	Others
Water immersion	(1) **ISO 2812-2:2018** (2) Test duration: 3000 hr (3) Water : sodium chloride, 5 %(mass fraction) aqueous solution	**ISO 4628-2** (Blistering) **ISO 4628-3** (Rusting) **ISO 4628-4** (Cracking) **ISO 4628-5** (Flaking)	0 (S0) Ri 0 0 (S0) 0 (S0)	
Water condensation	(1) **ISO 6270-1:2017** (2) Test duration: 720 hr			
Salt spray test	(1) Neutral salt spray test of **ISO 9227:2017** (2) Test duration: 1440 hr (3) Test specimen (a) Test specimen(3ea) for corrosion: A scribe line shall be made on each test specimen in accordance with Annex A of **ISO 12944-6:2018** (b) Test specimen(3ea) for cross-cut test or pull-off test	Corrosion at scribe after salt spray test (**ISO 12944-6**, Annex A.2)	Max. 1.5 mm corrosion at scribe as average value	
		Cross-cut test (**ISO 2409:2020**)	Classification 0 to 2	- Only if the dry-film thickness of the paint system is less than or equal to 250 µm -Assessment after 7 days in standard atmosphere as defined in **ISO 3270**
		Pull-off test (**ISO 4624:2016**)	1) Minimum pull-off value of 2.5 MPa for each measurement 2) 0 % adhesive failure between steel/metalized steel respectively and the first coat (unless pull-off values are at least 5 MPa)	- After 7 days reconditioning in a standard atmosphere as defined in **ISO 3270**
Cyclic ageing test	(1) **ISO 12944-6:2018** Annex B (2) Test duration: 1680 hr (3) Test specimen (a) Test specimen(3ea) for corrosion: A scribe line is to be made on each test specimen in accordance with Annex A of **ISO 12944-6:2018** (b) Test specimen(3ea) for cross-cut test or pull-off test	Corrosion at scribe after cyclic ageing test (**ISO 12944-6**, Annex A.2)	Max. 3.0 mm corrosion at scribe as average value	
		Cross-cut test (**ISO 2409:2020**)	Classification 0 to 2	- Only if the dry-film thickness of the paint system is less than or equal to 250 µm -Assessment after 7 days in standard atmosphere as defined in **ISO 3270**
		Pull-off test (**ISO 4624:2016**)	1) Minimum pull-off value of 2.5 MPa for each measurement 2) 0 % adhesive failure between steel/metalized steel respectively and the first coat (unless pull-off values are at least 5 MPa)	- After 7 days reconditioning in a standard atmosphere as defined in **ISO 3270**

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To : All Surveyors and whom it may concern

No : 2021-9-E
Date : 12 May 2021

Subject	9.145 Notice for Amendment to the KR Technical Rules - Guidance Relating to the Rules for the Classification of Steel Ships Pt 1, Pt 5, Pt 7 Ch5 - Guidance for LNG Fuel Ready Ships - Guidance for Battery Systems on Board of 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 Rules 2021 as attachment to reflect IACS Resolutions 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.

Amended KR Technical Rules	Effective Date	Reflected IACS Res.
Guidance Relating to the Rules for the Classification of Steel Ships Pt 5	1 July 2021(Date of contract for construction)	To reflect result of internal review
Guidance Relating to the Rules for the Classification of Steel Ships Pt 7 Ch 5	1 July 2021(Date of contract for construction)	IACS UI GC 32, 33, 34, 35, 36, 37 (New Feb 2021) To reflect result of internal review
	To be applied retroactively	To reflect result of internal review
Guidance for LNG Fuel Ready Ships	To be applied retroactively	To reflect result of internal review
Guidance Relating to the Rules for the Classification of Steel Ships Pt 1	To be applied retroactively	To reflect result of internal review
Guidance for Battery Systems on Board of Ships	17 May 2021(Date of application for certification)	To reflect result of internal review

2. Furthermore, please be informed that the establishment will be included in 2022 edition on KR Technical Rules which will be published in the first half of 2022.

Attachments: Amended KR Technical Rules (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

Part 5 Machinery Installation

2021. 5.

- Main Amendments -

(1) Reflecting industrial code <ships contracted for construction on or after 2021/07/01>

◉ to require devices to protect the supply lines from back flow of gas and flame passage

Present	Amendment
Annex 5-5 Requirements of Equipment for Gas welding	**Annex 5-5 Requirements of Equipment for Gas welding**
1. to 3. <omitted>	1. to 3. <same as the present Guidance>
4. In case where permanent piping is arranged between the gas bottles and working area, the following requirements are to be complied with :	4. In case where permanent piping is arranged between the gas bottles and working area, the following requirements are to be complied with :
(1) to (2) <omitted>	(1) to (2) <same as the present Guidance>
(3) The procedures of piping arrangement are to be as specified below :	(3) The procedures of piping arrangement are to be as specified below :
(A) Acetylene gas piping and oxygen gas piping are not to be led through enclosed spaces which are susceptible to fire. But, in case where it can be led through enclosed space, the following comply; *(2017)*	(A) Acetylene gas piping and oxygen gas piping are not to be led through enclosed spaces which are susceptible to fire. But, in case where it can be led through enclosed space, the following comply; *(2017)*
(a) Provision of effective mechanical exhaust ventilation.	(a) Provision of effective mechanical exhaust ventilation.
(b) Pipe connection with butt-welding	(b) Pipe connection with butt-welding
(c) Pipes are to be protected from mechanical damage where necessary.	(c) Pipes are to be protected from mechanical damage where necessary.
(B) Stop valves are to be fitted on oxygen and acetylene gas piping at adequate locations of the penetrations through the casing of the store room and working area. Except when used in a working area, gas bottles are to be kept closed by stop valves which are fitted in a store room, and warning notices to this effect are to be placed in a store room and working area. *(2021)*	(B) Stop valves are to be fitted on oxygen and acetylene gas piping at adequate locations of the penetrations through the casing of the store room and working area. Except when used in a working area, gas bottles are to be kept closed by stop valves which are fitted in a store room, and warning notices to this effect are to be placed in a store room and working area. *(2021)*
(C) Joints between pipes and pipe fittings are to be of welded joint or flange joint as far as practicable.	(C) Joints between pipes and pipe fittings are to be of welded joint or flange joint as far as practicable.
(D) For clear distinction of the acetylene gas piping system and oxygen gas piping system, the piping systems are to be provided with adequate means of identification.	(D) For clear distinction of the acetylene gas piping system and oxygen gas piping system, the piping systems are to be provided with adequate means of identification.
	(E) Supply lines are to include, at the distribution station as far as practicable, devices to protect the supply lines from back flow of gas or flame passage. *(2021)*
<hereafter omitted>	<hereafter same as the present Guidance>

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk

2021. 05.

- Main Amendments -

(1) Reflecting IACS UI GCs <ships contracted for construction on or after 2021/07/01>

◉ UI GC32 (New Feb 2021) : design pressure of the outer pipe or duct

◉ UI GC33 (New Feb 2021) : Cargo sampling

◉ UI GC34 (New Feb 2021) : Cargo Filters

◉ UI GC35 (New Feb 2021) : Inhibition of Cargo Pump Operation and Opening of Manifold ESD valves with Level Alarms Overridden

◉ UI GC36 (New Feb 2021) : Arrangement of oxygen sensor for the space or spaces containing the inert gas system

◉ UI GC37 (New Feb 2021) : Suitable Pressure Relief System for Air Inlet, Scavenge Spaces, Exhaust System and Crank Case

(2) Location of ESD2 operation <ships contracted for construction on or after 2021/07/01>

- Requirements for activation location of ESD2

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 Guidance>**
504. Design pressure [See Rule]	**504. Design pressure [See Rule]**
1. For the purpose of the requirements in 504. 2 of the Rules, where design vapour temperature higher or lower than 45°C is employed, the requirements in 401. 2 of the Rules apply.	1. For the purpose of the requirements in 504. 2 of the Rules, where design vapour temperature higher or lower than 45°C is employed, the requirements in 401. 2 of the Rules apply.
<newly added>	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: (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.
505. to 512. <omitted>	**505. to 512. <same as the present Guidance>**
513. Testing requirements	**513. Testing requirements**
1. to 3. <omitted>	1. to 3. <same as the present Guidance>
<newly added>	4. 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.
4. <omitted>	5. <same as the present Guidance>

Present	Amendment
506. Cargo transfer arrangements **[See Rule]**	**506. Cargo transfer arrangements** **[See Rule]**
1. to 4. <omitted>	1. to 4. <same as the present Guidance>
<newly added>	5. 506. 5 of the Rules is only applicable if such a sampling system is fitted on board. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections.
	6. For the purpose of the requirements in 506. 6 of the Rules, means to indicate that filters are becoming blocked and filter maintenance is required is to be provided for fixed in-line filter arrangement and portable filter installations where dedicated filter housing piping is provided.
	Where portable filters for fitting to manifold presentation flanges are used without dedicated filter housing, and these can be visually inspected after each loading and discharging operation, no additional arrangements for indicating blockage or facilitating drainage are required.
<hereafter omitted>	<hereafter same as the present Guidance>
Section 18 Operating Requirements	**Section 18 Operating Requirements**
<newly added>	**1810. Cargo sampling** **[See Rule]**
	1. 1809. of the Rules is only applicable if such a sampling system is fitted on board. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections.
1810. Cargo emergency shutdown (ESD) system	**1810. Cargo emergency shutdown (ESD) system**
1. <omitted>	**1. <same as the present Guidance>**
<newly added>	2. In applying “operation of cargo pumps and the opening of manifold ESD valves is to be inhibited” of **note 4** of **Table 7.5.12**, a hardware system such as an electric or mechanical interlocking device is to be provided to prevent inadvertent operation of cargo pumps and inadvertent opening of manifold ESD valves.
<hereafter omitted>	<hereafter same as the present Guidance>

Present	Amendment
Section 13 Instrumentation and Automation Systems	Section 13 Instrumentation and Automation Systems
1301. – 1304. <same as the present Rules>	1301. – 1304. <same as the present Rules>
1306. Gas detection	1306. Gas detection
<Newly added>	1. For the purpose of the requirements in 1309. 3 of the Rules, two oxygen sensors are to be positioned at appropriate locations in the space or spaces containing the inert gas system, in accordance with paragraph 15.2.2.4.5.4 of the FSS Code, for all gas carriers, irrespective of the carriage of cargo indicated by an "A" in column "f" in the table in chapter 19 of the Code. *(2021)*
1. – 3. <same as the present Rules>	~~1. – 3.~~ 2. – 4. <same as the present Rules>
1307. – 1309. <same as the present Rules>	1307. – 1309. <same as the present Rules>
<hereafter omitted>	<hereafter same as the present Guidance>

Present	Amendment
Section 16 Use of Cargo as Fuel	**Section 16 Use of Cargo as Fuel**
1606. <omitted>	**1606. <same as the present Guidance>**
1607. Special requirements for gas-fired internal combustion engines [See Rule]	**1607. Special requirements for gas-fired internal combustion engines** [See Rule]
1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.	1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.
<newly added>	2. A suitable pressure relief system for air inlet manifolds, scavenge spaces and exhaust system is to be provided unless designed to accommodate the worst-case overpressure due to ignited gas leaks or justified by the safety concept of the engine. A detailed evaluation regarding the hazard potential of overpressure in air inlet manifolds, scavenge spaces and exhaust system is to be carried out and reflected in the safety concept of the engine. In the case of crankcases, the explosion relief valves, as required by 1607. 1 (4) of the Rules, are to be considered suitable for the gas operation of the engine. For engines not covered by said Regulation, a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase is to be carried out.
2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.	3. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.
<hereafter omitted>	<hereafter same as the present Guidance>

Present	Amendment
Annex 7A-3 LNG Bunkering Systems	**Annex 7A-3 LNG Bunkering Systems**
Section 1 to Section 5 <omitted>	**Section 1 to Section 5** <same as the present Guidance>
Section 6 Control, Monitoring and Safety Systems	**Section 6 Control, Monitoring and Safety Systems**
601. to 603. <omitted>	**601. to 603. <same as the present Guidance>**
604. Emergency release systems 1. to 2. <omitted> 3. Emergency release systems are to be controllable from both bunkering ship and receiving ship. 4. to 7. <omitted> <hereafter omitted>	**604. Emergency release systems** 1. to 2. <same as the present Guidance> ~~3. Emergency release systems are to be controllable from both bunkering ship and receiving ship.~~ 3. to 6. <same as the present Guidance> <hereafter same as the present Guidance>

- Main Amendments -

(1) in accordance with newly added requirements for “use of LPG cargo as fuel” <applied retroactively>

◉ to add notation(DFDE) for ships fitted with LPG dual fuel diesel engine

Present	Amendment
Annex 7A-5 Use of LPG Cargo as Fuel	**Annex 7A-5 Use of LPG Cargo as Fuel**
Section 1 General	**Section 1 General**
<omitted>	<same as the present Guidance>
Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules	**Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules**
201.to 206. <omitted>	**201.to 206. <same as the present Guidance>**
207. Special requirements for gas-fired internal combustion engines Dual fuel engines are those that employ LPG fuel (with pilot oil) and oil fuel. Oil fuels may include distillate and residual fuels. LPG only engines are those that employ LPG fuel only.	**207. Special requirements for gas-fired internal combustion engines** Dual fuel engines are those that employ LPG fuel (with pilot oil) and oil fuel. Oil fuels may include distillate and residual fuels. LPG only engines are those that employ LPG fuel only.
1. to 3. **<omitted>**	1. to 3. **<same as the present Guidance>**
<newly added>	**4. Additional installation notation** For LPG carriers fitted with dual-fuel diesel engines utilizing LPG cargo as fuel, the an additional installation notation of DFDE(LPG) may be assigned.
<hereafter omitted>	<hereafter same as the present Guidance>

Present	Amendment
Section 16 Use of Cargo as Fuel	**Section 16 Use of Cargo as Fuel**
1606. Special requirements for main boilers [See Rule] <omitted>	**1606. Special requirements for main boilers [See Rule]** <same as the present Guidance>
1607. Special requirements for gas-fired internal combustion engines [See Rule] 1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance. 2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent. <hereafter omitted>	**1607. Special requirements for gas-fired internal combustion engines [See Rule]** 1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE(LNG) may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance. 2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent. <hereafter same as the present Guidance>

Guidance for LNG Fuel Ready Ships

2021. 05.

- Main Amendments -

(1) Reflecting Request from ship builders <applied retroactively>

◉ Addition of Notation 'LNG Ready D(A)'

- To newly add 'LNG Ready D(A)' for ships preparing LNG fueled ship concept design of AIP level.

Present	Amendment
CHAPTER 1 GENERAL	**CHAPTER 1 GENERAL**
Section 1 General	**Section 1 General**
<omitted>	<same as the present>
Section 2 Class Notation	**Section 2 Class Notation**
201. General	**201. General**
<omitted>	<same as the present>
<newly added>	**202. LNG Ready D(A)** 1. LNG Ready D(A) as an additional special feature notation may be assigned to ships whose the LNG fueled ship concept design is prepared for evaluation of the basic suitability for **Rules for the Classification of Ships Using Low-flashpoint Fuels.** 2. LNG Ready D(A) is not to be assigned to ships having LNG Ready D.
202. LNG Ready D	**203. LNG Ready D**
<omitted>	<same as the present>
203. LNG Ready I	**204. LNG Ready I**
<omitted>	<same as the present>

Present	Amendment
CHAPTER 2 REQUIREMENTS FOR LEVELS OF LNG FUEL READY	**CHAPTER 2 REQUIREMENTS FOR LEVELS OF LNG FUEL READY**
Section 1 General	**Section 1 General**
<omitted>	<same as the present>
	Section 2 Level of Preparing Concept Design
<newly added>	**201. General** 1. Plans and documents required for an Approval in Principle (AIP) are to be submitted for LNG 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 "LNG Ready" to separate them from the normal plans and documents of new building.
Section 2 Level of Preparing Generic Design	**Section 3 Level of Preparing Generic Design**
<omitted>	<hereafter, numbering is changed in order>

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

Part 1 Classification and Survey

2021. 05.

- Main Amendments -

(1) Reflecting Request from ship builders <applied retroactively>

◉ to add notation(DFDE) for ships fitted with LPG dual fuel diesel engine

◉ to newly add 'LNG Ready D(A)' for ships preparing LNG fueled ship concept design of AIP level

Present

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Additional Special Feature Notations	Relevant Requirements
<newly added>	
LNG Ready D	to ships for which the generic Design is prepared in accordance with Ch 2, Sec 2 of the Guidance for LNG Fuel Ready Ships.
LNG Ready I (SR, FT, TV, FS, BS, ME, AE, B, ME-C, AE-C, B-C) *(2017)*	to ships for which parts of the systems are installed with the detailed design in accordance with Ch 2, Sec 3 of the Guidance for LNG Fuel Ready Ships

Amendment

Annex 1-1 Character of Classification

1. Class Notation

1.1 Ship Type and Special Feature Notations

Additional Special Feature Notations	Relevant Requirements
LNG Ready D(A) *(2021)*	to ships for which the concept design is prepared in accordance with **Ch 2, Sec 2 of the Guidance for LNG Fuel Ready Ships**.
LNG Ready D	to ships for which the generic **D**esign is prepared in accordance with **Ch 2, Sec 3 of the Guidance for LNG Fuel Ready Ships**.
LNG Ready I (SR, FT, TV, FS, BS, ME, AE, B, ME-C, AE-C, B-C) *(2017)*	to ships for which parts of the systems are installed with the detailed design in accordance with **Ch 2, Sec 4** of the **Guidance for LNG Fuel Ready Ships**

Present

1.2 Additional Installations Notations

The following Additional Installations Notations may be appended to ships complying with the relevant requirements.

Additional Installations Notations		Relevant Requirements
Machinery Items	<omitted>	
	DFDE	to liquefied natural gas carriers where the Dual-fuel Diesel Engine utilizing methane gas specified in Pt 7, Ch 5, 1607. of the Guidance is provided onboard. <newly added>
	<omitted>	

Amendment

1.2 Additional Installations Notations

The following Additional Installations Notations may be appended to ships complying with the relevant requirements.

Additional Installations Notations		Relevant Requirements
Machinery Items	<same as the presnet Guidance>	
	DFDE (LNG, LPG) *(2021)*	to liquefied natural gas carriers where the Dual-fuel Diesel Engine utilizing methane gas specified in Pt 7, Ch 5, 1607. of the Guidance is provided onboard, or to LPG carriers where the Dual-fuel Diesel Engine utilizing LPG specified in Pt 7, Ch 5, Annex 7A-5 207. 4 of the Guidance is provided onboard.
	<same as the present Guidance>	

Guidance for Battery Systems on Board of Ships

2021. 05.

- Main Amendments -

(1) Reflecting result of internal review

◉ to add the discharge performance test and to clarify test standard of the charge capacity retention and recovery test

◉ to clarify the subject of the thermal runaway propagation test

◉ to add an environmental test for the battery system

◉ to allow installation of pipes in the battery compartment when there is adequate protection against leakage for the pipe that penetrates into the battery room.

◉ to amend not to enforce automatic injection fire extinguishing system for CO2 fire extinguishing systems

Present

CHAPTER 1 <same as the present Rules>

CHAPTER 2 CLASSIFICATION SURVEYS

Section 1 – 2 <same as the present Rules>

Section 3 Tests and Inspections

301. <same as the present Rules>

302. Test and Inspection

1. The battery system shall be subjected to the test and inspection in accordance with the following tables.

2. – 3. <same as the present Rules>

Table 2 Battery module *(2019)*

No.	Test	Test Standard	Subject	Classification
<New added>				
1	Capacity Checking Test	Specifications / IEC 62620 6.4.1	Module	Type Approval
2–9	<same as the present Rules>			
(Notes) (1) – (4) <same as the present Rules> (5) Perform thermal runaway propagation test on battery module or pack basis *(2019)*				

Amendment

CHAPTER 1 <same as the present Rules>

CHAPTER 2 CLASSIFICATION SURVEYS

Section 1 – 2 <same as the present Rules>

Section 3 Tests and Inspections

301. <same as the present Rules>

302. Test and Inspection

1. The battery system shall be subjected to the test and inspection in accordance with the following tables.

2. – 3. <same as the present Rules>

Table 2 Battery module ~~*(2019)*~~ *(2021)*

No.	Test	Test Standard	Subject	Classification
1	Discharge performance Test	IEC 62620 6.3.1	Module	Type Approval
~~1~~ 2	~~Capacity Checking Test~~ Charge Capacity Retention and Recovery Test	Specifications / IEC 62620 ~~6.4.1~~ 6.4	Module	Type Approval
~~2–9~~ 3–10	<same as the present Rules>			
(Notes) (1) – (4) <same as the present Rules> (5) Perform thermal runaway propagation test on battery cell or module ~~or pack~~ basis ~~*(2019)*~~ *(2021)*				

Present

Table 3 Battery system *(2019)*

No.	Test	Test Standard	Type Approval	Testing and Inspection
1-10	<same as the present Rules>			
<Newly added>				
11	Electromagnetic Compatibility Test	Refer to Table 5	O	
(Notes) <same as the present Rules>				

Table 4 - 5 <same as the present Rules>

Section 4 <same as the present Rules>

Amendment

Table 3 Battery system ~~*(2019)*~~ *(2021)*

No.	Test	Test Standard	Type Approval	Testing and Inspection
1-10	<same as the present Rules>			
11	Environmental test	Refer to Table 5	O	
~~11~~ 12	Electromagnetic Compatibility Test	Refer to Table 5	O	
(Notes) <same as the present Rules>				

Table 4 - 5 <same as the present Rules>

Section 4 <same as the present Rules>

Present	Amendment
# CHAPTER 3 CONSTRUCTION AND EQUIPMENT ## Section 1 <same as the present Rules> ## Section 2 System Design **201.** <same as the present Rules> **202.** Construction and design **1. – 3.** <same as the present Rules> **4.** Installation (1) - (2) <same as the present Rules> (3) The battery room shall not contain other systems related to the essential services of the ship, and cables, pipes, etc. for supplying to systems other than the battery system shall not penetrate. **5.** <same as the present Rules> **203. – 206.** <same as the present Rules>	# CHAPTER 3 CONSTRUCTION AND EQUIPMENT ## Section 1 <same as the present Rules> ## Section 2 System Design **201.** <same as the present Rules> **202.** Construction and design **1. – 3.** <same as the present Rules> **4.** Installation (1) - (2) <same as the present Rules> (3) The battery room shall not contain other systems related to the essential services of the ship, ~~and cables, pipes, etc. for supplying to systems other than the battery system shall not penetrate.~~ Pipes shall not penetrate into the battery room as leakage of the pipe may cause damage or failure of the battery system. However, in case of unavoidable installation of pipes, the pipe joints shall be welded joints, and flanges, threaded joints or mechanical joints shall not be used(For pipe joint types, refer to Pt 5, Ch 6, 104. 1 of the Rules for the Classification of Steel Ships). *(2021)* **5.** <same as the present Rules> **203. – 206.** <same as the present Rules>

Present	Amendment
Section 3 <same as the present Rules>	Section 3 <same as the present Rules>
Section 4 Fire Protection and Fire Extinction	Section 4 Fire Protection and Fire Extinction
401. – 404. <same as the present Rules>	401. – 404. <same as the present Rules>
405. Fire extinction and Cooling	405. Fire extinction and Cooling
1. – 2. <same as the present Rules>	1. – 2. <same as the present Rules>
3. The battery system area shall be equipped with automatic fire extinguishing system. The operation signal of the fire extinguishing system shall be operated as a separate redundant signal and also be operated manually.	3. ~~The battery system area shall be equipped with automatic fire extinguishing system. The~~ When an automatic fire extinguishing system is applied in the battery system area, the operation signal of the fire extinguishing system shall be operated as a separate redundant signal and also be operated manually.
4. <same as the present Rules>	4. <same as the present Rules>
Section 5 – 7 <same as the present Rules>	Section 5 – 7 <same as the present Rules>

CIRCULAR

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No : 2021-10-E
Date : 2021.06.28

To : All Surveyors and who it may concern

Subject	**9.146 Notice for Amendments to the KR Technical Rules (Part 2 of the Rules/Guidance, Welder performance qualifcation)**
Application	**1 January 2022 (the date for application for certification of welding)**

1. Please be informed that the partial amendments have been made to the "Part 2 of the Rules/Guidance", as below/attachments and you are kindly requested to apply the amendments on the relevant works.

