LIST

Chapter Ⅷ Inspection, Approval and Accredition for Materials

Chapter Ⅸ Notice for amendments of KR Technical Rules or corrigenda.

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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

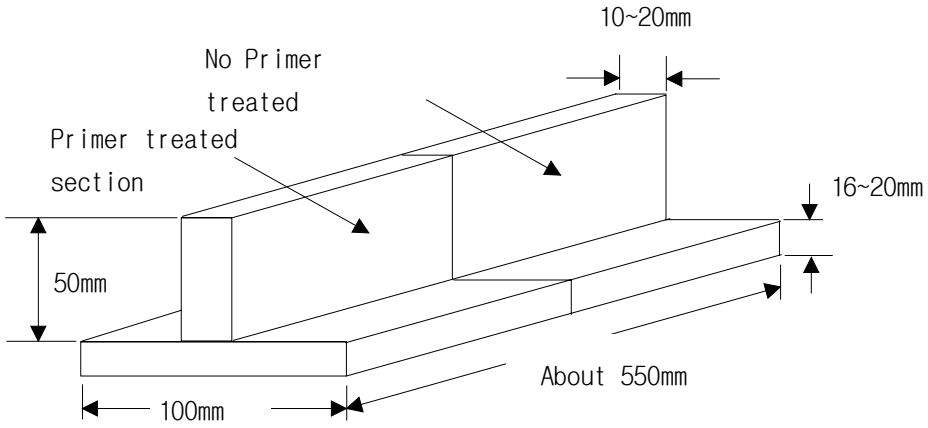
2). Filet Welding Test

(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

Approved by Senior Vice President

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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.

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(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

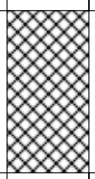
Code	Competence	Criteria for Class survey and approval for ship handling simulator	1	2	3
1.1	Plan and conduct a passage and determine position	1. Determination of position shall be able by following equipment; ① GPS ② Radar ③ Gyro Compass (error within 1 degree is permitted) ④ Magnetic Compass			
		2. 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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E-mail : whlee@krs.co.kr
Person in charge : LEE Woonho

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

To : All Surveyors and whom it may concern

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

1. Application

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

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

2. Implementation

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

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

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

3. Remarks

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

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

Attachments

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

KIM Yeontae

Executive Vice President, Technical Division

<Attachment 1. List of Products eligible for MR>

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

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

<Attachment 2. Application EU RO MR Type Approval>

한 국 선 급
Korean Register

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

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

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

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

Date 신청일 ( ) YY 년 ( ) MM 월 ( ) DD 일

Applicant 신청자 (Signature or stamp 서명 또는 날인)

Address of Applicant
신청자 주소

Tel. No.
전화번호

Fax. No.
팩스번호

E-mail
전자우편

Person in Charge
수검담당자

Mobile No.
휴대전화

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

General Conditions

1. Definitions

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

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

2. Duties of the Client

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

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

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

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

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

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

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

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

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

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

3. Duties of KR

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

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

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

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

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

3.2 KR은 고객의 HSE 지침을 준수하여야 한다.

4. Competence of KR

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

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

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

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

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

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

5. Service Execution

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

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

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

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

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

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

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

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

6. Liability of KR

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

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

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

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

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

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

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

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

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

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

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

6.6 KR은 직접 수행한 작업에 대해서만 책임을 진다.

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

(i) Client's breach of Obligations

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

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

(i) 고객이 일반 의무를 위반한 경우;

(ii) 본 계약에 따라 발행된 결과물의 악용.

7. Use of information

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

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

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

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

8. Fees

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

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

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

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

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

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

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

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

9. Force Majeure

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

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

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

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

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

Guidance of EU RO Mutual Recognition for Type Approval

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

July 2020

Guidance of
EU RO Mutual Recognition for Type Approval

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

< Come into force on 1 July 2020>

SECTION 1 GENERAL

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

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

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

Terms and Conditions for Mutual Recognition of Type Approval

General Information

Appendix I EU MR Type Approval Certificate Information

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

Appendix III List of Products included in EU RO MR

Appendix IV List of EU Recognised Orgarnisations (EU ROs)

Appendix V EU RO MR Design Evaluation Scheme

Appendix VI EU RO MR Production Evaluation Assurance (PQA)

Appendix VII Link to Agreed Technical Requirements

Appendix VIII EU RO MR Maintenance Process

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

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

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

EU RO Framework Document for the Mutual Recognition of Type Approval

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

Document Administration

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

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

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

4. **Revision History:**

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

..Continued

4. Revision History (continued):

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

5. Document Owner

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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*.