- Below –

(1) To reflect IACS UR W32(Rev.1 Sep 2020)

2. Furthermore, please be informed that the amendments will be included in 2022 edition for Rules and Guidance on KR Classification Technical Rules which will be published in the first half of 2022.

Attachments : (A) Amendment for Part 2 of the Rules -------- 1 copy
(B) Amendment for Part 2 of the Guidance ---- 1 copy. (The end)

(Form no : FI-03-03) (20.06.2018)

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Part 2 Materials and Welding)

2021.06.

Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2022 (the date of application for certification of welding)

◉ To reflect IACS UR W32(Rev.1 Sep 2020)

Present	Amendment
CHAPTER 1 <Omitted> **CHAPTER 2 WELDING** **Section 1 ~ Section 4 <Omitted>** **Section 5 Welders and Welder Performance Qualification Scheme *(2018)*** **501. General** **1. ~ 5.** <Omitted> **6.** Welders or welding operators qualified in accordance with national or international welder qualification standards may also be engaged in welding of hull structures at the discretion of the Society provided that the qualification testing, range of approval and revalidation requirements are considered equivalent to this Section.	**CHAPTER 1 <Same as the present Rules>** **CHAPTER 2 WELDING** **Section 1 ~ Section 4 <Same as the present Rules>** **Section 5 Welders and Welder Performance Qualification Scheme *(2018)*** **501. General** **1. ~ 5.** <Same as the present Rules> **6.** Welders or welding operators qualified in accordance with national or international welder qualification standards may also be engaged in welding of hull structures at the discretion of the Society provided that standard is considered equivalent to this Section from technical perspective covering examination, testing and range approval. Even if the requirements stipulated in the standards are applied, the requirement for revalidation of welders' qualification shall be in accordance with **504. 2**. And alternative welding standards or codes are to be applied in full, cross-mixing requirements of standards and codes is not permitted. *(2022)*

Present

502. Grades, and range of qualification

1. <Omitted>

2. Welding processes

(1) The welding processes for welder's qualification are to be classified in **Table 2.2.19**.

Table 2.2.19 Welding processes for welder''s qualification *(2019)*

Symbol	Welding process in actual welding works(1)(2)		ISO 4063
M	Manual welding	Shield Metal Arc Welding(SMAW)	111
G	Gas welding	Gas Welding(GW)	31
S	Semi-automatic welding	(1) Metal Inert Gas welding(MIG)	131
		(2) Metal Active Gas welding(MAG)	135(solid wire), 138(metal cored wire)
		(3) Flux Cored Arc Welding(FCAW)	136
T	TIG welding	Gas Tungsten Arc Welding(GTAW)	141
A	Automatic welding	(1) Submerged Arc Welding(SAW)	12
		(2) Gravity Welding(GRW)	112
		(3) Electro-gas Welding(EGW)	73
		(4) Electro-slag Welding(ESW)	72

NOTES:

(1) Each testing normally qualifies only for one welding process. A change of welding process requires a new qualification test. Welders who have passed qualification tests for semi-automatic welding or TIG welding may be similarly regard as the welder responsible for setting up and/or adjusting of the welding process using an auto-carriage in the range of qualification for the qualification they qualified.

(2) It is permitted for a welder to be qualified for two or more welding processes by welding a single test piece with multi-process joint and sequence or by two or more separate qualification tests. The sequence of welding processes can not be changed.

Amendment

502. Grades, and range of qualification

1. <Same as the present Rules>

2. Welding processes

(1) The welding processes for welder's qualification are to be classified in **Table 2.2.19**.

Table 2.2.19 Welding processes for welder''s qualification *(2019)* *(2022)*

Symbol	Welding process in actual welding works(1)(2)		ISO 4063:2009
M	Manual welding	Shield Metal Arc Welding(SMAW)	111
G	Gas welding	Gas Welding(GW)	31
S	Semi-automatic welding	(1) Metal Inert Gas welding(MIG)	131
		(2) Metal Active Gas welding(MAG)	135(solid wire), 138(metal cored wire)
		(3) Flux Cored Arc Welding(FCAW)	136
T	TIG welding	Gas Tungsten Arc Welding(GTAW)	141
A	Automatic welding	(1) Submerged Arc Welding(SAW)	12
		(2) Gravity Welding(GRW)	112
		(3) Electro-gas Welding(EGW)	73
		(4) Electro-slag Welding(ESW)	72

NOTES:

(1) Each testing normally qualifies only for one welding process. A change of welding process requires a new qualification test. Welders who have passed qualification tests for semi-automatic welding or TIG welding may be similarly regard as the welder responsible for setting up and/or adjusting of the welding process using an auto-carriage in the range of qualification for the qualification they qualified.

(2) It is permitted for a welder to be qualified for two or more welding processes by welding a single test piece with multi-process joint and sequence or by two or more separate qualification tests. The sequence of welding processes can not be changed.

Present	Amendment
3. ~ **7.** <Omitted>	**3.** ~ **7.** <Same as the present Rules>
503. Testing procedure	**503. Testing procedure**
1. ~ **2.** <Omitted>	**1.** ~ **2.** <Same as the present Rules>
3. Examination and test	**3. Examination and test**
(1) <Omitted>	(1) <Same as the present Rules>
(2) **Visual examination**	(2) **Visual examination**
(a) The welds should be visually examined prior to the cutting of the test specimen for the bend test.	(a) The welds should be visually examined prior to the cutting of the test specimen for the bend test.
(b) The result of the examination is to show the absence of cracks or other serious imperfections. Imperfections detected are to be assessed in accordance with quality level B in (*KS B*) *ISO 5817*, except for imperfection type such as excess weld metal, excess penetration, excessive convexity and excessive throat thickness for which level C applies.	(b) The result of the examination is to show the absence of cracks or other serious imperfections. Imperfections detected are to be assessed in accordance with quality level B in (*KS B*) *ISO 5817:2014*, except for imperfection type such as excess weld metal, excess penetration, excessive convexity and excessive throat thickness for which level C applies. *(2022)*
(3) <Omitted>	(3) <Same as the present Rules>
(4) **Radiographic test**	(4) **Radiographic test**
(a) When radiographic testing is used in lieu of bend test, imperfections detected are to be assessed in accordance with (*KS B*) *ISO 5817*, level B.	(a) When radiographic testing is used in lieu of bend test, imperfections detected are to be assessed in accordance with (*KS B*) *ISO 5817:2014*, level B. *(2022)*
(b) Where deemed the excess of the amount of heat input by visual inspection after welding, bend tests other than radiographic testing may be required additionally.	(b) Where deemed the excess of the amount of heat input by visual inspection after welding, bend tests other than radiographic testing may be required additionally.
(5) **Fracture test ~~(Fillet welds)~~**	(5) **Fracture test**
(a) When fracture test is used for butt welds, full test specimen in length is to be tested in accordance with *ISO 9017* and *ISO 9606-1*. Imperfections detected are to be assessed in accordance with (*KS B*) *ISO 5817*, level B.	(a) When fracture test is used for butt welds, full test specimen in length is to be tested in accordance with *ISO 9017:2017* and *ISO 9606-1:2012*. Imperfections detected are to be assessed in accordance with (*KS B*) *ISO 5817:2014*, level B. *(2022)*
(b) The fracture test of fillet welds is to be carried out in accordance with the requirements specified in **Pt 2, Ch 2, 405. 8** of the Rules	(b) The fracture test of fillet welds is to be carried out in accordance with the requirements specified in **Pt 2, Ch 2, 405. 8** of the Rules
(c) Evaluation should concentrate on cracks, porosity and pores, inclusions, lack of fusion and incomplete penetration. Imperfections that are detected should be assessed in accordance with (*KS B*) *ISO 5817*, level B.	(c) Evaluation should concentrate on cracks, porosity and pores, inclusions, lack of fusion and incomplete penetration. Imperfections that are detected should be assessed in accordance with (*KS B*) *ISO 5817:2014*, level B. *(2022)*
(6) <Omitted>	(6) <Same as the present Rules>
4. <Omitted>	**4.** <Same as the present Rules>

Present	Amendment
5. Certification (1) Qualification certificates are normally issued to shipbuilder or manufacturer when the welder has passed the qualification test by the Society. Each Shipyard and Manufacturer is to be responsible for the control of the validity of the certificate and the range of the approval. (2) ~ (3) <Omitted>	**5. Certification** (1) Qualification certificates are normally issued to shipbuilder or manufacturer when the welder has passed the qualification test in accordance with the Society's Rules. Each Shipyard and Manufacturer is to be responsible for the control of the validity of the certificate and the range of the approval. *(2022)* (2) ~ (3) <Same as the present Rules>
504. General requirements for qualification validity **1.** <Omitted>	**504. General requirements for qualification validity** **1.** <Same as the present Rules>
2. Maintenance of the approval (1) Revalidation is to be carried out by the Society. The skill of the welder is to be periodically verified by one of the following: (a) The welder is to be tested every 3 years. The welder is to be performed the test for revalidation within 6 months before the expiration date of qualification. These tests revalidate the welder's qualifications for an additional 3 years. (b) Every 2 years, two welds made during the last 6 months of the 2 years validity period are to be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness and the outer diameter. These tests revalidate the welder's qualifications for an additional 2 years. (c) If the Society recognizes the equivalence, qualification shall be deemed to be revalidated. *(2020)* [See Guidance]	**2. Maintenance of the approval** (1) Revalidation is to be carried out by the Society. The skill of the welder is to be periodically verified by one of the following (A) ~ (C) options. The chosen maintenance option scheme of qualification is in accordance with (A) or (B) or (C) shall be stated on the certificate at the time of issue: *(2022)* (A) The welder is to be re-tested every 3 years. The welder is to be performed the test for revalidation within 6 months before the expiration date of qualification. These tests revalidate the welder's qualifications for an additional 3 years. (B) Every 2 years, two welds made during the last 6 months of the 2 years validity period are to be tested by radiographic or ultrasonic testing or destructive testing and shall be recorded. The weld tested shall reproduce the initial test conditions except for the thickness and the outer diameter. These tests revalidate the welder's qualifications for an additional 2 years. (C) A welder's qualification for any certificate shall be valid as long as it is signed according to **1.** (2) above subject that all the following conditions are fulfilled. In this option, the fulfilment of all the conditions is to be verified by the Society. The frequency of verification by the Society is to be no longer than 3 years and is to be agreed between the Society and the shipyards/manufacturers. This can be replaced by a method recognized by the Society. *(2020) (2022)* [See Guidance]

Present	Amendment
	(a) The welder is working for the same shipyard/manufacturer which is responsible for production weld quality as indicated on his or her qualification certificate. (b) The Society shall verify that the welder quality management system of the shipyard/manufacturer includes as minimum: (i) A designated person responsible for the coordination of the welder quality management system. (ii) List of welders and welding supervisors in shipyard/manufacturer (iii) If applicable, list of subcontracted welders (iv) Qualification certificate of welders and description of the associated management system (v) Training requirements for welder qualification programme (vi) Identification system for welders and WPS used on welds (vii) Procedure describing the system in place to monitor each welder performance based on results of welds examination records(e.g. repair rate, etc.) including the criteria permitting the maintenance of the welder qualification without retesting. (c) The shipyards/manufacturers have to document at least once a year that the welder has produced acceptable welds in accordance with construction quality standards and Society's requirements in the welding positions, type of welds and backing conditions covered by its certificate. Which documents are required and how to document the evidences should be in agreement between the Society and the shipyards/manufacturers.
(d) <Omitted> (2) ~ (3) <Omitted>	(D) <Same as the present Rules> (2) ~ (3) <Same as the present Rules>

GUIDANCE RELATING TO THE RULES FOR THE CLASSIFICATION OF STEEL SHIPS

(Guidance Part 2 Materials and Welding)

2021. 06.

Machinery Rule Development Team

- Main Amendments -

(1) Enter into force on 1 January 2022 (the date of application for certification of welding)

◉ To reflect IACS UR W32(Rev.1 Sep 2020)

Present	Amendment
CHAPTER 1 <Omitted> **CHAPTER 2 WELDING** **Section 1 ~ Section 4 <Omitted>** **Section 5 Welders and Welder Performance Qualification Scheme *(2018)*** **503. <Omitted>** **504. General requirements for qualification validity** **1. Maintenance of the approval *(2019)* [See Rule]** (1) "If the Society recognizes the equivalence", of **504. 2** (1) (c) means the followings. (a) Quality system of shipyards/manufacturer is to comply with **ISO 3834-2** or equivalent requirements. (b) Quality system of shipyards/manufacturers is to be approved and maintained by third party. (2) This revalidate the welder's qualifications for an additional 3 years.	**CHAPTER 1 <Same as the present Guidance>** **CHAPTER 2 WELDING** **Section 1 ~ Section 4 <Same as the present Guidance>** **Section 5 Welders and Welder Performance Qualification Scheme *(2018)*** **503. <Same as the present Guidance>** **504. General requirements for qualification validity** **1. Maintenance of the approval *(2019) (2022)* [See Rule]** (1) When **504. 2** (1) (C) of the Rules is selected as the method of revalidation for welder qualification, it may be replaced by the followings. (A) Quality system of shipyards/manufacturer is to comply with **ISO 3834-2** or equivalent requirements and is to be approved and maintained by third party. (B) It is to be confirmed by the Society that **504. 2** (1) (C) (a) and (c) of the Rules are satisfied. (C) Through the confirmation of (A) and (B) above, this revalidates the welder's qualifications for an additional 3 years.

CIRCULAR

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No : 2021-11-E
Date : 21 June 2021

To : All Surveyors and who it may concern

Subject	**9.147 Notice for Amendments to the Rules and Guidance for the Classification of Ships Using Low-flashpoint Fuels**
Application	**22 June 2021**

1. Please be informed that the amendments have been made to the "Rules and Guidance for the Classification of Ships Using Low-flashpoint Fuels", as below and you are kindly requested to apply the amendments on the relevant works.

- Below -

(1) Newly added Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel

2. Furthermore, please be informed that the amendments will be included in 2022 edition for Rules and Guidance for the Classification of Ships Using Low-flashpoint Fuels which will be published in the first half of 2022.

Attachments: Amendment for Rules and Guidance for the Classification of Ships Using Low-flashpoint Fuels ----------1 copy.(The end)

Amendments of the Rules for Classification of Ships Using Low-flashpoint Fuels

2021.06.

- Main Amendments -

(1) Effective date : 22 June 2021

◉ Has been added application requirement for ships using methyl/ethyl alcohol as fuel

Present	Amendment
# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** This Rules applies to ships using low-flashpoint fuels. However, does not apply to the ships specified in the following. (1) Ships carrying liquefied gases in bulk using their cargoes as fuel and complying with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships** (2) Ships carrying liquefied gases in bulk using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships .** (3) 〈newly added〉 **2.** Notwithstanding the requirement specified in **1**, for the ships specified in the following (1) or (2), some requirements of this Rules may be modified, as appropriate. (1) ships to which **SOLAS II-1** does not apply; or (2) ships which are subjected to Korean Ship Safety Act and Notification having a restricted to domestic service. **3.** **Ch 5** to **Ch 15** of this Rules applies to ships using natural gas as fuel, either in its liquefied or gaseous state. **4.** 〈newly added〉 **4.** In addition to the requirements in this Rules, they meet other related requirements in **Rules for the classification of steel ships.**	# CHAPTER 1 GENERAL ## Section 1 General **101. Application** **1.** This Rules applies to ships using low-flashpoint fuels. However, does not apply to the ships specified in the following. (1) Ships carrying liquefied gases in bulk using their cargoes as fuel and complying with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships** (2) Ships carrying liquefied gases in bulk using other low-flashpoint gaseous fuels provided that the fuel storage and distribution systems design and arrangements for such gaseous fuels comply with the requirements of **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** (3) Notwithstanding the requirement specified in (1) and (2), some requirements of this rules may be applied if specified in **Pt 7**, **Ch 5** of **Rules for the classification of steel ships.** *(2021)* **2.** Notwithstanding the requirement specified in **1**, for the ships specified in the following (1) or (2), some requirements of this Rules may be modified, as appropriate; (1) ships to which **SOLAS II-1** does not apply; or (2) ships which are subjected to Korean Ship Safety Act and Notification having a restricted to domestic service. **3.** **Ch 5** to **Ch 15** of this Rules applies to ships using natural gas as fuel, either in its liquefied or gaseous state. **4.** **Annex 5** applies to ships using methyl/ethyl alcohol as fuel.*(2021)* **5.** In addition to the requirements in this Rules, they meet other related requirements in **Rules for the classification of steel ships.**

Present	Amendment
CHAPTER 4 CLASSIFICATION AND SURVEYS	**CHAPTER 4 CLASSIFICATION AND SURVEYS**
Section 1 〈omitted〉	**Section 1 〈omitted〉**
Section 2 Classification	**Section 2 Classification**
201. Class notations Ships satisfying the requirements of this Rules may be given a notation "LFFS" as additional special feature notations and details are as follows. *(2020)* **1.** LFFS(DF-LNG): Dual fuel engines using LNG as fuel are installed **2.** LFFS(SF-LNG): Single fuel engines using LNG as fuel are installed **3. ~ 7.** 〈newly added〉	**201. Class notations** Ships satisfying the requirements of this Rules may be given a notation "LFFS" as additional special feature notations and details are as follows. *(2021)* **1.** LFFS(DF-LNG): Dual fuel engines using LNG as fuel are installed **2.** LFFS(SF-LNG): Single fuel engines using LNG as fuel are installed **3.** LFFS(DF-Methanol): Dual fuel engines using methyl alcohol as fuel are installed **4.** LFFS(SF-Methanol): Single fuel engines using methyl alcohol as fuel are installed **5.** LFFS(DF-Ethanol): Dual fuel engines using ethyl alcohol as fuel are installed **6.** LFFS(SF-Ethanol): Single fuel engines using ethyl alcohol as fuel are installed

Amendments of Guidances Relating to the Rules for Classification of Ships Using Low-flashpoint Fuels

2021.06.

- Main Amendments -

(1) Effective date : 22 June 2021

◉ Has been added application requirement for ships using methyl/ethyl alcohol as fuel reflecting IMO MSC.1/Circ.1621 (Annex 5)

〈Newly Added〉

Annex 5 Requirements for Ships Using Methyl/Ethyl Alcohol as Fuel *(2021)*

Section 1 General

101. Application

The requirements of this **Annex** apply to ships using methyl/ethyl alcohol as fuel.

102. Definitions

Except where specified in this **Annex**, the relevant definitions in **Rules for the Classification of Ships Using Low-flashpoint Fuels** (hereafter referred to "this **Rules**") and **Pt 8** of **Rules for the classification of steel ships** are to be applied.

1. **Bunkering** means the transfer of fuel from land-based or floating facilities into ship's permanent tanks or connection of portable tanks to the fuel supply system.
2. **Fuel** means methyl/ethyl alcohol fuels, containing allowable additives or impurities, suitable for the safe operation on board ships, complying with an international standard.
3. **Fuel tank** is any integral, independent or portable tank used for storage of fuel. The spaces around the fuel tank are defined as follows:
   (1) **Fuel storage hold space** is the space enclosed by the ship's structure in which a fuel tank is situated. If tank connections are located in the fuel storage hold space, a fuel storage hold space should also be considered as tank connection space. Integral fuel tanks do not have a fuel storage hold space;
   (2) **Cofferdam** is a structural space surrounding a fuel tank which provides an added layer of gas and liquid tightness protection against external fire, toxic and flammable vapours between the fuel tank and other areas of the ship; and
   (3) **Tank connection space** is a space surrounding all tank connections and tank valves that is required for tanks with such connections in enclosed spaces.
4. **Fuel preparation space** means any space containing equipment for fuel preparation purposes, such as fuel pumps, fuel valve train, heat exchangers and filters.
5. **Gas freeing** is the process carried out to achieve a safe tank atmosphere. It includes two distinct operations:
   (1) purging the hazardous tank atmosphere with an inert gas or other suitable medium (e.g. water) to dilute the hazardous vapour to a level where air can be safely introduced; and
   (2) replacing the diluted inert atmosphere with air.
6. **Independent tanks** are self-supporting, do not form part of the ship's hull and are not essential to the hull strength.
7. **Integral tank** means a fuel-containment envelope tank which forms part of the ship's hull and which may be stressed in the same manner and by the same loads which stress the contiguous hull structure and which is normally essential to the structural completeness of the ship's hull.
8. **Portable tank** means an independent tank being able to be:
   (1) easily connected and disconnected from ship systems; and
   (2) easily removed from ship and installed on board ship.
9. **Single failure** is where loss of intended function occurs through one fault or action.
10. **Single fuel engine** means an engine capable of operating on a fuel defined as in **2** only.

103. Alternative design

1. This **Annex** contains functional requirements for all appliances and arrangements related to the usage of methyl/ethyl alcohol fuels.
2. Appliances and arrangements of methyl/ethyl alcohol fuel systems may deviate from those set out in this **Annex**, provided such appliances and arrangements meet the intent of the goal and functional requirements concerned and provide an equivalent level of safety to the relevant sections.
3. **Ch 1, 103. 3** of this **Rules** is to be applied.

〈Newly Added〉

Section 2 Goal and Functional Requirements

201. Goal

Ch 2, 101. of this **Rules** is to be applied.

202. Functional requirements

1. The safety, reliability and dependability of the systems should be equivalent to that achieved with new and comparable conventional oil-fuelled main and auxiliary machinery.

2. The probability and consequences of fuel-related hazards should be limited to a minimum through arrangement and system design, such as ventilation, detection and safety actions. In the event of fuel leakage or failure of the risk reducing measures, necessary safety actions should be initiated.

3. The design philosophy should ensure that risk-reducing measures and safety actions for the fuel installation do not lead to an unacceptable loss of power.

4. Hazardous areas should be restricted, as far as practicable, to minimize the potential risks that might affect the safety of the ship, persons on board and equipment.

5. Equipment installed in hazardous areas should be minimized to that required for operational purposes and should be suitably and appropriately certified.

6. Unintended accumulation of explosive, flammable or toxic vapour and liquid concentrations should be prevented.

7. System components should be protected against external damage.

8. Sources of ignition in hazardous areas should be minimized to reduce the probability of fire and explosions.

9. Safe and suitable fuel supply, storage and bunkering arrangements should be provided, capable of receiving and containing the fuel in the required state without leakage.

10. Piping systems, containment and overpressure relief arrangements that are of suitable design, material, construction and installation for their intended application should be provided.

11. Machinery, systems and components should be designed, constructed, installed, operated, maintained and protected to ensure safe and reliable operation.

12. Suitable control, alarm, monitoring and shutdown systems should be provided to ensure safe and reliable operation.

13. Fixed fuel vapour and/or leakage detection suitable for all spaces and areas concerned should be arranged.

14. Fire detection, protection and extinction measures appropriate to the hazards concerned should be provided.

15. Commissioning, trials and maintenance of fuel systems and fuel utilization machinery should satisfy the goal in terms of safety, availability and reliability.

16. The technical documentation should 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.

17. A single failure in a technical system or component should not lead to an unsafe or unreliable situation.

Section 3 General Requirements

301. Goal

Ch 3, 101. of this **Rules** is to be applied.

302. Risk assessment

1. A risk assessment should be conducted to ensure that risks arising from the use of fuels affecting persons on board, the environment, the structural strength or the integrity of the ship are addressed. Consideration should be given to the hazards associated with physical layout, operation and maintenance, following any reasonably foreseeable failure.
2. In risk assessment required by **1** for ships using fuels, the followings are to be as a minimum considered, but not limited to:
   (1) **510. 2**
   (2) **803. 1** (1)
   (3) **903. 2**
   (4) **1507. 1** (8)
3. The risks should be analysed using acceptable and recognized risk analysis techniques. Loss of function, component damage, fire, explosion, toxicity and electric shock should, as a minimum, be considered. The analysis should ensure that risks are eliminated wherever possible. Risks which cannot be eliminated should be mitigated as necessary.
4. Details of risks, and the means by which they are mitigated, should be documented in accordance with applicable requirements in **Guidance for Approval of Risk-based Ship Design.**

303. Limitation of explosion consequences

Ch 3, 301. of this **Rules** is to be applied.

Section 4 Classification and Surveys

401. General

1. Classification and surveys are to be complied with applicable requirements in this **Section**.
2. In the case of items not specified in this Chapter, the requirements specified in **Pt 1** of **Rules for the classification of steel ships** are to be applied.

402. Class notation

Ships satisfying the requirements of this Part may be given a notation LFFS (DF-Methanol, SF-Methanol, DF-Ethanol, SF-Ethanol) as additional special feature notations.

403. Maintenance of classification

1. Ships classed with the Society are to be subjected to the surveys to maintain the classification and are to be maintained in good condition in accordance with the requirements specified in this **Section**.
2. Plans and particulars of any proposed alterations to the approved scantlings or arrangements of hull, machinery or equipment are to be submitted for approval by the Society before the work is commenced and such alterations are to be Surveyed by the Society.

404. Classification Survey during Construction.

1. General

   At the Classification Survey during Construction, the hull, machinery and equipment are to be examined in detail in order to ascertain that they meet the relevant requirements of this **Annex**. When it is intended to obtain a surveys for alterations, plans and documents equivalent to the survey during construction are to be submitted to the Society for the approval before the work is commenced.

2. Plan and Documents

   For a ship in which methyl/ethyl alcohol-fuelled engine installations are installed, plans and documents, specified below **3** and **4**, are to be submitted and approved before the work is commenced.

And, the Society, where considered necessary, may require further plans and documents other than those specified below.

3. Plan and data for approval

(1) Arrangement plans showing location of:
  (A) Machinery spaces, accommodation, service and control station spaces
  (B) Fuel containment systems
  (C) Fuel preparation spaces
  (D) Fuel bunkering pipes with shore connections
  (E) Tank hatches, ventilation pipes and any other openings to the gas tanks
  (F) Ventilating pipes, doors and openings to fuel preparation spaces and other hazardous areas
  (G) Entrances, air inlets and openings to accommodation, service and control station spaces
  (H) Hazardous areas of zone "0", "1" and "2"

(2) Following plans and data of the fuel containment system:
  (A) Drawing of fuel tanks including information on non-destructive testing of welds and strength and tightness testing of tanks
  (B) Drawings of support and staying of fuel tanks
  (C) Welding procedures for fuel tanks
  (D) Drawings and specifications of fuel tank insulation
  (E) Arrangement and specifications fuel tank including tank connections and tank connection space

(3) Following plans and data of piping systems:
  (A) Drawings and specifications of fuel piping including vent lines or similar piping
  (B) Drawings and specifications of offsets, loops, bends and mechanical expansion joints, such as bellows, slip joints(only inside tank) or similar means in the fuel piping
  (C) Drawings and specifications of flanges, valves and other fittings in the fuel piping system
  (D) Specification of means for removal of liquid contents from bunkering pipes prior to dis-connecting the shore connection
  (E) Cooling or heating water system in connection with fuel system, if fitted.
  (F) Drawings of piping systems for gas freeing and purging of fuel tanks
  (G) Bilge and drainage arrangements in fuel preparation spaces and tank connection spaces, if fitted.

(4) Drawings and specifications for pressure/vacuum valves and associated ventilation piping

(5) Following plans and data for equipment and systems regarding fire protection :
  (A) Arrangement and specification of water spray system, including pipes, valves, nozzles and fit-tings
  (B) Arrangement of ventilation duct required for fuel pipes lead through enclosed spaces
  (C) Arrangement of ventilation duct for fuel tank fitted below deck, if applicable
  (D) Arrangement of fire insulation for storage tank and pipes, ventilation trunks for storage tank connection space

(6) Following plans and data for electrical installations :
  (A) Drawings showing location of all electrical equipment in hazardous areas
  (B) Data for verification of the compatibility between the barrier and the field component
  (C) Single line diagram for intrinsically safe circuits
  (D) List of explosion protected equipment

(7) Following control and monitoring systems :
  (A) Vapour detection and leak detection system
  (B) Fuel tank monitoring system
  (C) Fuel engines control and monitoring system.

(8) A test procedure for the safety functions of the fuel installation (may be included in programme for sea trials or on-board test)

4. Plans and documents for reference

(1) Plans and data of the following equipment and systems
  (A) Drawings showing location and construction of air locks with alarm equipment, if fitted
  (B) Drawings of gastight bulkhead penetrations, if fitted
  (C) Arrangements and specifications of mechanical ventilation systems in spaces covering fuel system, giving capacity and location of fans and their motors. Drawings and material specifi-cations of rotating parts and casings for fans and portable ventilators
  (D) For fixed vapour/leak detection and alarm systems: specification and location of detectors, alarm devices and call points, and cable routing layout drawing

(2) Operation manual (including bunkering, gas freeing, normal operation, emergency operation).
(3) Data for a risk analysis according to **302.**.
(4) Chemical and physical properties and other special properties of fuels
(5) Data of reactivity hazard between fuels and coating or lining in fuel tanks and of piping and equipment that may come into contact with fuel liquid or vapour (if applicable)
(6) Data of suitability of corrosion-resistance materials for the fuels (if applicable)
(7) Specification of design loads and structural analysis of fuel tanks (Hull structural analysis may be covered for integral tanks.)

405. Periodical Surveys

1. Annal Survey

The following is to be carried out during the survey of the Fuel Storage, Fuel Bunkering System and Fuel Supply System.

(1) Operating and Maintenance Instruction Manuals
The manufacturer/builder instructions and manuals covering the operations, safety and maintenance requirements and occupational health hazards relevant to fuel storage, fuel bunkering, and fuel supply and associated systems for the use of the fuel, are to be confirmed as being aboard the vessel.
(2) Control, Monitoring and Safety Systems
(A) Vapour detection and other leakage detection equipment in compartments containing fuel storage, fuel bunkering, and fuel supply equipment or components or associated systems, including indicators and alarms, is to be confirmed in satisfactory operating condition. Recalibration of the vapour detection systems should be verified in accordance with the manufacturers' recommendations.
(B) Verification of the satisfactory operation of the control, monitoring and automatic shutdown systems as far as practicable of the fuel supply and bunkering systems.
(3) Fuel Handling Piping, Machinery and Equipment
(A) Fuel handling piping
(a) Pipings, hoses, double wall piping or duct are to be external examined.
(b) Emergency shut-down valves and remote operating valves are to be external examined and function-tested.
(c) Safety valves of fuel piping are to be external examined.
(B) Machinery and Equipment
(a) Machinery and equipment for fuel storage, fuel bunkering and fuel supply or otherwise handling the fuel is to be examined, as far as practicable.
(b) Means for inerting is to be examined.
(4) Ventilating System
(A) Examination of the ventilation system, including portable ventilating equipment where fitted, is to be made for spaces containing fuel storage, fuel bunkering, and fuel supply units or components or associated systems, including air locks, pump rooms, compressor rooms, fuel preparation rooms, fuel valve rooms, control rooms and spaces containing gas burning equipment.
(B) Where alarms, such as differential pressure and loss of pressure alarms, are fitted, these should be operationally tested as far as practicable.
(5) Drip Trays
Portable and fixed drip trays and insulation for the protection of the ship's structure in the event of leakage are to be examined.
(6) Hazardous Areas
Electrical equipment and bulkhead/deck penetrations including access openings in hazardous areas are to be examined for continued suitability for their intended service and installation area.
(7) Electrical Bonding
(A) Electrical bonding arrangements in hazardous areas, including bonding straps where fitted, are to be examined.
(B) Bonding straps are to be examined for fuel tanks and fuel systems and pipings which are not permanently connected to the hull of the ship.
(8) Fuel Storage System
(A) External examination of the fuel tanks
(B) General examination of the fuel storage hold place
(C) Internal examination of tank connection space (if applicable)

(D) External examination of tank and P/V valves and vent systems
(E) Verification of satisfactory operation of tank monitoring system
(F) Examination and testing of installed bilge alarms and means of drainage of the compartment
(G) Testing of the remote and local closing of the installed main tank valve

(9) Bunkering System
(A) Examination of bunkering stations and the fuel bunkering system
(B) Verification of satisfactory operation of the fuel bunkering control, monitoring and shutdown systems

(10) Fuel Supply System
Examination of the fuel supply system during working condition as far as practicable
(A) Verification of satisfactory operation of the fuel supply system control, monitoring and shut-down systems.
(B) Testing of the remote and local closing of the master fuel valve for each engine compartment

(11) Water spray systems
Water spray systems are to be examined.

2. Intermediate Survey

At the Intermediate Survey, in addition to all the requirements for Annual Survey, the following items are to be surveyed.

(1) Vapour detectors, temperature sensors, pressure sensors, level indicators, and other equipment providing input to the fuel safety system are to be randomly tested to confirm satisfactory operating condition.
(2) Proper response of the fuel safety system upon fault conditions is to be verified. Pressure, temperature and level indicating equipment are to be calibrated in accordance with the manufacturer's requirements.
(3) Alarms and shutdown function for fuel pumps and engines are to be verified. In case where a proper record of testing is maintained consideration should be given to accepting recent readings.

3. Special Survey

(1) General
The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the fuel installations are in a satisfactory condition and is fit for its intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

(2) Fuel Handling and Piping
All piping for fuel storage, fuel bunkering, and fuel supply or otherwise handling the fuel and liquid nitrogen installations are to be examined. Removal of insulation from the piping and opening for examination may be required. Where deemed suspect, a hydrostatic test to 1.25 times the Maximum Allowable Relief Valve Setting (MARVS) for the pipeline is to be carried out. After reassembly, the complete piping is to be tested for leaks. Where water cannot be tolerated and the piping cannot be dried prior to putting the system into service, the Surveyor may accept alternative testing fluids or alternative means of testing.

(3) Fuel Valves
Fuel valves in (1) and (2) are to be examined and proven operable. A random selection of valves is to be opened for examination.
(A) Emergency shut-down valves, check valves, block and bleed valves, master gas valves, remote operating valves
(B) Isolating valves for safety valves in the fuel storage, fuel bunkering, and fuel supply piping systems are to be examined and proven operable.

(4) Fuel Handling Equipment
Fuel pumps, process pressure vessels, inert gas generators, heat exchangers and other components used in connection with fuel handling are to be examined as required in the **Rules for the classification of steel ships**.

(5) Electrical Equipment
(A) Examination of electrical equipment to include the physical condition of electrical cables and supports, intrinsically safe, explosion proof, or increased safety features of electrical equipment.
(B) Functional testing of pressurized equipment and associated alarms.

(C) Testing of systems for de-energizing electrical equipment which is not certified for use in hazardous areas.
(D) An electrical insulation resistance test of the circuits terminating in, or passing through, the hazardous zones and spaces is to be carried out.

(6) Safety Systems
Vapour detectors, temperature sensors, pressure sensors, level indicators and other equipment providing input to the fuel safety system are to be tested to confirm satisfactory operating condition.
(A) Proper response of the fuel safety system upon fault conditions is to be verified.
(B) Pressure, temperature and level indicating equipment are to be calibrated in accordance with the manufacturer's requirements.

(7) Fuel Storage Tanks
(A) All Fuel tanks are to be examined internally.
(B) External of the fuel tanks and tank support arrangements should be visually examined.
(C) Non-destructive testing is to supplement fuel tank inspection with special attention to be given to the integrity of the main structural members, tank shell and highly stressed parts, including welded connections as deemed necessary by the surveyor.
(D) The tightness of all fuel tanks is to be verified by an appropriate procedure. Provided that the effectiveness of the ship's vapour detection equipment has been confirmed, it will be
(E) The pressure/vacuum valves and other pressure relief devices for fuel tanks are to be opened, examined, tested and readjusted as necessary, depending on their design.

Section 5 Ship Design and Arrangement

501. Goal

Ch 5, 101. of this **Rules** is to be applied.

502. Functional requirements

Functional requirements **1~7, 12, 14, 16** of **202.** of this **Rules** are to be applied.

1. Functional requirements **1**, **4** and **5** of **Ch 5, 201**. of this **Rules** are to be applied.

2. Fuel containment systems, fuel piping and other fuel release sources should be located and arranged such that released fuel, either as vapour or liquid, is led to safe locations;

3. The access or other openings to spaces containing potential sources of fuel release should be arranged such that flammable, asphyxiating or toxic vapours or liquids cannot escape to spaces that are not designed for the presence of such substances;

4. The probability of a fire or explosion in a machinery space as a result of a fuel release should be minimized in the design, with special attention to the risk of leakage from pumps, valves and connections.

503. General Requirements of Fuel containment system Arrangement

1. Tanks containing fuel should not be located within accommodation spaces or machinery spaces of category A.

2. Integral fuel tanks should be surrounded by protective cofferdams, except on those surfaces bound by shell plating below the lowest possible waterline, other fuel tanks containing methyl/ethyl alcohol, or fuel preparation space. When located above the lowest possible waterline, the fuel tanks are to be located no less than 800 mm from the ship's side.

3. The fuel containment system should be abaft of the collision bulkhead and forward of the aft peak bulkhead.

4. Fuel tanks located on open decks should be protected against mechanical damage.

5. Fuel tanks on open decks should be surrounded by coamings and spills should be collected in a dedicated holding tank.

6. For chemical tankers using cargo as fuel, a fuel service tank is to be installed in the cargo area. In case the related requirements of **Pt 7, Ch 6** of the **Rules for the Classification of Steel Ships** are applied, this requirement need not be applied.

504. Independent fuel tanks

1. Independent tanks may be accepted on open decks or in a fuel storage hold space.
2. Independent tanks should be fitted with:
   (1) mechanical protection of the tanks depending on location and cargo operations;
   (2) if located on an open deck, drip tray arrangements for leak containment and water spray systems for emergency cooling; and
   (3) if located in a fuel storage hold space, the space should meet the provisions of **Sec.11** and **Sec.13.**
3. Independent fuel tanks should be secured to the ship's structure. The arrangement for supporting and fixing the tanks should be designed for the maximum expected static, dynamic inclinations and accidental loads as well as the maximum expected values of acceleration, taking into account the ship characteristics and the position of the tanks.

505. Portable tanks

1. Portable fuel tanks should be located in dedicated areas fitted with:
   (1) mechanical protection of the tanks depending on location and cargo operations;
   (2) if located on an open deck, drip tray arrangements for leak containment and water spray systems for emergency cooling; and
   (3) if located in a fuel storage hold space, the space should meet the provisions of **Sec.11** and **Sec.13**.
2. Portable fuel tanks should be secured to the deck while connected to the ship systems. The arrangement for supporting and fixing the tanks should be designed for the maximum expected static and dynamic inclinations, as well as the maximum expected values of acceleration, taking into account the ship characteristics and the position of the tanks.
3. Consideration should be given to the ship's strength and the effect of the portable fuel tanks on the ship's stability.
4. Connections to the ship's fuel piping systems should be made by means of approved flexible hoses suitable for methyl/ethyl alcohol or other suitable means designed to provide sufficient flexibility.
5. Arrangements should be provided to limit the quantity of fuel spilled in case of inadvertent disconnection or rupture of the non-permanent connections.
6. The pressure relief system of portable tanks should be connected to a fixed venting system.
7. Control and monitoring systems for portable fuel tanks should be integrated in the ship's control and monitoring system. A safety system for portable fuel tanks should be integrated in the ship's safety system (e.g. shutdown systems for tank valves, leak/vapour detection systems).
8. Safe access to tank connections for the purpose of inspection and maintenance should be ensured.
9. When connected to the ship's fuel piping system:
   (1) each portable tank should be capable of being isolated at any time;
   (2) isolation of one tank should not impair the availability of the remaining portable tanks; and
   (3) the tank should not exceed its filling limits.

506. Machinery space

1. A single failure within the fuel system should not lead to a release of fuel into the machinery space.
2. All fuel piping within machinery space boundaries should be enclosed in gas and liquid tight enclosures in accordance with **904**..

〈Newly Added〉

507. Location and protection of fuel piping

1. Fuel pipes should not be located less than 800 mm from the ship's side.
2. Fuel piping should not be led directly through accommodation spaces, service spaces, electrical equipment rooms or control stations as defined in **Pt 8** of the **Rules for the Classification of Steel Ships**.
3. Fuel pipes led through ro-ro spaces, special category spaces and on open decks should be protected against mechanical damage.
4. Fuel piping should comply with the following:
   (1) Fuel piping that passes through enclosed spaces in the ship should be enclosed in a pipe or duct that is gas and liquid tight towards the surrounding spaces with the fuel contained in the inner pipe. Such double walled piping is not required in cofferdams surrounding fuel tanks, fuel preparation spaces or spaces containing independent fuel tanks as the boundaries for these spaces will serve as a second barrier
   (2) All fuel pipes should be self-draining to suitable fuel or collecting tanks in normal condition of trim and list of the ship. Alternative arrangements for draining the piping may be accepted by the Society.

508. Fuel preparation spaces design

Fuel preparation spaces should be located outside machinery spaces of category A.

509. Bilge systems

1. Bilge systems installed in areas where methyl/ethyl alcohol can be present should be segregated from the bilge system of spaces where methyl alcohol or ethyl alcohol cannot be present.
2. One or more holding tanks for collecting drainage and any possible leakage of methyl/ethyl alcohol from fuel pumps, valves or from double walled inner pipes, located in enclosed spaces should be provided. Means should be provided for safely transferring contaminated liquids to onshore reception facilities.
3. The bilge system serving the fuel preparation space should be operable from outside the fuel preparation space.

510. Drip trays

1. Drip trays should be fitted where leakage and spill may occur.
2. Each tray should have a sufficient capacity to ensure that the maximum amount of spill according to the risk assessment can be handled.
3. Each drip tray should be provided with means to safely drain spills or transfer spills to a dedicated holding tank. Means for preventing backflow from the tank should be provided.
4. Drip trays for leakage of less than 10 litres may be provided with means for manual emptying.
5. The holding tank should be equipped with a level indicator and alarm and should be inerted at all times during normal operation.

511. Arrangement of entrances and other openings in enclosed spaces

1. Direct access should not be permitted from a non-hazardous area to a hazardous area. Where such openings are necessary for operational reasons, an airlock which complies with the provisions of **512**. should be provided.
2. Fuel preparation spaces should have independent access direct from open deck. Where a separate access from open deck is not practicable, an airlock complying with **512**. should be provided.
3. Fuel tanks and surrounding cofferdams should have suitable access from the open deck, where practicable, for gas-freeing, cleaning, maintenance and inspection.