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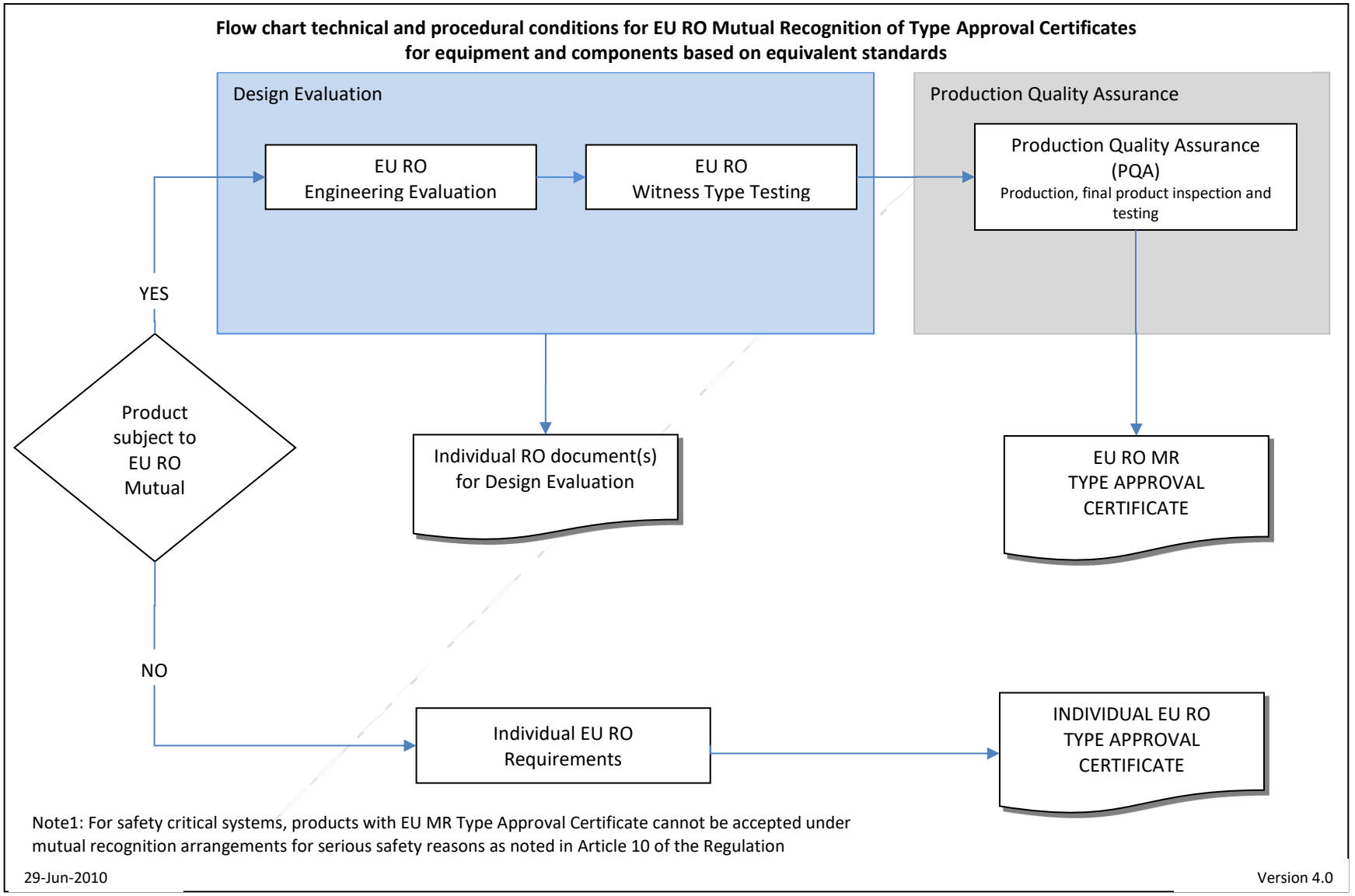
APPENDIX II


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

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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

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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.