4. Without direct access to open deck, an entry space to fuel tanks or surrounding cofferdams should be provided and comply with the following:
   (1) be fitted with an independent mechanical extraction ventilation system, providing a minimum of six air changes per hour; a low oxygen alarm and a gas detection alarm should be fitted;
   (2) have sufficient open area around the fuel tank hatch for efficient evacuation and rescue operation;
   (3) not be an accommodation space, service space, control station or machinery space of category A; and
   (4) a cargo space may be accepted as an entry space, depending upon the type of cargo, if the area is cleared of cargo and no cargo operation is undertaken during entry to the space.
5. The area around independent fuel tanks should be sufficient to carry out evacuation and rescue operations.
6. For safe access, horizontal hatches or openings to or within fuel tanks or surrounding cofferdams should have a minimum clear opening of 600 X 600 mm that also facilitates the hoisting of an injured person from the bottom of the tank/cofferdam. For access through vertical openings providing main passage through the length and breadth within fuel tanks and cofferdams, the minimum clear opening should not be less than 600 X 800 mm at a height of not more than 600 mm from bottom plating unless gratings or footholds are provided. Smaller openings may be accepted provided evacuation of an injured person from the bottom of the tank/cofferdam can be demonstrated.

512. Airlocks

1. **1, 3~7** of **Ch 5, 1201.** of this **Rules**.
2. Airlocks should be mechanically ventilated at an overpressure relative to the adjacent hazardous area or space.

Section 6 Fuel Containment System

601. Goal

1. **Ch 6, 101.** of this **Rules** is to be applied.

602. Functional requirements

1. This **section** refers to Functional requirements **1**, **2**, **5** and **8~16** of **202.** are to be applied.
2. **1** (2) ~ (5), **3** and **4** of **Ch 6, 201.** of this **Rules** is to be applied.

603. Fuel tanks venting and gas freeing system

1. The fuel tanks should be fitted with a controlled tank venting system.
2. A fixed piping system should be arranged to enable each fuel tank to be safely gas-freed, and to be safely filled with fuel from a gas-free condition.
3. The formation of gas pockets during gas freeing operation should be avoided by considering the arrangement of internal tank structure and location of gas freeing inlets and outlets.
4. Pressure and vacuum relief valves should be fitted to each fuel tank to limit the pressure or vacuum in the fuel tank. The tank venting system may consist of individual vents from each fuel tank or the vents from each individual fuel tank may be connected to a common header. Design and arrangement should prevent flame propagation into the fuel containment system. If pressure relief valves (PRVs) of the high velocity type are fitted to the end of the vent pipes, they should be certified for endurance burning in accordance with **IMO MSC/Circ.677**. If PRVs are fitted in the vent line, the vent outlet should be fitted with a flame arrestor certified for endurance burning in accordance with **IMO MSC/Circ.677**.
5. Shut-off valves should not be arranged either upstream or downstream of the PRVs. By-pass valves

may be provided. For temporary tank segregation purposes (maintenance) shut-off valves in common vent lines may be accepted if a secondary independent over/underpressure protection is provided to all tanks as per **7**.

6. The fuel tank-controlled venting system should be designed with redundancy for the relief of full flow overpressure and/or vacuum. Pressure sensors fitted in each fuel tank, and connected to an alarm system, may be accepted in lieu of the secondary redundancy requirement for pressure relief. The opening pressure of the PRVs should not be lower than 0.007 MPa below atmospheric pressure.

7. PRVs should vent to a safe location on open deck and should be of a type which allows the functioning of the valve to be easily checked.

8. The fuel tank vent system should be sized to permit bunkering at a design loading rate without over-pressurizing the fuel tank.

9. The fuel tank vent system should be connected to the highest point of each tank and vent lines should be self-draining under all normal operating conditions.

604. Inerting and atmospheric control within the fuel storage system

1. All fuel tanks should be inerted at all times during normal operation.

2. Cofferdams should be arranged either for purging or filling with water through a non-permanent connection. Emptying the cofferdams should be done by a separate drainage system, e.g. bilge ejector.

3. The system should be designed to eliminate the possibility of a flammable mixture atmosphere existing in the fuel tank during any part of the atmosphere change operation, gas-freeing or inerting by utilizing an inerting medium.

4. To prevent the return of flammable liquid and vapour to the inert gas system, the inert gas supply line should be fitted with two shutoff valves in series with a venting valve in between (double block and bleed valves). In addition, a closable non-return valve should be installed between the double block and bleed arrangement and the fuel system. These valves should be located inside hazardous spaces.

5. Where the connections to the inert gas piping systems are non-permanent, two non-return valves may substitute the valves required in **4**.

6. Blanking arrangements should be fitted in the inert gas supply line to individual tanks. The position of the blanking arrangements should be immediately obvious to personnel entering the tank. Blanking should be via removable spool piece.

7. Fuel tank vent outlets should be situated normally not less than 3 m above the deck or gangway if located within 4 m from such gangways. The vent outlets are also to be arranged at a distance of at least 10 m from the nearest air intake or opening to accommodation and service spaces and ignition sources. The vapour discharge should be directed upwards in the form of unimpeded jets.

8. Vapour outlets from fuel tanks should be provided with devices tested and type approved to prevent the passage of flame into the tank. Due attention should be paid in the design and position of the PRVs with respect to blocking and due to ice during adverse weather conditions. Provision for inspection and cleaning should be arranged.

9. The arrangements for gas-freeing and ventilation of fuel tanks should be such as to minimize the hazards due to the dispersal of flammable vapours to the atmosphere and to flammable gas mixture in the tanks. The ventilation system for fuel tanks should be exclusively for ventilating and gas-freeing purposes. Connection between fuel tank and fuel preparation space ventilation will not be accepted.

10. Gas-freeing operations should be carried out such that vapour is initially discharged in one of the following ways:
    (1) through outlets at least 3 m above the deck level with a vertical efflux velocity of at least 30 m/s maintained during the gas-freeing operation;
    (2) through outlets at least 3 m above the deck level with a vertical efflux velocity of at least 20 m/s which are protected by suitable devices to prevent the passage of flame; or

(3) through outlets underwater.

11. In designing a gas-freeing system in conformity with 301. 2 due consideration should be given to the following:

(1) materials of construction of system;
(2) time to gas-free;
(3) flow characteristics of fans to be used;
(4) the pressure losses created by ducting, piping, fuel tank inlets and outlets;
(5) the pressure achievable in the fan driving medium (e.g. water or compressed air); and
(6) the densities of the fuel vapour/air mixture.

605. Inert gas availability on board

1. Inert gas should be available permanently on board in order to achieve at least one trip from port to port considering maximum consumption of fuel expected and maximum length of trip expected and to keep tanks inerted during two weeks in harbour with minimum port consumption.

2. A production plant and/or adequate storage capacities might be used to achieve availability target defined in 1.

3. Fluid used for inerting should not modify the characteristics of the fuel.

4. The production plant, if fitted, should be capable of producing inert gas with oxygen content at no time greater than 5% by volume. A continuous-reading oxygen content meter should be fitted to the inert gas supply from the equipment and should be fitted with an alarm set at a maximum of 5% oxygen content by volume. The system should be designed to ensure that if the oxygen content exceeds 5% by volume, the inert gas should be automatically vented+ to atmosphere.

5. The system should be able to maintain an atmosphere with an oxygen content not exceeding 8% by volume in any part of any fuel tank.

6. An inert gas system should have pressure controls and monitoring arrangements appropriate to the fuel containment system.

7. Where a nitrogen generator or nitrogen storage facilities are installed in a separate compartment outside of the engine-room, the separate compartment should be fitted with an independent mechanical extraction ventilation system, providing a minimum of six air changes per hour. If the oxygen content is below 19% in the separate compartment, an alarm should be given. A minimum of two oxygen sensors should be provided in each space. Visual and audible alarms should be placed at each entrance to the inert gas room.

8. Nitrogen pipes should only be led through well ventilated spaces. Nitrogen pipes in enclosed spaces should:

(1) have only a minimum of flange connections as needed for fitting of valves and be fully welded; and
(2) be as short as possible.

9. Notwithstanding the provisions of 303., inert gas utilized for gas-freeing of tanks may be provided externally to the ship.

Section 7 MATERIAL AND GENERAL PIPE DESIGN

701. Goal

Ch 7, 101. of this **Rules** is to be applied.

702. Functional requirements

This **Section** relates to functional requirements **1, 6, 8, 9** and **10** of **202.**. In particular, all materials used should be suitable for the fuel under the maximum working pressure and temperature.

〈Newly Added〉

703. General pipe design

1. The design pressure for any section of the fuel piping system is the maximum gauge pressure to which the system may be subjected in service, taking into account the highest set pressure on any relief valve on the system.
2. The wall thickness of pipes made of steel is to be applied in accordance with **Ch 7, 302. 1** of this **Rules**.
3. The wall thickness of pipes made of steel is to be applied in accordance with **Ch 7, 304. 1** and **2** of this **Rules**.
4. For pipes made of materials other than steel, the allowable stress should be considered by the Society.
5. High pressure fuel piping systems is to be applied in accordance with **Ch 7, 304. 4** of this **Rules**. Whether a fuel system should be considered as a high-pressure system for the purpose of this **Annex** depends on the design and arrangement of the specific system. Accordingly, the stress analysis should be waived or done to the satisfaction of the Society.
6. Fuel pipes and all the other piping needed for safe and reliable operation and maintenance should be colour marked in accordance with a standard at least equivalent to those acceptable to the Society.
7. All fuel piping and independent fuel tanks should be electrically bonded to the ship's hull. Electrical conductivity should be maintained across all joints and fittings. Electrical resistance between piping and the hull should be maximum 10^6 Ohm.
8. Piping other than fuel supply piping and cabling may be arranged in the double wall piping or duct provided that it does not create a source of ignition or compromise the integrity of the double pipe or duct. The double wall piping or duct should only contain piping or cabling necessary for operational purposes.
9. Filling lines to fuel tanks should be arranged to minimize the possibility for static electricity, e.g. by reducing the free fall into the fuel tank to a minimum.
10. The arrangement and installation of fuel piping should provide the necessary flexibility to maintain the integrity of the piping system in the actual service situations, taking potential for fatigue into account. Expansion bellows should not be used.
11. Piping fabrication and joining details
    (1) The inner piping, where a protective duct is required, is to be full penetration butt-welded, and fully radiographed. Flange connections in this piping are to only be permitted within the tank connection space and fuel preparation space or similar;
        (A) during the use of the fuel piping, all doors, ports and other openings on the corresponding superstructure or deckhouse side should normally be kept closed; and
        (B) the annular space in the double walled fuel piping should be segregated at the engine room bulkhead; this implies that there should be no common ducting between the engine-room and other spaces.
    (2) Piping for fuel should be joined by welding except:
        (A) for approved connections to shut-off valve and expansion joints, if fitted; and
        (B) for other exceptional cases specifically approved by the Society.
    (3) The following direct connections of pipe length without flanges may be considered:
        (A) butt-welded joints with complete penetrations at the root;
        (B) slip-on welded joints with sleeves and related welding having dimensions in accordance with recognized standards should only be used in pipes having an external diameter of 50 mm or less; the possibility for corrosion is to be considered; and
        (C) screwed connections, in accordance with recognized standards, should only be used for piping with an external diameter of 25 mm or less.
    (4) Welding, post-weld heat treatment, radiographic testing, dye penetrating testing, pressure testing, leakage testing and non-destructive testing should be performed in accordance with recognized standards. Butt welding should be subject to 100% non-destructive testing, while sleeve welds should be subject to at least 10% liquid penetrant testing(PT) or magnetic particle testing(MT).
    (5) Where flanges are used, they should be of the welded-neck or slip-on type. Socket welds are

not to be used in nominal sizes above 50 mm.

(6) Expansion of piping should normally be allowed for by the provision of expansion loops or bends in the fuel piping system. Use of expansion joints used in high pressure4 fuel systems should be approved by the Society. Slip joints should not be used.

(7) Other connections: Piping connections should be joined in accordance with (2), but for other exceptional cases the Society may consider alternative arrangements.

704. Provisions for materials

1. Due consideration should be taken with respect to the corrosive nature of fuel when selecting materials.

2. Except where specified in this **Annex**, the relevant requirements of **Rules for the classification of steel ships** are to be applied.

Section 8 Bunkering

801. Goal

Ch 8, 101. of this **Rules** is to be applied.

802. Functional requirements

1. This **Section** relates to functional requirements **1~11, 13~16** of **201.**.

2. The piping system for transfer of fuel to the fuel tank should be designed such that any leakage from the piping system cannot cause danger to the persons on board, the environment or the ship.

803. Bunkering Station

1. General

(1) The bunkering station should be located on open deck so that sufficient natural ventilation is provided. Closed or semi-enclosed bunkering stations should be subject to special consideration with respect to provisions for mechanical ventilation. The Society may require special risk assessment.

(2) Entrances, air inlets and openings to accommodation, service and machinery spaces and control stations should not face the bunkering station.

(3) Closed or semi-enclosed bunkering stations should be surrounded by gas and liquid-tight boundaries against enclosed spaces.

(4) Bunkering lines should not be led directly through accommodation, control stations or service spaces. Bunkering lines passing through non-hazardous areas in enclosed spaces should be double-walled or located in gas-tight ducts.

(5) Arrangements should be made for safe management of fuel spills. Coamings and/or drip trays should be provided below the bunkering connections together with a means of safely collecting and storing spills. This could be a drain to a dedicated holding tank equipped with a level indicator and alarm. Where coamings or drip trays are subject to rainwater, provisions should be made to drain rainwater overboard.

(6) Showers and eye wash stations for emergency usage are to be located in close proximity to areas where the possibility for accidental contact with fuel exists. The emergency showers and eye wash stations are to be operable under all ambient conditions.‘

2. Ships bunker hoses

(1) Bunker hoses carried on board are to be suitable for methyl/ethyl alcohol and be type approved as follows.

(A) Each type of bunker hose, complete with end-fittings, should be prototype-tested at a normal ambient temperature, with 200 pressure cycles from zero to at least twice the specified maximum working pressure. After this cycle pressure test has been carried out, the prototype test should demonstrate a bursting pressure of at least 5 times its specified maximum working pressure at the upper and lower extreme service temperature. Hoses used for proto

type testing should not be used for bunker service.

(B) Before being placed in service, each new length of bunker hose produced should be hydrostatically tested at ambient temperature to a pressure not less than 1.5 times its specified maximum working pressure, but not more than two fifths of its bursting pressure. The hose should be stencilled, or otherwise marked, with the date of testing, its specified maximum working pressure and, if used in services other than ambient temperature services, its maximum and minimum service temperature, as applicable. The specified maximum working pressure should not be less than 1 MPa gauge.

(2) Means should be provided for draining any fuel from the bunkering hoses upon completion of operation.

(3) Where fuel hoses are carried on board, arrangements should be made for safe storage of the hoses. Hoses should be stored on the open deck or in a storage room with an independent mechanical extraction ventilation system, providing a minimum of six air changes per hour.

804. Manifold

Ch 5, 401. of this Rules is to be applied.

805. Provisions for bunkering system

1. Ch 8, 101. 4 ~ 7 of this Rules is to be applied.
2. In the bunkering line, as close to the connection point as possible, there should be a manually operated stop valve and a remotely operated shutdown valve arranged in series. Alternatively, a combined manually operated and remote shutdown valve may be provided. It should be possible to operate this remotely operated valve from the bunkering control station.
3. For chemical tankers using cargo as fuel, If there is a system that is deemed suitable for its goal and function in this **section**, the requirements of this **section** may not apply.

Section 9 Fuel Supply to Consumer

901. Goal

Ch 9, 101. of this Rules is to be applied.

902. Functional requirements

This **Section** is related to functional requirements 1~ 6, 8 ~ 11, 13 ~ 17 of 202..

903. General requirements for fuel supply system

1. The fuel piping system should be separate from all other piping systems.
2. The fuel supply system should be arranged such that the consequences of any release of fuel will be minimized, while providing safe access for operation and inspection. The causes and consequences of release of fuel should be subject to special consideration within the risk assessment of 302..
3. The piping system for fuel transfer to the consumers should be designed in a way that a failure of one barrier cannot lead to a leak from the piping system into the surrounding area causing danger to the persons on board, the environment or the ship.
4. Fuel lines should be installed and protected so as to minimize the risk of injury to persons on board in case of leakage.

904. Requirements for fuel distribution

1. The outer pipe or duct should be gas and liquid tight.
2. The annular space between inner and outer pipe should have mechanical ventilation of underpressure type with a capacity of minimum 30 air changes per hour and be ventilated to open air. Appropriate means for detecting leakage into the annular space should be provided. The double wall

enclosure should be connected to a suitable draining tank allowing the collection and the detection of any possible leakage.

3. Inerting of the annular space might be accepted as an alternative to ventilation. Appropriate means of detecting leakage into the annular space should be provided. Suitable alarms should be provided to indicate a loss of inert gas pressure between the pipes.

4. The outer pipe in the double-walled fuel pipes should be dimensioned for a design pressure not less than the maximum working pressure of the fuel pipes. As an alternative the calculated maximum built-up pressure in the duct in the case of an inner pipe rupture may be used for dimensioning of the duct.

905. Redundancy of fuel supply

Propulsion and power generation arrangements, together with fuel supply systems, should be arranged so that a failure in fuel supply does not lead to an unacceptable loss of power.

906. Safety functions of the fuel supply system

1. All fuel piping should be arranged for gas-freeing and inerting.

2. Fuel tank inlet and outlet valves should be as close to the tank as possible. Valves required to be operated under normal operation, such as when fuel is supplied to consumers or during bunkering, should be remotely operated if not easily accessible.

3. The main fuel supply line to each consumer or set of consumers should be equipped with an automatically-operated master fuel valve. The master fuel valve(s) should be situated in the part of the piping that is outside the machinery space containing methyl/ethyl alcohol-fuelled consumer(s). The master fuel valve(s) should automatically shut off the fuel supply in accordance with 1502. 3 and table 1.

4. Means of manual emergency shutdown of fuel supply to the consumers or set of consumers should be provided on the primary and secondary escape routes from the consumer compartment, at a location outside consumer space, outside the fuel preparation space and at the bridge. The activation device should be arranged as a physical button, duly marked and protected against inadvertent operation and operable under emergency lighting.

5. The fuel supply line to each consumer should be provided with a remotely operated shut-off valve.

6. There should be one manually operated shutdown valve in the fuel line to each consumer to ensure safe isolation during maintenance.

7. Valves should be of the fail-safe type.

8. When pipes penetrate the fuel tank below the top of the tank a remotely operated shut-off valve should be fitted to the fuel tank bulkhead. When the fuel tank is adjacent to a fuel preparation space, the valve may be fitted on the tank bulkhead on the fuel preparation space side.

907. Requirements for Fuel preparation spaces and Pumps

1. Any fuel preparation space should not be located within a machinery space of category A, should be gas and liquid tight to surrounding enclosed spaces and vented to open air.

2. Hydraulically powered pumps that are submerged in fuel tanks should be arranged with double barriers preventing the hydraulic system serving the pumps from being directly exposed to methyl/ethyl alcohol. The double barrier should be arranged for detection and drainage of eventual methyl/ethyl alcohol leakage.

3. All pumps in the fuel system should be protected against running dry (i.e. protected against operation in the absence of fuel or service fluid). All pumps which are capable of developing a pressure exceeding the design pressure of the system should be provided with relief valves. Each relief valve should be in closed circuit, i.e. arranged to discharge back to the piping upstream of the suction side of the pump and to effectively limit the pump discharge pressure to the design pressure of the system.

〈Newly Added〉

Section 10 POWER GENERATION INCLUDING PROPULSION AND OTHER ENERGY CONVERTERS

1001. Goal

Ch 10, 101. of this **Rules** is to be applied.

1002. Functional requirements

1. This **section** is related to functional requirements as described in **1**, **11** and **13** ~ **17** of **202.**. In particular the following apply:
   (1) the exhaust system should be designed to prevent any accumulation of unburnt fuel; and
   (2) each fuel consumer should have a separate exhaust system.
2. One single failure in the fuel system should not lead to an unacceptable loss of power.

1003. General

1. All engine components and engine-related systems should be designed in such a way that fire and explosion risks are minimized.
2. Engine components containing fuel should be effectively sealed to prevent leakage of fuel into the machinery space.
3. For engines where the space below the piston is in direct communication with the crankcase, a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase should be carried out and reflected in the safety concept of the engine.
4. A means should be provided to monitor and detect poor combustion or misfiring. In the event that it is detected, continued operation may be allowed, provided that the fuel supply to the concerned cylinder is shut off and provided that the operation of the engine with one cylinder cut-off is acceptable with respect to torsional vibrations.

1004. Dual-fuel engines

Ch 10, 302. 1~3 of this **Rules** is to be applied.

1005. Single fuel engines

In case of a normal stop or an emergency shutdown, the fuel supply should be shut off not later than the ignition source. It should not be possible to shut off the ignition source without first or simultaneously closing the fuel supply to each cylinder or to the complete engine.

Section 11 Fire Safety

1101. Goal

Ch 11, 101. of this **Rules** is to be applied.

1102. Functional requirements

This **Section** is related to functional requirements in **1**, **2**, **4**, **5**, **12**, **14** and **16** of **202.** is to be applied.

1103. General provisions

The provisions in this **section** are additional to those given in **Pt 8** of **Rules for the classification of steel ships**. For fuel service tanks and fuel preparation spaces located in the cargo area of chemical tankers using cargo as fuel, **Pt 7, Ch 6** of the **Rules for the Classification of Steel Ships** is to be applied in lieu of this **Section**.

〈Newly Added〉

1104. Fire protection

1. For the purposes of fire protection, fuel preparation spaces should be regarded as machinery space of category A. Should the space have boundaries towards other machinery spaces of category A, accommodation, control station or cargo areas, these boundaries should not be less than A-60.
2. Any boundary of accommodation up to navigation bridge windows, service spaces, control stations, machinery spaces and escape routes, facing fuel tanks on open deck should have A-60 fire integrity.
3. For fire integrity, the fuel tank boundaries should be separated from the machinery spaces of category-A and other rooms with high fire risks by a cofferdam of at least 600 mm, with insulation of not less than A-60 class.
4. The bunkering station should be separated by A-60 class divisions towards machinery spaces of category A, accommodation, control stations and high fire risk spaces, except for spaces such as tanks, voids, auxiliary machinery spaces of little or no fire risk, sanitary and similar spaces where the insulation standard may be reduced to class A-0.

1105. Fire main

When the fuel storage tank is located on the open deck, isolating valves should be fitted in the fire main in order to isolate damaged sections of the fire main. Isolation of a section of fire main should not deprive the fire line ahead of the isolated section from the supply of water.

1106. Fire fighting

1. Where fuel tanks were located on open deck, there should be a fixed fire-fighting system of alcohol-resistant foam type, as set out in **chapter 17** of the **IBC Code** and, where appropriate, **chapter 14** of the **FSS Code**.
2. The alcohol-resistant foam type fire-fighting system should cover the area below the fuel tank where a spill of fuel could be expected to spread.
3. The bunker station should have a fixed fire-extinguishing system of alcohol resistant foam type and a portable dry chemical powder extinguisher or an equivalent extinguisher, located near the entrance of the bunkering station.
4. Where fuel tanks are located on open deck, there should be a fixed water spray system for diluting eventual spills, cooling and fire prevention. The system should cover exposed parts of the fuel tank.
5. A fixed fire detection and fire alarm system complying with **FSS Code** should be provided for all compartments containing the fuel system.
6. Suitable detectors should be selected based on the fire characteristics of the fuel. Smoke detectors should be used in combination with detectors which can more effectively detect methyl/ethyl alcohol fires.
7. Means to ease detection and recognition of methyl/ethyl alcohol fires in machinery spaces should be provided for fire patrols and for fire-fighting purposes, such as portable heat-detection devices.

1107. Fire extinguishing of engine-room and fuel preparation space

1. Machinery space and fuel preparation space where methyl/ethyl alcohol-fuelled engines or fuel pumps are arranged should be protected by an approved fixed fire-extinguishing system in accordance with **Pt 8, Ch 8** of **Rules for the classification of steel ships** and the **FSS Code**. In addition, the fire-extinguishing medium used should be suitable for the extinguishing of methyl/ethyl alcohol fires.
2. An approved alcohol-resistant foam system covering the tank top and bilge area under the floor plates should be arranged for machinery space category A and fuel preparation space containing methyl/ethyl alcohol.

〈Newly Added〉

Section 12 Explosion and Area Classification

1201. Goal

The goal of this **section** is to provide for the prevention of explosions and for the limitation of effects of a fire and explosion.

1202. Functional requirements

This **Section** is related to functional requirements **1~ 6, 8, 11~17** of **202.**. The probability of explosions should be reduced to a minimum by:

1. reducing the number of sources of ignition;
2. reducing the probability of formation of ignitable mixtures; and
3. the use of certified safe type electrical equipment suitable for the hazardous zone where the use of electrical equipment in hazardous areas is unavoidable.

1203. General requirements

1. Hazardous areas on open deck and other spaces not addressed in this **section** should be analysed and classified based on a recognized standard. The electrical equipment fitted within hazardous areas should be according to the same standard.
2. All hazardous areas should be inaccessible to passengers and unauthorized crew at all times.

1204. Area classification

1. Ch 12, 401. 1 & 3 of this Rules is to be applied.
2. In order to facilitate the selection of appropriate electrical apparatus and the design of suitable electrical installations, hazardous areas are divided into zones 0, 1 and 2, according to **1205.**. In cases where the prescriptive provisions in **1205**. are deemed to be inappropriate, area classification according to **IEC 60079-10-1** should be applied with special consideration by the Society.

1205. Hazardous area zone

1. Hazardous area zone 0

This zone includes, but is not limited to, the interiors of fuel tanks, any pipework for pressure-relief or other venting systems for fuel tanks, pipes and equipment containing fuel.

2. Hazardous area zone 1

This zone includes, but is not limited to:
(1) cofferdams and other protective spaces surrounding the fuel tanks;
(2) fuel preparation spaces;
(3) areas on open deck, or semi-enclosed spaces on deck, within 3 m of any fuel tank outlet, gas or vapour outlet, bunker manifold valve, other fuel valve, fuel pipe flange, fuel preparation space ventilation outlets;
(4) areas on open deck or semi-enclosed spaces on deck in the vicinity of the fuel tank P/V outlets, within a vertical cylinder of unlimited height and 6 m radius centred upon the centre of the outlet and within a hemisphere of 6 m radius below the outlet;
(5) areas on open deck or semi-enclosed spaces on deck, within 1.5 m of fuel preparation space entrances, fuel preparation space ventilation inlets and other openings into zone 1 spaces;
(6) areas on the open deck within spillage coamings surrounding fuel bunker manifold valves and 3 m beyond these, up to a height of 2.4 m above the deck;
(7) enclosed or semi-enclosed spaces in which pipes containing fuel are located, e.g. ducts around fuel pipes, semi-enclosed bunkering stations; and
(8) a space protected by an airlock is considered as non-hazardous area during normal operation, but will require equipment to operate following loss of differential pressure between the protected space and the hazardous area to be certified as suitable for zone 1.

3. Hazardous area zone 2

This zone includes, but is not limited to:
(1) areas 4 m beyond the cylinder and 4 m beyond the sphere defined in **2.** (4);
(2) areas within 1.5 m surrounding other open or semi-enclosed spaces of zone 1 defined in **2**; and
(3) airlocks.

Section 13 Ventilation

1301. Goal

The goal of this **Section** is to provide for the ventilation required for safe working conditions for personnel and the safe operation of machinery and equipment where methyl/ethyl alcohol is used as fuel.

1302. Functional requirements

This **Section** is related to functional requirements in **1**, **2**, **4**, **6** and **11** ~ **17** of **202.** is to be applied.

1303. General requirements

1. **Ch 13, 301. ~ 303. & 305. ~ 310.** of this **Rules** is to be applied.
2. Ventilation inlets and outlets for spaces required to be fitted with mechanical ventilation should be located such that according to the International Convention on Load Lines they will not be required to have closing appliances.
3. Ventilation systems required to avoid any vapour accumulation should consist of independent fans, each of sufficient capacity, unless otherwise specified in this **Section**. The ventilation system should be of a mechanical exhaust type, with extraction inlets located such as to avoid accumulation of vapour from leaked methyl/ethyl alcohol in the space.
4. Double bottoms, cofferdams, duct keels, pipe tunnels, hold spaces and other spaces where the fuel may accumulate should be capable of being ventilated to ensure a safe environment when entry into the spaces is necessary.

1304. Fuel preparation spaces

1. Fuel preparation spaces should be provided with an effective mechanical forced ventilation system of extraction type. During normal operation the ventilation should be at least 30 air changes per hour.
2. The number and power of the ventilation fans should be such that the capacity is not reduced by more than 50%, if a fan with a separate circuit from the main switchboard or emergency switchboard or a group of fans with common circuit from the main switchboard or emergency switchboard, is inoperable.
3. Ventilation systems for fuel preparation spaces and other fuel handling spaces should be in operation when pumps or other fuel treatment equipment are working.

1305. Bunkering station

Ch 13, 701. of this **Rules** is to be applied.

1306. Ducts and double wall pipes

1. Ducts and double wall pipes containing fuel piping fitted with mechanical ventilation system of the extraction type should be provided with a ventilation capacity of at least 30 air changes per hour.
2. The ventilation system for double wall piping and ducts should be independent of all other ventilation systems.

3. The ventilation inlet for the double wall piping or duct should always be located in a non-hazardous area, in open air, away from ignition sources. The inlet opening should be fitted with a suitable wire mesh guard and protected from ingress of water.

Section 14 Electrical Installations

1401. Goal

Ch 14, 101. of this **Rules** is to be applied.

1402. Functional requirements

This **Section** is related to functional requirements in **1, 2, 3, 5, 8, 11, 13** and **15 ~ 17** of **202.**.

1403. General requirements

1. **Ch 14, 301., 1, 2, 5, 6** of this **Rules** and **Ch 14, 301. 1** of this **Guidance** is to be applied.
2. Where electrical equipment is installed in hazardous areas as provided in **Ch 14 301. 2** of this **Rules**, it should be selected, installed and maintained in accordance with **IEC 60092-502** or other standards at least equivalent to those acceptable.

Section 15 Control, Monitoring and Safety Systems

151. Goal

Ch 15, 101. of this **Rules** is to be applied.

1502. Functional requirements

1. This **Section** is related to functional requirements in **1, 2, 3, 9, 10, 11, 13, 14** and **17** of **202.**. In particular, **Ch 15, 201. 1** and **4 ~ 6** of this **Rules** is to be applied.
2. A fuel safety system should be arranged to close down the fuel supply system automatically, upon failure in systems as described in **table 1** and upon other fault conditions which may develop too fast for manual intervention.

1503. General provisions

1. **Ch 15, 301. 1** & **3** of this **Rules** is to be applied.
2. Liquid leakage detection should be installed in the protective cofferdams surrounding the fuel tanks, in all ducts around fuel pipes, in fuel preparation spaces, and in other enclosed spaces containing single-walled fuel piping or other fuel equipment.
3. The annular space in a double-walled piping system should be monitored for leakages and the monitoring system should be connected to an alarm system. Any leakage detected should lead to shutdown of the affected fuel supply line in accordance with **table 1**.
4. At least one bilge well with a level indicator should be provided for each enclosed space, where an independent storage tank without a protective cofferdam is located. A high-level bilge alarm should be provided. The leakage detection system should trigger an alarm and the safety functions in accordance with **table 1**.

〈Newly Added〉

1504. Bunkering and fuel tank monitoring

1. Level indicators for fuel tanks

Each fuel tank should be fitted with closed level gauging devices, arranged to ensure a level reading is always obtainable and unless any necessary maintenance can be carried out while the fuel tank is in service, two devices should be installed.

2. Overflow control

(1) Each fuel tank should be fitted with a visual and audible high-level alarm. This should be able to be function tested from the outside of the tank and can be common with the level gauging system (configured as an alarm on the gauging transmitter), but should be independent of the high-high level alarm.
(2) An additional sensor (high-high level) operating independently of the high liquid level alarm should automatically actuate a shut-off valve to avoid excessive liquid pressure in the bunkering line and prevent the tank from becoming liquid full.
(3) The high and high-high level alarm for the fuel tanks should be visual and audible at the location at which gas-freeing by water filling of the fuel tanks is controlled, given that water filling is the preferred method for gas-freeing.

1505. Bunkering control

1. Bunkering control should be from a safe remote location. At this safe remote location:
(1) tank level should be capable of being monitored;
(2) the remote-control valves required by **Ch 8, 501. 7** of this **Rules** should be capable of being operated from this location; closing of the bunkering shutdown valve should be possible from the control location for bunkering and from another safe location; and
(3) overfill alarms and automatic shutdown should also be indicated at this location.

2. If the ventilation in the ducting enclosure or annular spaces of the double walled bunkering lines stops, an audible and visual alarm should be activated at the bunkering control location.

3. If fuel leakage is detected in ducting enclosure or the annular spaces of the double walled bunkering lines, an audible and visual alarm and emergency shutdown of the bunkering valve should automatically be activated.

1506. Engine monitoring

Ch 15, 701. of this **Rules** is to be applied.

1507. Vapour detection

1. Permanently installed vapour detectors should be fitted in:
(1) all ventilated annular spaces of the double walled fuel pipes;
(2) machinery spaces containing fuel equipment or consumers;
(3) fuel preparation spaces;
(4) other enclosed spaces containing fuel piping or other fuel equipment without ducting;
(5) other enclosed or semi-enclosed spaces where fuel vapours may accumulate;
(6) cofferdams and fuel storage hold spaces surrounding fuel tanks;
(7) airlocks; and
(8) ventilation inlets to accommodation and machinery spaces if required based on the risk assessment required in **302.**.

2. The number and placement of detectors in each space should be considered taking into account the size, layout and ventilation of the space. Gas dispersal analysis or a physical smoke test should be used to find the best arrangement.

3. Ch 15, 801. 5 of this **Rules and Guidance** is to be applied.

4. An audible and visible alarm should be activated at a fuel vapour concentration of 20% of the lower explosion limit (LEL). The safety system should be activated at 40% of LEL at two detectors. Special consideration should be given to toxicity in the design process of the detection system.

5. For ventilated ducts and annular spaces around fuel pipes in the machinery spaces containing methyl/ethyl alcohol-fuelled engines, the alarm limit should be set to 20% LEL. The safety system should be activated at 40% of LEL at two detectors.

6. **Ch 15, 801. 8** & **9** of this **Rules** is to be applied.

1508. Fire detection

Fire detection in machinery space containing fuel engines and fuel storage hold spaces should give audible and visual alarms on the navigation bridge and in a continuously manned central control station or safety centre as well as locally.

1509. Ventilation

Any loss of the required ventilating capacity should give an audible and visual alarm on the navigation bridge and in a continuously manned central control station or safety centre as well as locally.

1510. Safety functions of fuel supply systems

1. **Ch 15, 1101.** of this **Rules** is to be applied, except **Ch 15, 1101. 4**.

〈Newly Added〉

Table 1 Monitoring of gas supply system to engines

Parameter	Alarm	Automatic shutdown of tank valve (valve(s) referred to in Ch 9 501. 2)	Automatic shutdown of master fuel valve (valve(s) referred to in Ch 9 501. 3)	Automatic shutdown of bunkering valve
High-level fuel tank	X			X
High, high-level fuel tank	X			X
Loss of ventilation in the annular space in the bunkering line	X			X
Vapour detection in the annular space in the bunkering line	X			X
Loss of ventilation in ventilated areas	X			
Manual shutdown	X			X
Liquid methyl/ethyl alcohol detection in the annular space of the double walled bunkering line	X			X
Vapour detection in ducts around fuel pipes	X			
Vapour detection in cofferdams surrounding fuel tanks. One detector giving 20% of LEL	X			
Vapour detection in airlocks	X			
Vapour detection in cofferdams surrounding fuel tanks. Two detectors giving 40% of LEL	X	X		X
Vapour detection in ducts around double walled pipes, 20% LEL	X			
Vapour detection in ducts around double walled pipes, 40% of LEL	X	X	X	
Liquid leak detection in annular space of double-walled pipes	X	X	X	
Liquid leak detection in engine-room	X	X		
Liquid leak detection in fuel preparation space	X	X		
Liquid leakage detection in protective cofferdams surrounding fuel tanks	X			

〈Newly Added〉

Section 16 Training, Drills and Emergency Exercises

1601. Goal

The goal of this **Section** is to ensure that seafarers on board ships to which this **Annex** apply, are adequately qualified, trained and experienced.

1. Methyl/ethyl alcohol fuel-related drills and exercises should be incorporated into schedule for periodical drills.
2. **Ch 16, 101. 2** of this **Rules** is to be applied.
3. The response and safety system for hazards and accident control should be reviewed and tested.
4. The company should ensure that seafarers on board ships using fuels should have completed training to attain the abilities that are appropriate to the capacity to be filled and duties and responsibilities to be taken up.
5. The master, officers, ratings and other personnel on ships using fuels should be trained and qualified in accordance to the regulation V/3 of the STCW Convention and section A-V/3 of the STCW Code, taking into account the specific hazards of the methyl/ethyl alcohol used as fuel.

Section 17 Operation

1701. Goal

Ch 18, 101. of this **Rules** is to be applied.

1702. Functional requirements

Ch 18, 201. of this **Rules** is to be applied.

1703. Maintenance

1. Maintenance and repair procedures should include considerations with respect to the fuel containment system and adjacent spaces. Special consideration should be given to the toxicity of fuel.
2. **Ch 18, 301. 1** of this **Rules** is to be applied.

1704. Responsibilities for Bunkering operation

1. **Responsibilities**
   (1) Before any bunkering operation commences, the master of the receiving ship or their representative and the representative of the bunkering source (persons in charge, PIC) should:
      (A) agree in writing the transfer procedure including the maximum transfer rate at all stages and volume to be transferred;
      (B) agree in writing action to be taken in an emergency; and
      (C) complete and sign the bunker safety checklist.
   (2) Upon completion of bunkering operations, the ship PIC should receive and sign documentation containing a description of the product and the quantity delivered.
2. **Control, automation and safety systems**
   (1) The fuel handling manual required by **1702.** should include the requirements of **Ch 18, 402. 1** (1) and (4) ~ (9) of this **Rules** but not be limited to.
   (2) **Ch 18, 402. 2** of this **Rules** is to be applied.
3. **Pre-bunkering verification**
   (1) Prior to conducting bunkering operations, pre-bunkering verification including, but not limited to **Ch 18, 403. 1** (1), (3) ~ (5) of this **Rules** and the following, should be carried out and documented in the bunker safety checklist:
      (A) operation of fixed fire detection equipment;

(B) readiness of fixed and portable fire-fighting systems and appliances.

(2) **Ch 18, 403. 2** of this **Rules** is to be applied.

4. Ship bunkering source communications

Ch 18, 404. of this **Rules** is to be applied.

5. Electrical bonding

Consideration should be given to the electrical insulation between ship and shore. ⚓

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No : 2021-12-E
Date : 16 July 2021

To : All Surveyors and whom it may concern

Subject	9.148 Notice for Establishment to the KR Technical Rules - Guidance for Smart Ship Infrastructure
Application	21 July 2021

1. Please be informed that the "Guidance for Smart Ship Infrastructure" has been established as below, and you are kindly requested to apply the Guidance on the relevant works according to effective date.

2. Furthermore, please be informed that the establishment will be included in 2022 edition on KR Technical Rules which will be published in the first half of 2022.

--------- Follows ---------

Attachments: Guidance for Smart Ship Infrastructure (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

2021

Guidance for Smart Ship Infrastructure

KR

CONTENTS

CHAPTER 1 GENERAL

Section 1 General

101. General

With the advancement of information and communication technology and the digitalization of the shipping industry, installations of equipment to collect data related to the operation of ships through various means and use the collected data to optimize ship operation are increasing. Such data-related equipment plays an important role as an infrastructure that enables the smart functions in ships.

102. Objective

The purpose of this Guidance is to ensure the safety and reliability of the infrastructure of smart ships.

103. Class notation

Ships equipped with smart infrastructures may be assigned the additional installations notation of **Smart (INFRA)** according to this Guidance.

104. Application

The **Smart (INFRA)** notation in accordance with this Guidance can be applied to both existing and new ships.

Section 2 Drawings and Data

201. Drawings and data to be submitted

1. For smart ships subject to initial survey, the following drawings and data are to be submitted for reference to the Society. In addition, if deemed necessary by the Society, additional drawings and data other than those specified below may be requested.
   (1) Operation manual
   (2) Functional description
   (3) Software quality plan
   (4) Test procedure ⚓

CHAPTER 2 CLASSIFICATION SURVEYS

Section 1 Testing and Inspection

101. Initial survey

1. During initial survey of ships equipped with smart infrastructure, the following items are to be checked:

(1) Proper installation of the equipment related smart infrastructure

(2) Proper provision on board of all relevant documents, procedures manuals and record books ⚓

CIRCULAR

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Person in charge :Kim Hyunjung

No : 2021-13-E
Date : 2021. 6. 24

To : All Surveyors and whom it may concern

Subject	9.149 Notice for Amendment to the KR Technical Rules - Rules and Guidance for Pt 1 - Guideance for Remote Inspection Techniques
Application	1st August 2021 (Date of which application for survey is submitted)

1. Please be informed that the amendments have been made to the following KR Technical Rules 2021 as attachment to Requests for Establishment/Revision of Classification Technical Rules.

2. Furthermore, please be informed that the establishment will be included in 2022 edition on KR Technical Rules which will be published in the first half of 2022.

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)

June 2021

- Main Amendments -

(1) Effective date : 1 Aug. 2021 (Date of which the application for survey is submitted)

◉ Designation of a maximum agreed period for postponement of survey due to COVID-19.

◉ Updating requirements of Remote Inspection Techniquies(RIT)
- Due to the establishment of 「Guidance for Remote Inspection Techniquies(RIT)」

◉ Clarify the expression of terms

(1) Effective date : 1 Aug. 2021

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 9 Suspension/Withdrawal of Class and Reclassification **901. Suspension/Reinstatement of class**	**Section 9 Suspension/Withdrawal of Class and Reclassification** **901. Suspension/Reinstatement of class**
1. ~ 5. 〈omitted〉	**1. ~ 5. 〈same as the current Rules〉**
6. Force Majeure *(2020)* If, due to circumstances reasonably beyond the owner's or the Society's control, the vessel is not in a port where the overdue surveys can be completed at the expiry of the periods allowed, the Society may allow the vessel to sail, in class, directly to an agreed discharge port, and if necessary, hence, in ballast, to an agreed port at which the survey will be completed, provided the Society: (1) ~ (3) 〈omitted〉 (4) If, due to force majeure conditions such as Pandemic (e.g. COVID-19), the due survey of the vessel can not be completed at the expiry of the periods allowed, the Society may allow the vessel to sail, in class until the agreed period of postponement under the following conditions: *(2020)* (A) approval by the relevant flag state (if applicable) (B) exams the ship's records (C) carries out the due and/or overdue surveys and examination of Conditions of Class at the first port of call with available facilities where Surveyor can reasonably attend to complete. (D) review of evidence provided by the Owner confirming that the vessel is in a satisfactory condition in class for the agreed period of postponement (where the Society may request remote survey or acceptable photo, video or other evidence of condition of structures or equipment) (E) obtain written statement from the Master stating that the vessel is in compliance with the Rules and Regulations of the Society and is in condition to satisfactorily continue in service for the agreed period. 〈herein after, omitted〉	**6.** Force Majeure *(2020)* If, due to circumstances reasonably beyond the owner's or the Society's control, the vessel is not in a port where the overdue surveys can be completed at the expiry of the periods allowed, the Society may allow the vessel to sail, in class, directly to an agreed discharge port, and if necessary, hence, in ballast, to an agreed port at which the survey will be completed, provided the Society: (1) ~ (3) 〈same as the current Rules〉 (4) If, due to force majeure conditions such as Pandemic (e.g. COVID-19), the due survey of the vessel can not be completed at the expiry of the periods allowed, the Society may allow the vessel to sail, in class until the agreed period ~~of postponement~~ (maximum six (6) months, initial postponement/extension up to maximum three (3) months, and then additional postponement/extension up to further there (3) months) under the following conditions: *(2021)* (A) approval by the relevant flag state (if applicable) (B) exams the ship's records (C) carries out the due and/or overdue surveys and examination of Conditions of Class at the first port of call with available facilities where Surveyor can reasonably attend to complete. (D) review of evidence provided by the Owner confirming that the vessel is in a satisfactory condition in class for the agreed period of postponement (where the Society may request remote survey or acceptable photo, video or other evidence of condition of structures or equipment) (E) obtain written statement from the Master stating that the vessel is in compliance with the Rules and Regulations of the Society and is in condition to satisfactorily continue in service for the agreed period. 〈herein after, same as the current Rules〉

Present	Amendments
CHAPTER 2 CLASSIFICATION	**CHAPTER 2 CLASSIFICATION**
Section 1 General	**Section 1 General**
101. ~ 111. 〈omitted〉	**101. ~ 111. 〈same as the current Rules〉**
112. Remote Inspection Techniques (RIT) ***(2019)***	**112. Remote Inspection Techniques (RIT)** ***(2019)***
1. The RIT is to provide the information normally obtained from a close-up survey. RIT surveys are to be carried out in accordance with the requirements given here-in and the requirements of IACS Recommendation 42 'Guidelines for Use of Remote Inspection Techniques for surveys'. These considerations are to be included in the proposals for use of a RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Society.	1. The RIT is to provide the information normally obtained from a close-up survey. RIT surveys are to be carried out in accordance with the requirements given here-in, ~~and~~ the requirements of IACS Recommendation 42 'Guidelines for Use of Remote Inspection Techniques for surveys' and **Guidance for Remote Inspection Techniques**. These considerations are to be included in the proposals for use of a RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Society. *(2021)*
2. The equipment and procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the RIT survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.	2. The equipment and procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the RIT survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.
3. When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to **Guidance for Approval of Service Suppliers** and is to be witnessed by an attending surveyor of the Society.	3. When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to **Guidance for Approval of Service Suppliers** and is to be witnessed by an attending surveyor of the Society.
4. The structure to be examined using a RIT is to be sufficiently clean to permit meaningful examination. Visibility is to be sufficient to allow for a meaningful examination. The Society is to be satisfied with the methods of orientation on the structure.	4. The structure to be examined using a RIT is to be sufficiently clean to permit meaningful examination. Visibility is to be sufficient to allow for a meaningful examination. The Society is to be satisfied with the methods of orientation on the structure.
〈herein after, omitted〉	〈herein after, saem as the current Rules〉

Present	Amendments
Section 19 Special Requirements for Ships Subject to Korean Ship Safety Act or Fishing Vessels Act	**Section 19 Special Requirements for Ships Subject to Korean Ship Safety Act or Fishing Vessels Act**
〈omitted〉	〈same as present〉
1902. Special requirements for ships subject to Korean Fishing Vessels Act	**1902. Special requirements for ships subject to Korean Fishing Vessels Act**
1. to **2.** 〈omitted〉	**1.** to **2.** 〈same as present〉
3. For fishing vessels of 24 m in length and above and less than 5 years of age after launching date, Annual Surveys may be omitted.	**3.** For fishing vessels of 24 m in length and above and less than 5 years of age after launching date, Annual Surveys for statutory survey of Korean Government may be omitted.*(2021)*
〈herein after, omitted〉	〈herein after, same as present〉

Amended Guidance for the Classification of Steel Ships

(Part 1 Classification and Surveys)

June 2021

- Main Amendments -

(1) Effective date : 1 Aug. 2021 (Date of which the application for Classification Survey is submitted to the Society)

◉ Revision of the phrase to thoroughly inspect the condition of the ventilation opening in the machinery space

Present	Amendment
CHAPTER 2 PERIODICAL AND OTHER SURVEYS	**CHAPTER 2 PERIODICAL AND OTHER SURVEYS**
Section 2 Annual Survey	**Section 2 Annual Survey**
202. Hull, equipment and fire-extinguishing appliances	**202. Hull, equipment and fire-extinguishing appliances**
1. to **2.** 〈omitted〉	**1.** to **2.** 〈omitted〉
3. In application to **202. 2** of the Rules, the following items are to be surveyed. **【See Rule】** *(2017)* (1) to (5) 〈omitted〉 (6) Examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids.	**3.** In application to **202. 2** of the Rules, the following items are to be surveyed. **【See Rule】** *(2017)* (1) to (5) 〈same as present〉 (6) Examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings (Conducting internal inspection, and if deemed necessary by the Society's Surveyor, an overhaul inspection is to be carried out), the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids. *(2021)*
〈omitted〉	〈same as present〉

2021

Guidance for Remote Inspection Techniques

GC-39-E

KR

- Main Amendments -

(1) Effective date : 1st Aug. 2021 (Date of which application for survey is submitted)

◉ The “Guideline for Remote Inspection Techniques Using Drones” published in Jan. 2020 has been newly established as Guidance for “Remote Inspection Techniques”.

- Refer to the "Guidelines for ship survey using remote inspection techniques(RIT) equipment" punished by the Ministry of Oceans and Fisheries (effective on or after 1st May 2021)

Application of Guidance for "Remote Inspection Techniques"

1. Unless expressly specified otherwise, the requirement in the Guidance apply to ships for which the application for Classification Survey is submitted to the Society or or after 1st August 2021.

CONTENTS

Chapter 1 General

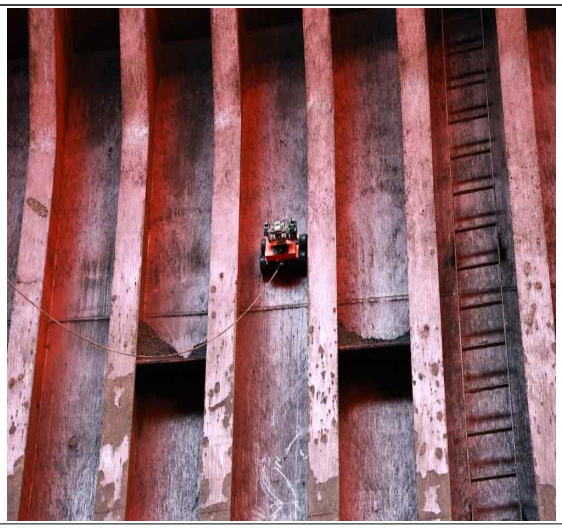
101. Definitions

1. **Remote Inspection Techniques (RIT)** is a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor. For surveys conducted by use of a remote inspection technique, one or more of the following means for access, acceptable to the Surveyor, is to be provided.

(1) Unmanned Aerial Vehicles (UAV) / Drones

	
Close-up Survey using Drone	Photo taken by Drone while Close-up Survey

(2) Unmanned robot arm
(3) Remotely Operated Vehicles, ROV
(4) Climbers
(5) Other means acceptable to the Society



Thickness measurement carried out by a crawler

2. **Close-up Survey** means a survey where the details of structural components are within the close visual inspection range of the Surveyor, i.e. normally within reach of hand.

3. **Service Supplier** means a person or company, not employed by an IACS Member, who at the request of an equipment manufacturer, shipyard, vessel's owner or other client acts in connection with inspection work and provides services for a ship or a mobile offshore unit such as measurements, tests or maintenance of safety systems and equipment, the results of which are used by surveyors in making decisions affecting classification or statutory certification and services.

4. **the Owner** means including Charterer, representatives of Owner, Representatives of Charterer and master of ship.

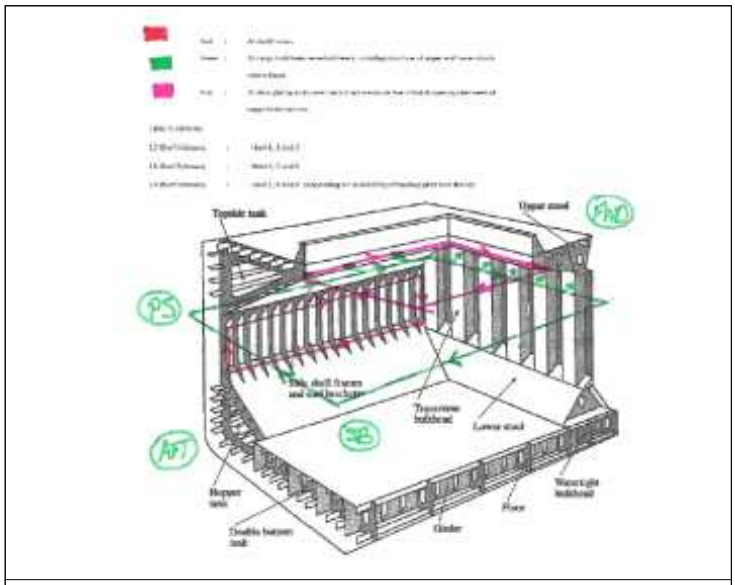
5. **Unmanned Aviation/Aerial Vehicle (UAV) / Drone means** a pilot-free aircraft capable of remote control or autonomous flight based on pre-programmed flight routes and/or dynamic automation systems.

6. **Operators** mean Operators (pilot mission) who directly controls the flight of the drone.

7. **Hazardous Areas mean** areas where flammable or explosive gases, vapors, or dust are generally present or may be present.

8. **Survey plans** means plans for the survey of various hull compartments, including an appropriate flight plan, if unmanned aerial vehicles are used, are recommended to be developed based on the extent of survey, requirements and the drawings of the dangerous areas of the ship.

9. **Flight Plan:** for safe flight, activities performed by flight personnel, such as supervisors, operators, and assistants, before take-off, in accordance with all applicable standards and regulations relating to flight, including weather, flight paths, flight zones, equipment composition, supporting personnel, communication requirements and other factors.



Example of flight plan

Chapter 2 Qualification of Service Suppliers

201. General

Where remote inspection techniques(hereafter referred to as “RIT”) is to be used as an alternative to close-up survey, it shall be carried out by Service Suppliers approved by the Society and the requirements and procedures of approval are to be in accordance with the Guidance for Approval of Service Suppliers.

Note: 1) The above Guidance can be found in our website (www.krs.co.kr) - “Rules and Solutions” - “Classification Technical Rules Service” - “Other Rules and Guidance” - “Guidance for Approval of Service Suppliers”.
2) For reference, the registration guide can be found in our website (www.krs.co.kr) - “Our Services” - “Service Supplier”.
3) In case of an emergency case, it is recommended that Service Suppliers maintain third party liability insurance.

Chapter 3 Survey using RIT

301. General

In case of using the RIT, the Owner shall select a Service Supplier approved by the Society. This chapter provides the procedures when surveys using RIT is used for classification survey and follows the Table 1.

Table 1 Classification Survey Flow for RIT

	the Owner	Service Supplier	KR (Branch Office)
Step 1	Select Service Supplier and provide ship's status and drawings to the Service Supplier		
Step 2		Submission of survey plans including: 1) Determine which equipment of RIT to use 2) Risk assessment according to the scope of work and establishment of RIT flight plan	
Step 3	Review and approve survey plans(incl. flight plan etc.) prepared by Service Supplier		
Step 4	Obtain flight-related approval from local government (if necessary)		
Step 5	Submit an application including survey plans to the KR branch		
Step 6			Review and approve the submitted survey plans
Step 7	Obtain work/site permit, crews, survey preparation, etc.		
Step 8	A survey planning meeting between the Owner, the Service Supplier and the attending Surveyor		
Step 9	Attend survey	Conduct RIT survey	Attend survey
Step 10		Provide survey results and data to the Owner and the attending Surveyor	
Step 11	Review reports submitted by the Service Suppliers		Review and evaluation of reports submitted by the Service Supplier (conduct confirmatory survey/Close-up survey/thickness measurement, if necessary)

302. Application

RIT is a tool to assist the attending Surveyor as an alternative to close-up survey. The acceptance of the survey results is to be confirmed by the Surveyor that the results meet the requirements of the Rules. If the Surveyor is dissatisfied with the results of the RIT, traditional methods may be required.

RIT may not be appropriate if any of the following conditions exist or are found during the survey.

(1) Any indication or condition that indicates damage or abnormality in the structure under survey.
(2) When the condition of the structure under survey affects the classification of the hull structure.
(3) Any damage or defect that requires immediate action during the survey is identified.
(4) The structure to be surveyed is not clean enough to be practically inspected and the view is not sufficient.

RIT is an effective way to identify unsatisfactory conditions such as defects and corrosion, but other approaches may be needed to determine the appropriate assessment and repair coverage.

303. Preparations for Survey

1. Submitted documents

(1) Prior to survey, the Owner shall submit the survey plans(including flight plan, prepared by a Service Supplier) containing the following information to the related KR Branch Office for approval.

(A) Main particulars
(B) Types of survey (eg Annual/Intermediate/Special Survey, Damage Survey)
(C) Scope of Survey (ie Close-up survey, thickness measurement, nondestructive test, etc.);
(D) After completion of the survey, confirmatory survey/close-up survey/thickness measurement place and method (when necessary)
(E) The place of survey, estimated time and operational status of the ship (e.g. shipyard, quay or anchorage, etc.)
(F) Transport procedures for site permits, operation work permits and transporting related equipment to the survey site.
(G) Business name and certificate number of the Service Supplier
(H) Equipment used
(I) Flight route / flight method / communication method
(J) Drone Pilot Certification
(K) If necessary, approval of the aeronautical authorities, etc. of the countries and regions having jurisdiction over the operating area of the flight area, and/or the approval of the local government
(L) Emergency Response Plan Evacuation Routes and Contacts
(M) Other drawings, etc. if deemed necessary by the Society

(2) Survey Planning Meeting
Prior to the commencement of the survey, the Owner, Service Supplier and the Surveyor shall hold a survey planning meeting to ensure that all items mentioned in the approved survey plans (including flight plan) are well prepared and thus safe and effective. This meeting shall discuss the following (A) and (B).

(A) Risk Assessment
In addition to the usual risk assessment, the Service Supplier shall conduct a case specific risk assessment to identify risks associated with the need for planned drone operations and the need for risk control measures. The risk assessment shall be conducted during an survey planning meeting attended by all parties and, where appropriate, incorporated into an approved survey plans.

Risk assessments include the following categories.

(a) Explosion risks in Hazardous Locations
Where RIT operation are conducted in hazardous areas, equipment used shall be explosion-proof(e.g. Ex-class) or the area shall be made for safe for use of RIT equipment. The Service Supplier shall refer to the dangerous area drawing on board to identify the

dangerous area.
In addition, where applicable, the safe operation requirements specified by the Owner, Service Supplier shall be followed, Typical factors to be considered include, but not limited of the following categories

i) Payload : risks associated with motors, cameras or other onboard modules
ii) Batteries : risks associated with storing, using, changing, replacing and recharging batteries
iii) Explosion due to operation incidents/accidents

(b) Risk of falling object : in case of malfunction or failure of RIT equipment, it can pose risks to the asset and onsite personnel as a falling object. Typical factors to be considered include, but are not limited to
i) take-off and landing areas
ii) mobile areas where the ship is in operation occupied by personnel

(c) Collision risks : unexpected changes in the survey environment, malfunctions of the RIT equipment, and/or human error may result in a collision.
i) collisions with birds, ship structures or operating equipment/machinery
ii) collisions due to communication failures or unexpected malfunctions of the RIT equipment
iii) collision where visual line of sight is not maintained or unexpected interruption of the pilot operation

(d) Other risks : Identify other risks in terms of personnel's health and safety
i) high-risk work areas that may contain high voltages, toxic gases or hazardous contents
ii) risks associated with other work in progress in the area during the RIT operation
iii) emergency scenarios that requires evacuation from the ship

(B) Flight Plan
(a) check the work scope of the intended flight plan
(b) evaluate flight conditions and determine if revision of the flight plan is necessary
(c) check the responsibilities of all personnel, including the Owner, Service Supplier and attending Surveyor
(d) review risks and associated mitigation plans
(e) review of emergency plans to escape or evacuate

All parties shall have the authority to suspend the operation immediately at any time as deemed necessary.

304. Conduct a Survey

1. General

(A) Survey shall be conducted under the presence of the Surveyor.
(B) The information obtained from the camera mounted on the RIT equipment shall be of sufficient quality(minimum requirement : 720 pixels or HD level or higher resoultion) to determine the condition of the ship's hull structure.
In addition, if necessary, appropriate illumination shall be installed on the RIT equipment or separately prepared.
(C) If the quality of the equipment related to the RIT is deemed inadequate, the survey related to the RIT may be cancelled by the Surveyor before the actual survey.
(D) RIT supervisor and operators shall act in accordance with the Surveyor's instructions. However, in the event that the instructions cannot be complied with during operation for safety reasons, the supervisor and the operator shall inform the attending Surveyor the reasons and consider alternative methods with the Surveyor.
(E) Remove or clean any obstructions if necessary.
(F) In the event that the required thickness measurement using the RIT cannot be carried out. temporary means of access for thickness measurement shall be provided.
(G) Data such as photos and videos taken from cameras mounted on RIT equipment shall be recorded.
(H) Reviews of recorded photos, videos should be carried out by the attending Surveyor and the relevant parties, either during survey or after completion of the survey, as soon as possible.

And additional survey by RIT or traditional methods, may be required if deemed necessary by the Surveyor.

2. Take off

(A) Communication: If the communication signal between team members is cut or interfered a lot, the operation shall be stopped immediately.

(B) Documentation: It is recommended that whenever exceptions are found during operation, reference data (i.e., still image capture, location, etc.) should be correctly documented for final reporting.

(C) Related to Drone

(a) Take-off and landing area: The take-off and landing areas shall be marked conspicuously and may, if necessary, restrict access to the take-off and landing areas.

(b) Visual line of sight(VLOS): Some aviation authorities require human direct and unaided VLOS is maintained throughout the operation. At the current level of RIT, it is recommended that VLOC is maintained even if there are no requirements applied.

The Surveyor shall be in or near the space to be surveyed and, if necessary, instruct the RIT operation team on survey requirements and execution.

3. After flight

(A) Logging

(a) Flight records such as date and time of survey start and end, still image, video image, etc.

(b) when an accident or a near miss is found during the operation, it shall be documented and reported to all parties so that the decision to suspend the operation or any other adjustment can be made on time.

305. Data Review

Three types of visual data(still image, real-time image, and recorded images) for surveying and evaluating the condition of the structure, shall be available to the attending Surveyor.

After completion of the flight, all visual data at the site shall be reviewed in all forms so that additional flight requests or alternative survey methods may be required, if necessary.

306. Reporting

The items to be listed in the report are as follows.

(1) Name of Firm carrying out RIT

(2) Name of supervisor and worker including certificate or training certificate number

(3) Survey date and location

(4) Name of RIT equipment used

(5) Name of ship, classification number, gross tonnage, port of registry and the Owner

(6) Survey information including kinds of survey, name and/or location of surveyed structure or space

(7) Survey details and results (damage, condition, etc.)

(8) Flight records related to still images and video images including date and time of survey start and end.

(9) In the event that survey is suspended due to an accident, the related records

(10) When submitting relevant data online to KR, a method considering the reliability of the data and the risk of leakage shall be used

Note : If review of the data identifies any situation that may affect classification, though not confirmed at the time of survey, the Owner shall notify the KR.

Chapter 4 Data

401. General

Data(e.g. still image, video image) collected by the equipment of the RIT are mostly visual information. Appropriate equipment for marking and reproducing this collected data shall be included.

402. Data Acquisition

Visual data collected during the flight shall be reviewed and evaluated at the designated time and place as agreed by all parties at the survey planning meeting. To evaluate the visual data collected by the equipment of the RIT, the following criteria shall be considered.

(1) Image quality shall be able to assess the structure's condition substantially and be suitable for identifying anomalies.
(2). If abnormalities are identified during the survey, the quality of the images shall enable the attending Surveyor to identify the nature, severity, and approximate dimensions of the anomaly, if applicable.
(3) The images of real-time or recorded video are not broken, so any part of the structure must be visible to the attending Surveyor.
(4) Data identifying structural members, particularly those related to anomalies, shall be collected for later tracking.

403. Post-Analysis Data

While most data assessments are performed in real time, either during or within a short period of time after flight, some Service Suppliers may provide post-analysis data for further evaluation.

404. Data Security

Service Suppliers shall comply with any statutory or requirements, company regulations, or contracts (where applicable) and recommend that cyber security is properly handled when implementing remote data access portals for customers.

GUIDELINE FOR REMOTE INSPECTION TECHNIQUE USING DRONES

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No : 2021-14-E
Date : 27 July 2021

To : All Surveyors and whom it may concern

Subject	9.150 Notice for Establishment to the KR Technical Rules - See below
Application	- See below

1. Please be informed that the "Guidance for the Classification of Steel Ships Pt 5" and "Guidance for Ships designed to Prevent the spread of Infectious Disease" have been established as below, and you are kindly requested to apply the Guidance on the relevant works according to effective date.

2. Furthermore, please be informed that the establishment will be included in 2022 edition on KR Technical Rules which will be published in the first half of 2022.

--------- below ---------

Amended KR Technical Rules	Effective Date	Main Amendments
Guidance for the Classification of Steel Ships Pt 5	The contract date for ship construction on or after 01.09.2021	- Sea trials programme of internal combustion engine - Alternative source of power for non-traditional steering gear - Guidance for enhanced shaft alignment
Guidance for Ships designed to Prevent the spread of Infectious Disease	The contract date for ship construction on or after 01.09.2021	The guidelines for ships designed to prevent the spread of infectious diseases have been newly established as guidance

Attachments: Guidance for the Classification of Steel Ships Pt 5 (K/E) --- each 1 copy. Guidance for Ships designed to Prevent the spread of Infectious Disease (K/E) --- each 1 copy. (The End)

(Form No. : FI-03-03) (20.06.2018)

Amended Guidance for the Classification of Steel Ships

Part 5 Machinery Installations

2021. 07

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Sep. 2021 (Date of which contracts for construction are signed)

◉ Test requirements of partial load in sea trials programme of internal combustion engine have been deleted.

◉ The requirement for an alternative source of power where the propulsion power does not exceed 2,500 kW have been deleted.

◉ Guidance for enhanced shaft alignment has been newly established.

〈Present〉 Guidance Pt 5, Ch 2, 211. 5

Table 5.2.3 Programme for Sea Trials (on-board tests) of Internal Combustion Engine

Use of engines / Test items		Propulsion engines driving propeller or impeller only[1]	Engines driving generators for electric propulsion and main power supply[2]	Propulsion engines also driving power take off (PTO) generator	Engines driving essential auxiliaries
110 % power run[3]		30 *minutes* at the speed of 1.032 times of the rated engine speed	10 *minutes* at the 110 % rated electrical power of generator	–	–
Approved intermittent overload (if applicable)		testing for duration as agreed with the manufacturer	–	–	testing for duration as agreed with the manufacturer
Load tests	100 % power run	4 *hours* at the rated engine speed	1 *hour* at the 100 % rated electrical power of generator	4 *hours* at the rated engine speed [4]	30 *minutes* at the rated engine speed
	90 % or Normal continuous cruise power run	2 *hours* at engine speed corresponding to nominal continuous cruise power	–	–	–
	75 % power run	reasonable hours at the rated engine speed for 1 or 2 kind of power run	–	–	–
	50 % power run		–	–	–
	25 % power run		–	–	–
Minimum engine speed test		○	–	–	–
Starting maneuvering test[5]		○	○	○	○
Reverse maneuvering test[6]		○	–	–	–
UMA test[7]		○	○	○	○
Alarms and safety devices test[8]		○	○	○	○
Test for fitness of fuel oil[9]		○	○	○	○

Table 5.2.3 Programme for Sea Trials (on-board tests) of Internal Combustion Engine (continued)

NOTES: (1) through (9) in this Table are subject to the following;

(1) For controllable pitch propellers, the tests are to be carried out at the maximum achievable power if 100 % cannot be reached, the tests are to be carried out at the various pitches. For controllable pitch propellers, the test at the speed of 1.032 × rated engine speed is not required. *(2021)*

(2) Each engine is to be tested 100 % electrical power for at least 60 min and 110 % of rated electrical power of the generator for at least 10 min. This may, if possible, be done during the electrical propulsion plant test, which is required to be tested with 100 % propulsion power (i.e. total electric motor capacity for propulsion) by distributing the power on as few generators as possible. The duration of this test is to be sufficient to reach stable operating temperatures of all rotating machines or for at least 4 hours. When some of the gen. set(s) cannot be tested due to insufficient time during the propulsion system test mentioned above, those required tests are to be carried out separately. Demonstration of the generator prime movers' and governors' ability to handle load steps as described in **Pt 6, Ch 1, 202. 2 of the Rules.**

(3) The test is to be carried out in case that engine adjustment permit (See **Table 5.2.2** Note 2. (2)). However, the test may be dispensed with when deemed appropriate by the Society in consideration of the result of the shop trials. *(2021)*

(4) The test is to be carried out for 2 hours with 100 % propeller branch power at rated engine speed (unless already covered in the test at 100 % power run). In addition, the test is to be carried out for 1 hour with 100 % PTO branch power at rated engine speed. *(2021)*

(5) The direct reversible engines are to be carried out ahead and astern starting repeatedly without replenishment, and the other engines are to be carried out starting and stop repeatedly without replenishment.

(6) For controllable pitch propellers in reverse pitch, for the direct reversible engine in reverse rotational direction during stopping tests, passages through the barred speed range are to be demonstrated in accordance with **211. 6** (2) of the Guidance.

(7) The test is to be carried out for ships which are going to be registered as ships provided with unattended machinery automatic systems.

(8) The monitoring and alarm systems are to be checked to the full extent for all engines, except items already verified during the works trials.

(9) The test is to be carried out for the engines used residue oil or equivalent thereto. However, the test may be dispense with when deemed appropriate by the Society or in the case of that the fitness was certified at the shop trial.

〈Amendment〉 Guidance Pt 5, Ch 2, 211. 5

Table 5.2.3 Programme for Sea Trials (on-board tests) of Internal Combustion Engine

Use of engines / Test items	Propulsion engines driving propeller or impeller only(1)	Engines driving generators for electric propulsion and main power supply(2)	Propulsion engines also driving power take off (PTO) generator	Engines driving essential auxiliaries
110 % power run(3)	30 *minutes* at the speed of 1.032 times of the rated engine speed	10 *minutes* at the 110 % rated electrical power of generator	–	–
Approved intermittent overload (if applicable)	testing for duration as agreed with the manufacturer	–	–	testing for duration as agreed with the manufacturer
100 % power run	4 *hours* at the rated engine speed	1 *hour* at the 100 % rated electrical power of generator	4 *hours* at the rated engine speed (4)	30 *minutes* at the rated engine speed
Minimum engine speed test	○	–	–	–
Starting maneuvering test(5)	○	○	○	○
Reverse maneuvering test(6)	○	–	–	–
UMA test(7)	○	○	○	○
Alarms and safety devices test(8)	○	○	○	○
Test for fitness of fuel oil(9)	○	○	○	○

Table 5.2.3 Programme for Sea Trials (on-board tests) of Internal Combustion Engine (continued)

NOTES: (1) through (9) in this Table are subject to the following;

(1) For controllable pitch propellers, the tests are to be carried out at the maximum achievable power if 100 % cannot be reached, the tests are to be carried out at the various pitches. For controllable pitch propellers, the test at the speed of 1.032 × rated engine speed is not required. *(2021)*

(2) Each engine is to be tested 100 % electrical power for at least 60 min and 110 % of rated electrical power of the generator for at least 10 min. This may, if possible, be done during the electrical propulsion plant test, which is required to be tested with 100 % propulsion power (i.e. total electric motor capacity for propulsion) by distributing the power on as few generators as possible. The duration of this test is to be sufficient to reach stable operating temperatures of all rotating machines or for at least 4 hours. When some of the gen. set(s) cannot be tested due to insufficient time during the propulsion system test mentioned above, those required tests are to be carried out separately. Demonstration of the generator prime movers' and governors' ability to handle load steps as described in **Pt 6, Ch 1, 202. 2 of the Rules.**

(3) The test is to be carried out in case that engine adjustment permit (See **Table 5.2.2** Note 2. (2)). However, the test may be dispensed with when deemed appropriate by the Society in consideration of the result of the shop trials. *(2021)*

(4) The test is to be carried out for 2 hours with 100 % propeller branch power at rated engine speed (unless already covered in the test at 100 % power run). In addition, the test is to be carried out for 1 hour with 100 % PTO branch power at rated engine speed. *(2021)*

(5) The direct reversible engines are to be carried out ahead and astern starting repeatedly without replenishment, and the other engines are to be carried out starting and stop repeatedly without replenishment.

(6) For controllable pitch propellers in reverse pitch, for the direct reversible engine in reverse rotational direction during stopping tests, passages through the barred speed range are to be demonstrated in accordance with **211. 6** (2) of the Guidance.

(7) The test is to be carried out for ships which are going to be registered as ships provided with unattended machinery automatic systems.

(8) The monitoring and alarm systems are to be checked to the full extent for all engines, except items already verified during the works trials.

(9) The test is to be carried out for the engines used residue oil or equivalent thereto. However, the test may be dispense with when deemed appropriate by the Society or in the case of that the fitness was certified at the shop trial.

Present	Amendment	Note
Annex 5-1 Requirements for the Water-jet Propulsion Systems and Azimuth or Rotatable Thrusters **1. Water-jet propulsion systems** (1) ~ (3) 〈omitted〉 (4) System design (A) ~ (E) 〈omitted〉 (F) Where the propulsion power exceeds 2,500 kW per thruster unit, an alternative source of power is to be provided in accordance with the following: (a) Any alternative source of power is to be capable of automatically supplying alternative power within 45 seconds to the deflector and its associated control system and its indication devices for deflector positions. (b) In every ship of 10,000 gross tonnage and upwards, the alternative power supply is to have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min. (c) The alternative source of power is to be either: (i) emergency source of electric power; or (ii) an independent source of power located in the steering gear compartment and used only for this purpose. (d) ~ (e) 〈omitted〉 (G) Electrical Installations for Steering and Reversing Systems Where hydraulic pumps for hydraulic power systems are driven by electric motors, electrical installations for steering and reversing systems are to comply with the following requirements : (a) ~ (g) 〈omitted〉 (h) Where the propulsion power does not exceed 2,500 kW per thruster unit and emergency generators are provided, one hydraulic power system for the steering system (including associated control systems) is to be served by exclusive circuits fed directly from emergency switchboards. In this cases, those exclusive circuits supplied through the emergency switchboards specified in above (a) may be used as this circuit. (hereafter, omitted)	**Annex 5-1 Requirements for the Water-jet Propulsion Systems and Azimuth or Rotatable Thrusters** **1. Water-jet propulsion systems** (1) ~ (3) 〈same as the present〉 (4) System design (A) ~ (E) 〈same as the present〉 (F) Where the propulsion power exceeds 2,500 kW per thruster unit, an alternative source of power is to be provided in accordance with the following: (a) Any alternative source of power is to be capable of automatically supplying alternative power within 45 seconds to the deflector and its associated control system and its indication devices for deflector positions. (b) In every ship of 10,000 gross tonnage and upwards, the alternative power supply is to have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min. (c) The alternative source of power is to be either: (i) emergency source of electric power; or (ii) an independent source of power located in the steering gear compartment and used only for this purpose. (d) ~ (e) 〈same as the present〉 (G) Electrical Installations for Steering and Reversing Systems Where hydraulic pumps for hydraulic power systems are driven by electric motors, electrical installations for steering and reversing systems are to comply with the following requirements : (a) ~ (g) 〈same as the present〉 ~~(h) Where the propulsion power does not exceed 2,500 kW per thruster unit and emergency generators are provided, one hydraulic power system for the steering system (including associated control systems) is to be served by exclusive circuits fed directly from emergency switchboards. In this cases, those exclusive circuits supplied through the emergency switchboards specified in above (a) may be used as this circuit.~~ (hereafter, same as the present Rules)	<Pt 5 Guidance> (Amendment) Deletion of the requirement for an alternative source of power where the propulsion power does not exceed 2,500 kW <application date: the date of contract for construction on or after 1 Sep. 2021>

Present	Amendment	Note
2. Azimuth or rotatable thrusters (1) ~ (3) 〈omitted〉 (4) System design (A) ~ (E) 〈omitted〉 (F) Where the propulsion power exceeds 2,500 kW per thruster unit, an alternative source of power is to be provided in accordance with the following: (a) Any alternative source of power is to be capable of automatically supplying alternative power within 45 seconds to the steering arrangement and its associated control system and its indication devices for azimuth angle. In every ship of 10,000 gross tonnage and upwards, the alternative power supply is to have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min. (b) The alternative source of power is to be either: (i) emergency source of electric power; or (ii) an independent source of power located in the steering gear compartment and used only for this purpose. (c) ~ (d) 〈omitted〉 (G) Electrical installations for azimuth steering gears Electrical installations for azimuth steering gears are to comply with the following requirements : (a) ~ (d) 〈omitted〉 (e) Where the propulsion power does not exceed 2,500kW per thruster unit and emergency generators are provided, one azimuth steering gear (including associated control systems) is to be served by exclusive circuits fed directly from emergency switchboards. In this cases, those exclusive circuits supplied through the emergency switchboards specified in (4) (E) (b) may be used as this circuit. (hereafter, omitted)	**2. Azimuth or rotatable thrusters** (1) ~ (3) 〈same as the present〉 (4) System design (A) ~ (E) 〈same as the present〉 (F) Where the propulsion power exceeds 2,500 kW per thruster unit, an alternative source of power is to be provided in accordance with the following: (a) Any alternative source of power is to be capable of automatically supplying alternative power within 45 seconds to the steering arrangement and its associated control system and its indication devices for azimuth angle. In every ship of 10,000 gross tonnage and upwards, the alternative power supply is to have a capacity for at least 30 min of continuous operation and in any other ship for at least 10 min. (b) The alternative source of power is to be either: (i) emergency source of electric power; or (ii) an independent source of power located in the steering gear compartment and used only for this purpose. (c) ~ (d) 〈same as the present〉 (G) Electrical installations for azimuth steering gears Electrical installations for azimuth steering gears are to comply with the following requirements : (a) ~ (d) 〈same as the present〉 ~~(e) Where the propulsion power does not exceed 2,500 kW per thruster unit and emergency generators are provided, one azimuth steering gear (including associated control systems) is to be served by exclusive circuits fed directly from emergency switchboards. In this cases, those exclusive circuits supplied through the emergency switchboards specified in (4) (E) (b) may be used as this circuit.~~ (hereafter, same as the present Rules)	<Pt 5 Guidance>

New	Note
Annex 5-12-1 Enhanced Shaft Alignment *(2021)*	<Pt 5 Guidance> (Amendment) Enhanced Shaft Alignment 〈application date: the date of contract for construction on or after 1 Sep. 2021〉
1. Application (1) This annex addresses the enhanced requirements of design, procedure and verification for shaft alignment in addition to the requirements in **Annex 5-12**. The sensitive installations to the shaft alignment (e.g. tankers, bulkers and twin screw vessels and shafting with no forward stern tube bearings, etc.) are the main targets of application, but can be extended if requested. (2) The requirements of this annex are optional, and ships satisfying the requirements of this annex may be assigned a notation specified in **2.** as additional special feature notations.	
2. Class notations Ships satisfying the requirements of this annex may be assigned the following notation as additional special feature notations. (1) Where the enhanced requirements of design for shaft alignment in **3.** are satisfied, the notation of ESA1 may be assigned. (2) Where the enhanced requirements of design, procedure and verification for shaft alignment in **3.** and **4.** are satisfied, the notation of ESA2 may be assigned.	- ESA(Enhanced Shaft Alignment)
3. The requirements for ships assigned ESA1 notation In order to register as ships with the ESA1 notation, the following requirements of the enhanced design for shaft alignment are to be satisfied. (1) Drawings and data to be submitted (A) Description of shafting system such as shaft diameter, shaft material, bearing length, bearing liner material, and bearing axial position, bearing clearance, propulsion system specifications (B) Stern tube lubricant specifications, (manufacturer, type and viscosity) (C) Propeller dimensional data, weight and buoyancy effect, including propeller cap and energy saving devices (D) Hydrodynamic propeller loads in running conditions including ship turning condition (E) For geared installations, gear forces and moments (F) External forces acting on crankshaft (G) Axial positions of the bearings points of support (H) Bearing Stiffness values for all bearings in the shaftline (I) Definition of a reference line (J) Bearing offsets from reference line (K) Thermal displacement of the bearings between cold static and hot static machinery conditions (L) Effect of predicted hull deflections over the range of the ship's operating drafts	

New	Note
(M) Calculated bearing loads for all considered conditions (N) Calculated shaftline deflection for all considered conditions (O) Bending moment and shear force curves along the shaftline for static and dynamic conditions (P) Misalignment angle between the shaft and the aft most bearing (aft stern tube bearing or aft most strut bearing) for all considered conditions or the alternative modelling techniques according to (5) (Q) Whirling Vibrations calculations (2) Hydrodynamic propeller loads (A) Transverse and vertical hydrodynamic propeller loads in the following ship conditions are to be used in the shaft alignment calculations. (a) Straight ahead condition at MCR at ballast draft (b) Straight ahead condition at MCR at full loaded draft (c) Full rudder turn to port and starboard at MCR at ballast draft (d) Full rudder turn to port and starboard at MCR at full loaded draft A turning condition is hereby defined as the condition in which the vessel is performing a steady state full rudder turn to port or starboard, commencing from a straight course at a ballast or full loaded draft at MCR condition. (B) Hydrodynamic propeller loads can be estimated by calculations (lifting surface method, boundary panel method, CFD, etc.) or based on empirical/database formulae duly justified. (C) Where hydrodynamic propeller loads as per (B) are not available, then empirical formulae for hydrodynamic propeller loads in **Table 1** are to be used for the dynamic condition calculations as shown in the following table. **Table 1 Empirical formulae for hydrodynamic propeller loads** Straight ahead condition: For single screw vessel: −5% of Q / +30% of Q; For twin screw vessel: +/−20% of Q Turning condition: For single screw vessel: −30% of Q; For twin screw vessel: −40% of Q NOTES: Q : Torque at MCR + : Upward moment about the transverse axis − : Downward moment about the transverse axis	

New	Note
(3) Hull deflections (A) The hull deflections in the following ship conditions are to be used in the shaft alignment calculations. In addition, the hull deflections for the aft peak tank empty and full (or the maximum level in the ship loading manual) is to be evaluated. (a) Dry dock or aft launching draft (lightship condition or close to lightship condition with minimum ballast) (b) Ballast draft (c) Full loaded draft (B) Hull deflections can be estimated by finite element calculations or by measurements from similar vessels (same type, similar vessel size, similar double bottom height in the area of the engine room, similar stern tube and stern arrangement) or other recognized calculation methodologies. (4) Shaft alignment calculations (A) In order to determine the shaft alignment that satisfies the various operating conditions of the ship, the shaft alignment calculations in the following conditions are to be performed. (a) Cold, static, dry dock or aft launching draft (lightship condition or close to lightship condition with minimum ballast) with propeller partially immersed (b) Hot, static, ballast draft with propeller fully immersed (c) Hot, ballast draft with propeller fully immersed in dynamic condition including hydrodynamic propeller loads according to (2) (d) Hot, static, full loaded draft with propeller fully immersed (e) Hot, full loaded draft with propeller fully immersed in dynamic condition including hydrodynamic propeller loads according to (2) (5) Contact between the shaft and the aft most bearing (aft stern tube bearing or aft most strut bearing) The misalignment angle between the shaft and the aft most bearing is not to exceed 0.3×10^{-3} rad under all ship conditions which the shaft alignment calculations are performed. When alternative recognized modelling techniques are used, such as 3D Finite Element Modelling with Fluid Structure Interaction between the bearing oil film and the rotating shaft, the relevant assumptions and practices are to be detailed in the submitted calculation report. If a 3D Finite Element Modelling with Fluid Structure Interaction between the bearing oil film and the rotating shaft is used, the misalignment angle criterion can be replaced by an oil film thickness criterion so that the oil film thickness to be not below 30 μm under all ship conditions which the shaft alignment calculations are performed; other criteria may be considered acceptable by the Society on a case by case basis.	

New	Note
(6) Whirling vibrations (A) Calculations are to be submitted to ensure that whirling vibration frequencies are satisfactory throughout the speed range. The calculations are to take into account bearing and oil-film stiffness and gyroscopic effects. The calculations are to investigate the excitation frequencies giving rise to all critical speeds within the speed range. (B) The whirling critical speeds are not to be within the range of ±20% of MCR. (7) STCM notation Oil lubricated stern tube shaft that the approved condition monitoring scheme in accordance with **Pt 1, Ch 2, 701. 2** of the Guidance is applied, is to be installed and the notation of STCM is to be assigned.	

New	Note
4. The requirements for ships assigned ESA2 notation In order to register as ships with the ESA2 notation, in addition to the requirements of EAS1 in **3**, the following requirements of the enhanced procedure and verification for shaft alignment are to be satisfied. (1) Data to be submitted (A) Shaft alignment procedure including final sighting and the followings (a) Bearing locations (including temporary supports), bearing offsets in respect of the reference line and bearing loads. (b) Bearing offset tolerances (c) Jack up positions and correction factors (d) Bearing load with tolerances (e) Bearing reaction influence coefficients (B) Bearing run-in procedure (C) Shaft alignment verification procedure during sea trials (2) Final sighting (A) After the stern structure is in place and heavy equipment such as engines, boilers, generators, etc. are installed and major welding works are completed at the aft part of ships, final sighting is to be carried out in the presence of the Surveyor. (B) The final sighting is to extend from the aft most bearing (aft stern tube bearing or aft most strut bearing), up to the engine or gearbox (if applicable) output flange, and is to be used to adjust the relative position of the engine and intermediate bearings in respect of the stern tube bearings. (C) Sufficient number of targets are to be utilized during the sighting-through, to ensure satisfactory accuracy in verification of bearings offsets. (D) The sighting procedure may be carried out by recognized methods, e.g. piano wire, optical sighting or laser sighting. (E) The bearings and engine/gearbox offsets (vertical and horizontal) in respect of the reference line are to correspond to those in the calculation with a tolerance of ± 0.1 mm. (F) When final sighting is carried out, shaft alignment by gap and sag method is not required.	

New	Note
(3) Bearing run-in procedure (A) Bearing run-in is to be carried out in the presence of the Surveyor. A bearing run-in procedure, to be agreed between the Surveyor and the yard, is to be conducted preferably with fully immersed propeller. If this is not possible due to shallow waters, then the lowest possible RPM for navigation and the lowest possible helm angles are to be used to avoid exposing the new bearings into high stresses and temperatures. (B) Bearing run-in procedure is to be carried out as soon as possible prior to commencing full operational sea trials. The procedure gradually exposes the stern tube bearing to increased loads and assists with bedding the stern tube shaft in a controlled manner to the stern tube bearing to create proper contact with the bearing bottom surface. It also prepares the stern tube bearings to withstand various service loads without sustaining damage. (C) During the bearing run-in, the aft stern tube bearing temperature is to be closely monitored. If bearing temperature rises at a rate faster than a previously agreed rate, such as 5℃/min, or exceeds expected temperature threshold then the rudder angle is to be immediately set to zero and the engine speed is to be immediately reduced to minimum, or shut down – until the bearing temperature lowers to an acceptable level and stabilizes accordingly. Temperatures exceeding the high temperature alarm settings and high temperatures increase rate to be reported to the Society. If previously agreed allowable limits, design criteria or alarm settings are exceeded, the shipyard may request to repeat the bearing run-in procedure. Repeating is subject to Society agreement; otherwise further investigation is to be carried out. (D) Once a bearing run-in procedure is completed satisfactorily, the parts of the sea trials addressing the propulsion system and shaftline may commence.	

New	Note
(4) Shaft alignment verification during sea trials (A) The sea trial is to be carried out in the presence of the Surveyor with stern tube lubricant according to specification in the shaft alignment calculation report. The aft stern tube bearing temperature is to be recorded during verification. (B) The following movements are to be included in the sea trial program after the vessel stabilizes at a full ahead condition, at a zero-rudder angle (straight ahead) and ballast condition. (a) Perform one 360 degree turn to the port by swiftly changing the rudder angle from 0 to full rudder angle and a full ahead setting. At the completion of the turn, return the rudder angle to zero (straight ahead). (b) Keep the rudder angle to zero for 5 minutes at a full ahead setting. (c) Perform one 360 degree turn to the starboard by swiftly changing the rudder angle from 0 to full rudder angle and a full ahead setting. At the completion of the turn, return the rudder angle to zero (straight ahead). (d) Keep the rudder angle to zero for 5 minutes and at a full ahead setting. (C) If the recorded bearing temperature rate of rise does not exceed a previously agreed rate, such as 5℃/min, or the high temperature alarm settings then the sea trial bearing performance for shaft alignment is regarded as satisfactory. If previously agreed allowable limits, design criteria or alarm settings are exceeded then the whole test in (B) may be repeated subject to the Society's acceptance and considered passed if satisfactory results are demonstrated twice. The results of the test (maximum rate of temperature rise and maximum bearing temperature, as well as alarm set point) are to be included in the sea trial report. A root cause analysis is to be initiated to reveal the possible cause of the damage, if bearing is deemed to be damaged. (D) In order to verify the bearing loads in various ship conditions, the bearing loads in the following conditions are to be additionally measured in the presence of the Surveyor during sea trials. (a) Ballast draft with the aft peak tank full (or the maximum level in the ship loading manual) at hot static condition, and the measured bearing loads are not to be exceeded bearing manufacturer's limits. (b) Full loaded draft at hot static condition, and the measured bearing loads are not to be exceeded the bearing manufacturer's limits. However if full loaded draft condition is not foreseen during sea trials, then the jack up test values at ballast draft hot static condition are to be performed and the bearing load values to be not above 80% of the bearing manufacturer's limits.	

Amended Guidance for Ships designed to Prevent the spread of Infectious Disease

2021. 07.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Sep. 2021 (Date of which contracts for construction are signed)

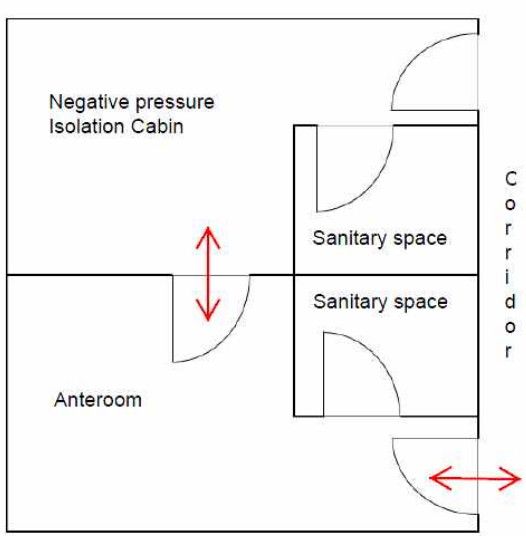
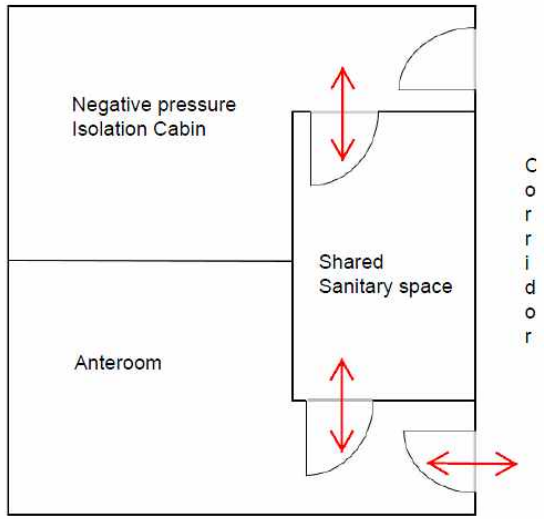
◉ The guidelines for ships designed to prevent the spread of infectious diseases have been newly established as guidance.

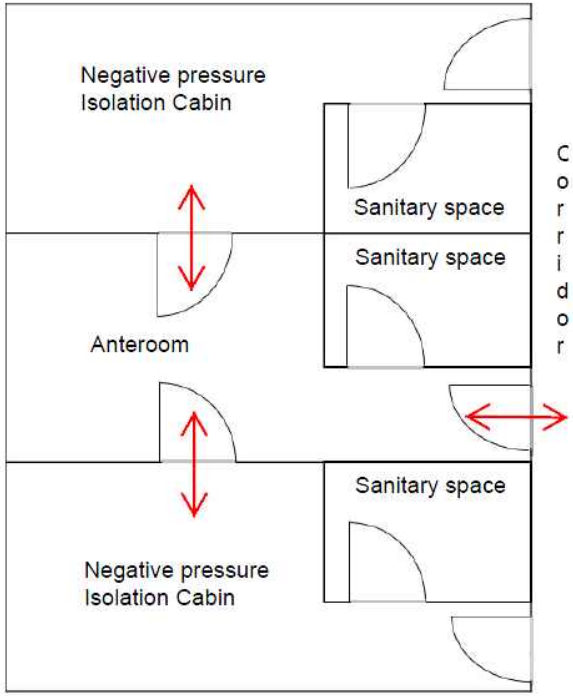
New	Note
# Guidance for Ships designed to Prevent the spread of Infectious Disease ## Section 1 General **101. Application** **1.** This guidance provides design and survey requirements to prevent the spread of infectious disease through isolation of suspected and confirmed persons, and separation of shore personnel and visitors from existing crew in the event of an outbreak of an infectious disease on board (hereinafter referred to as "outbreak"). **2.** The requirements of this guidance are optional, and ships satisfying the requirements of this guidance may be assigned a notation specified in **103.** as additional special feature notations. **102. Definitions** The definitions of terms in this guidance are as follows. **1. Negative pressure isolation cabin** is to be a cabin with a sanitary space maintaining continuous negative pressure to isolate suspected and confirmed persons in the event of an outbreak. The sanitary space can be accessed directly from the cabin, and a toilet and a shower facility are to be installed. **2. Anteroom** is to be a small space located between the negative pressure isolation cabin and the corridor as a space to prevent air infection as well as a preparation space for carrying out infection prevention management. **3. HEPA filter or equivalent filter** is to be a HEPA filter (removing more than 99.97% of 0.3μm particles) or a filter with equivalent decontamination capability. **103. Class notations** Ships satisfying the requirements of this guidance may be assigned the notation of PID as additional special feature notations. **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**.	(Amendment) Guidance for ships designed to Prevent the spread of Infectious Disease 〈application date: the date of contract for construction on or after 1 Sep. 2021〉 - PID (**P**revention of the spread of **I**nfectious **D**isease)

New	Note
105. Drawings and documents to be submitted **1.** Where ships are intended to be assigned the notation of **PID**, the drawings and documents listed below are to be submitted to the Society for approval prior to commencement of construction. In addition, if deemed necessary by the Society, additional drawings and documents other than those specified below may be requested. (1) Accommodation plans for each deck related to the design to prevent the spread of infectious disease (2) Schematics drawings, layout drawings and design specifications for ventilation system related to the design to prevent the spread of infectious disease (3) List of finishing materials such as ceilings, floors, walls of negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors and storage space of infectious solid waste ## Section 2 Classification Surveys **201. General** **1.** This section provides the requirements for classification surveys related to ships designed to prevent of infectious disease. In addition to those specified in this section, the requirements of **Pt 1** of **Rules for the Classification of Steel Ships** are to be followed. **202. Classification survey during construction** **1.** Where ships are intended to be assigned the notation of **PID**, the surveyors attending the classification survey during construction are to verify the following. (1) Negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, and storage space of infectious solid waste are installed in accordance with the design requirements of **Sec 3** (2) Anterooms maintain the negative pressure of at least -2.5 Pa compared to the corridor, and that negative pressure isolation cabins maintain the negative pressure of at least -2.5 Pa compared to anterooms with the ventilation system on. This is confirmed by reading the differential pressure indicator when differential pressure indicators are installed, or by measuring with the portable differential pressure manometer when small pipes are installed. Other means deemed appropriate by the Surveyor of the Society may be accepted. (3) Hospital rooms maintain the negative pressure of at least -2.5 Pa compared to the corridor or other spaces directly accessible to the hospital room with the ventilation system on. This is confirmed by reading the differential pressure indicator when differential pressure indicators are installed, or by measuring with the portable differential pressure manometer when small pipes are installed. Other means deemed appropriate by the Surveyor of the Society may be accepted.	

New	Note
(4) Telemedicine facility is installed in accordance with the requirements of **307.** (5) Laundry room is installed in accordance with the requirements of **308.** **203. Annual survey** **1.** In order to maintain the notation of **PID**, the surveyors during the annual survey are to verify the following. (1) After the previous survey, checking whether there are any changes affecting the design requirements of **Sec 3** in negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, and storage space of infectious solid waste. (2) One or more negative pressure isolation cabins, one or more anterooms, and one or more other places (other places mean hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, and storage space of infectious solid waste.) are selected and checked whether they are maintained in accordance with the design requirements of **Sec 3**. (3) Select one space and check whether the differential pressure is maintained in accordance with the requirements of **202. 1** (2) and (3) above. **204. Intermediate survey** **1.** In order to maintain the notation of **PID**, the intermediate survey is to be conducted in accordance with the same requirements of the annual survey. **205. Special survey** **1.** In order to maintain the notation of **PID**, the surveyors during the special survey are to verify the following. (1) After the previous survey, checking whether there are any changes affecting the design requirements of **Sec 3** in negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, and storage space of infectious solid waste. (2) All negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, and storage space of infectious solid waste are checked whether they are maintained in accordance with the design requirements of **Sec 3**. (3) Check whether the differential pressure in all relevant spaces is maintained in accordance with the requirements of **202. 1** (2) and (3) above. (4) Telemedicine facility is maintained in accordance with the requirements of **307.** (5) Laundry room is maintained in accordance with the requirements of **308.**	

New	Note
Section 3 Design Requirements **301. General** **1.** This section provides the requirements for construction, arrangement, materials, and ventilation for negative pressure isolation cabins, anterooms, hospital rooms, sanitary spaces and offices designated for shore personnel and visitors, storage space of infectious solid waste and laundry rooms related to the design to prevent the spread of infectious disease in the event of an outbreak. **2.** The ventilation requirements given in this section are only required in the event of an outbreak. The ventilation system is to provide normal operation mode and outbreak operation mode, and it is possible to easily being switched to outbreak operation mode in the event of an outbreak. **3.** When small pipes are installed as a means to check the differential pressure in negative pressure isolation cabins, anterooms, and hospital rooms, at least one portable differential pressure manometer is to be provided on board. **302. Negative pressure isolation cabins** **1. General** (1) Negative pressure isolation cabins are to be single room and to be able to accommodate at least 5% of the total complement. (2) Normal cabins satisfying the requirements of **302.** are able to converted into negative pressure isolation cabins in the event of an outbreak, and are included in the number of negative pressure isolation cabins in (1) above. (3) When negative pressure isolation cabins are in use due to an outbreak, it is to be clearly marked as "Negative pressure isolation cabin" so that it can be easily identified from the outside. (4) Negative pressure isolation cabins is to have windows that provide an adequate view to the outside. For open type windows it is to be closed to maintain the negative pressure and to be constructed to maintain air tightness in the cabins in the event of an outbreak. Negative pressure isolation cabins and anterooms are not to have balconies. (5) Negative pressure isolation cabins are to have a sanitary space with separate toilet and shower facility, and non-contact automatic faucet is to be installed in the wash basin. **2. Interior construction and materials** The interior construction and materials of negative pressure isolation cabins, anterooms, and sanitary spaces related to the design to prevent the spread of infectious disease are to satisfy the following requirements. (1) For indoor materials such as walls and ceilings, materials with good sealing performance are to be used to maintain negative pressure. The connections of walls, ceilings, and floors are to be constructed to maintain air tightness. (2) Attached devices such as sockets and switches, and joints such as air conditioning, sanitation, electric, and piping are to be constructed to maintain airtightness so as not to become a path for air leakage.	

New	Note
(3) Finishing materials such as walls, ceilings, and floors are to have strong impermeability and chemical resistance, and not to be perforated or corrugated for easy cleaning. The use of unfinished wood as a surface material is to be avoided. (4) All corners, such as the corners where floors and walls meet, are to be rounded as much as possible to avoid dust and make it easy to clean. (5) Textiles and fabrics that are difficult to wash are not to be used on floors, walls and furniture. Mattresses are to have an impermeable cover. **3. Arrangement** (1) Negative pressure isolation cabins are to be located near the corridor or stair with direct exit to the outside spaces that lead to the embarkation and disembarkation station, and are installed together in one place as possible. (2) An anteroom is to be installed between a negative pressure isolation cabin and a corridor. A normal room may be converted and used to an anterooms in the event of an outbreak. In this case, a door that allows direct access to the negative pressure isolation cabin from the anteroom is to be installed. Refer to **Fig 1** and **Fig 2** as examples related to the arrangement of negative pressure isolation cabins and anterooms. (3) Doors of negative pressure isolation cabins and anterooms are to comply with the requirements of **Table 1**.   * In this case, shared sanitary space is treated as a sanitary space belonging to negative pressure isolation cabin. **Fig 1 Example of arrangement of negative pressure isolation cabins and anterooms (in case of one negative pressure isolation cabin and one anteroom)**	

New	Note
 Fig 2 Example of arrangement of negative pressure isolation cabins and anterooms (in case of two negative pressure isolation cabins and one anteroom)	

New	Note

Table 1 Doors of negative pressure isolation cabins and anterooms

Requirements for door	Door location		
	between the corridor and anteroom	between the anteroom and the negative pressure isolation cabin	between the negative pressure isolation cabin and corridor
Maintaining air-tightness	O	O	O
Installing hold back device	X	X	-
Installing self closing device	O	O	-
Warning notice that two doors must not open at the same time	O	O	-
Doors swing into the anteroom	-	O	-
Louvers to be closed, if installed, in the event of an outbreak	O	O	O
Warning notice for the prohibition of use in the event of an outbreak	-	-	O
NOTES O : required X : prohibited - : not applicable			

4. Ventilation system

The requirements for ventilation system of negative pressure isolation cabins (including associated sanitary spaces) and anterooms (including associated sanitary spaces) are in accordance with the following.

(1) The air changes per hour in negative pressure isolation cabins (including associated sanitary spaces) and anterooms (including associated sanitary spaces) is to be at least 6 times, and 12 or more times is recommended.

(2) Anterooms are to maintain the negative pressure of at least -2.5 Pa compared to the corridor, and negative pressure isolation cabins are to maintain the negative pressure of at least -2.5 Pa compared to the anteroom. As shown in **Fig 1**, when the negative pressure isolation cabin and anteroom have a shared sanitary space, the boundary of the negative pressure is to be between the shared sanitary space and anteroom.

(3) Exhaust air from negative pressure isolation cabins (including associated sanitary spaces) and anterooms (including associated sanitary spaces) are not to be recirculated to other spaces even if filtered with HEPA filter or equivalent filter.

New	Note
(4) In order to prevent contaminated air from flowing back in the event of a shutdown or failure of the ventilation system, a HEPA filter or equivalent filter is to be installed, or a non return damper or flap is to be installed in the duct of air supply into negative pressure isolation cabins and anterooms. However, when a common air supply duct is used, a HEPA filter or equivalent filter is to be installed, or a non return damper or flap is to be installed in the duct branch connected to each room. (5) Exhaust air inlets in negative pressure isolation cabins are to be placed as close to the bed as possible. (6) Exhaust ducts from negative pressure isolation cabins (including associated sanitary spaces) and anterooms (including associated sanitary spaces) are to be separated from exhaust ducts of other spaces. In addition, exhaust fans of exhaust ducts are to be installed outdoor as applicable, and if installed indoor, the downstream of the duct after the exhaust fan is to be welded or sealed. (7) Exhaust ducts from each of the negative pressure isolation cabin (including the associated sanitary space) and anterooms (including the associated sanitary space) are to be exhausted independently. However, if a HEPA filter or equivalent filter is installed, or a non return damper or flap is installed in exhaust duct branch in each space, a common exhaust duct may be used in downstream of the filter, damper or flap. (8) Exhaust outlets from negative pressure isolation cabins (including associated sanitary spaces) and anterooms (including associated sanitary spaces) are to be located on the highest deck of the accommodation and to be not less than 8 m away from the intakes, natural ventilation openings, doors and open windows. However, if all contaminated air from each space is discharged to the outside through a HEPA filter or equivalent filter, exhaust outlets may be located on the adjacent deck and the above distance may be reduced to 2m. Appropriate means are to be taken so that the wind direction from the exhaust outlets is not directed toward adjacent passageway, intakes, natural ventilation openings, doors and open windows. (9) The warning notice indicating contaminated air is to be attached to the exhaust outlets from each of the negative pressure isolation cabin (including the associated sanitary space) and the anteroom (including the associated sanitary space). (10) Means are to be provided to check the differential pressure between the negative pressure isolation cabin and the anteroom, and between the anteroom and corridor. This may be a differential pressure indicator displayed up to the unit of 0.1 Pa (however, a differential pressure indicator displayed up to 1 Pa unit may be installed where the differential pressure is secured over 4 Pa) or a small pipe installed through a door or wall to measure the differential pressure. This pipe must be sealed when not in use.	

New	Note

303. Hospital rooms

1. Interior construction and materials

(1) The interior construction and materials of hospital rooms are to satisfy the requirements in **302. 2**.

2. Arrangement

(1) Hospital rooms are to be located near the corridor or stair with direct exit to the outside spaces that lead to the embarkation and disembarkation station.

(2) Where the space inside the hospital rooms satisfies the requirements of **302.**, this space may be used as a negative pressure isolation cabin in the event of an outbreak.

(3) Entrance doors of hospital rooms are to comply with the requirements of **Table 2**.

Table 2 Entrance doors of hospital rooms

Requirements for door	Application
Maintaining air-tightness	O
Installing hold back device	X
Installing self closing device	O
Louvers to be closed, if installed, in the event of an outbreak	O
NOTES O : required X : prohibited	

New	Note
3. Ventilation system The requirements for ventilation system of hospital rooms are in accordance with the following. (1) The air changes per hour in hospital rooms is to be at least 6 times, and 12 or more times is recommended. (2) Hospital rooms are to maintain the negative pressure of at least -2.5 Pa compared to the corridor or other spaces directly accessible to the hospital room. (3) Each separate space with a door in the hospital room is to have an air supply and an air exhaust. (4) A HEPA filter or equivalent filter is to be installed, or a non return damper or flap is to be installed in the supply air duct into the hospital room. (5) Exhaust ducts from hospital rooms are to be separated from exhaust ducts of other spaces. (6) Exhaust outlets from hospital rooms are to be not less than 8 m away from the intakes, natural ventilation openings, doors and open windows. However, if all contaminated air from each space is discharged to the outside through a HEPA filter or equivalent filter, the above distance may be reduced to 2 m. Appropriate means are to be taken so that the wind direction from the exhaust outlets is not directed toward adjacent passageway, intakes, natural ventilation openings, doors and open windows. (7) Means are to be provided to check the differential pressure between the hospital and the corridor or other spaces directly accessible to the hospital room. This may be a differential pressure indicator displayed up to the unit of 0.1 Pa (however, a differential pressure indicator displayed up to 1 Pa unit may be installed where the differential pressure is secured over 4 Pa) or a small pipe installed through a door or wall to measure the differential pressure. This pipe must be sealed when not in use. **304. Sanitary spaces designated for shore personnel and visitors** At least one designated sanitary space that can be used by shore personnel and visitors in the event of an outbreak is to be installed, and the notice “Shore personnel and visitors use only” is to be posted at the entrance. **1. Interior construction and materials** (1) The interior construction and materials of sanitary spaces designated for shore personnel and visitors are to satisfy the requirements in **302. 2**. **2. Arrangement** (1) Sanitary spaces designated for shore personnel and visitors are to be arranged to minimize the possibility of contact with crew, and to be easily accessible from outside entrances.	

New	Note
3. Ventilation system (1) The air changes per hour in sanitary spaces designated for shore personnel and visitors is to be at least 15 times. (2) Exhaust outlets from sanitary spaces designated for shore personnel and visitors are to be not less than 8 m away from the intakes, natural ventilation openings, doors and open windows. However, if all contaminated air from each space is discharged to the outside through a HEPA filter or equivalent filter, the above distance may be reduced to 2 m. Appropriate means are to be taken so that the wind direction from the exhaust outlets is not directed toward adjacent passageway, intakes, natural ventilation openings, doors and open windows. **305. Offices designated for shore personnel and visitors** At least one designated office that can be used by shore personnel and visitors in the event of an outbreak is to be installed. **1. Interior construction and materials** (1) The interior construction and materials of offices designated for shore personnel and visitors are to satisfy the requirements in **302. 2**. **2. Arrangement** (1) Offices designated for shore personnel and visitors are to be arranged to minimize the possibility of contact with crew, and to be easily accessible from outside entrances. **3. Ventilation system** (1) The air changes per hour in sanitary spaces designated for shore personnel and visitors is to be at least 12 times. (2) Exhaust outlets from offices designated for shore personnel and visitors are to be not less than 8 m away from the intakes, natural ventilation openings, doors and open windows. However, if all contaminated air from each space is discharged to the outside through a HEPA filter or equivalent filter, the above distance may be reduced to 2 m. Appropriate means are to be taken so that the wind direction from the exhaust outlets is not directed toward adjacent passageway, intakes, natural ventilation openings, doors and open windows.	

New	Note
306. Storage spaces of infectious solid waste At least one designated storage space that stores infectious solid waste in the event of an outbreak is to be installed. **1. Interior construction and materials** (1) The interior construction and materials of storage spaces of infectious solid waste are to satisfy the requirements in **302. 2**. **2. Arrangement** (1) Storage spaces for infectious solid waste are to be independent from other space and to be arranged in a location that allows for safe disposal of waste. The warning notice indicating that it is infectious waste is to be posted at the entrance to the storage space of infectious solid waste. Doors are equipped with self closing device, and installation of hold back devices is not permitted. Storage spaces for infectious solid waste can be used as a non-infectious waste storage normally, not during an outbreak. **3. Ventilation system** (1) The air changes per hour in storage spaces for infectious solid waste is to be at least 10 times. (2) Exhaust air from storage spaces for infectious solid waste is to be discharged directly to the outside air and separated from exhaust ducts of other spaces. (3) Exhaust outlets from storage spaces for infectious solid waste are to be not less than 8 m away from the intakes, natural ventilation openings, doors and open windows. However, if all contaminated air from each space is discharged to the outside through a HEPA filter or equivalent filter, the above distance may be reduced to 2 m. Appropriate means are to be taken so that the wind direction from the exhaust outlets is not directed toward adjacent passageway, intakes, natural ventilation openings, doors and open windows. **307. Telemedicine facility** Telemedicine support facilities are to be in place to provide medical advice to doctors or designated medical personnel. In other words, a two-way communication facility capable of exchanging voice and data are to be provided in a suitable place on board. **308. Laundry rooms** The laundry rooms are to have at least one washing machine capable of reaching 70℃ or higher of the water temperature during washing. Exhaust air from laundry rooms is to be discharged directly to the outside air.	