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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

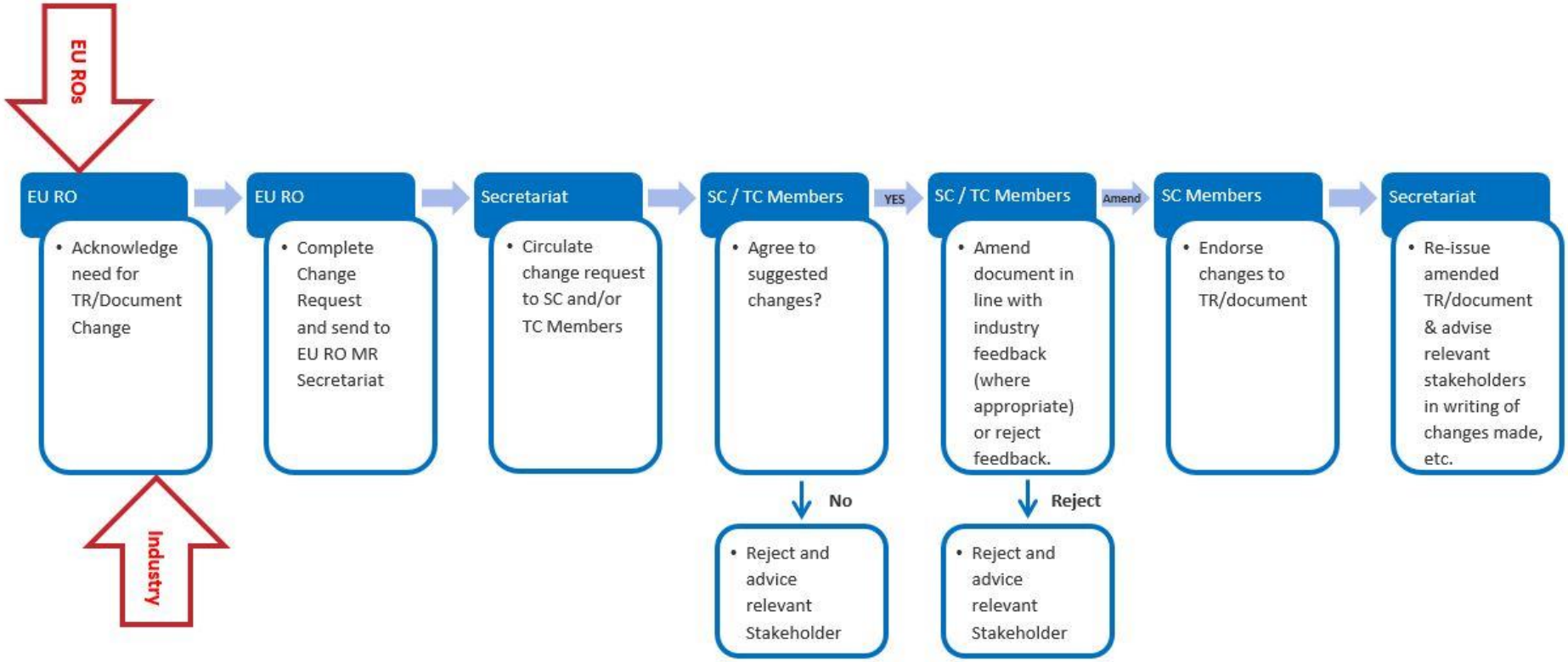

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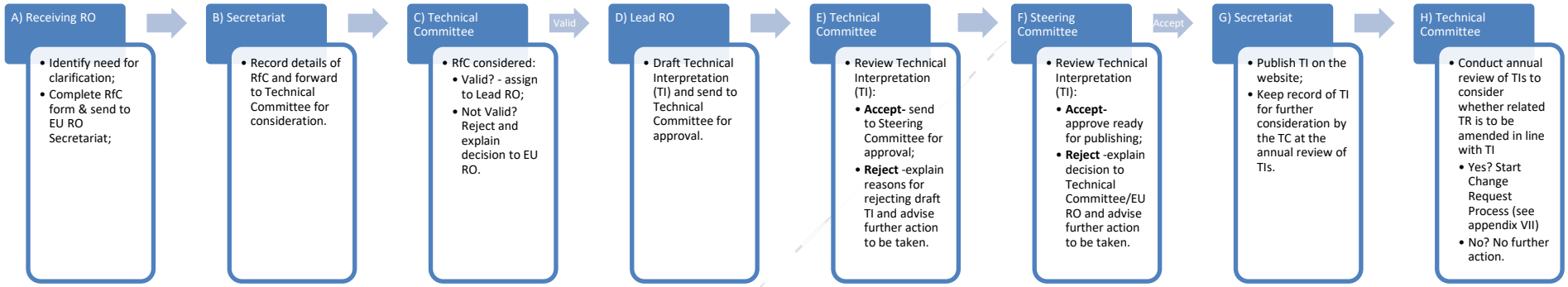
Figure 2 - EU RO MR Maintenance Process

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

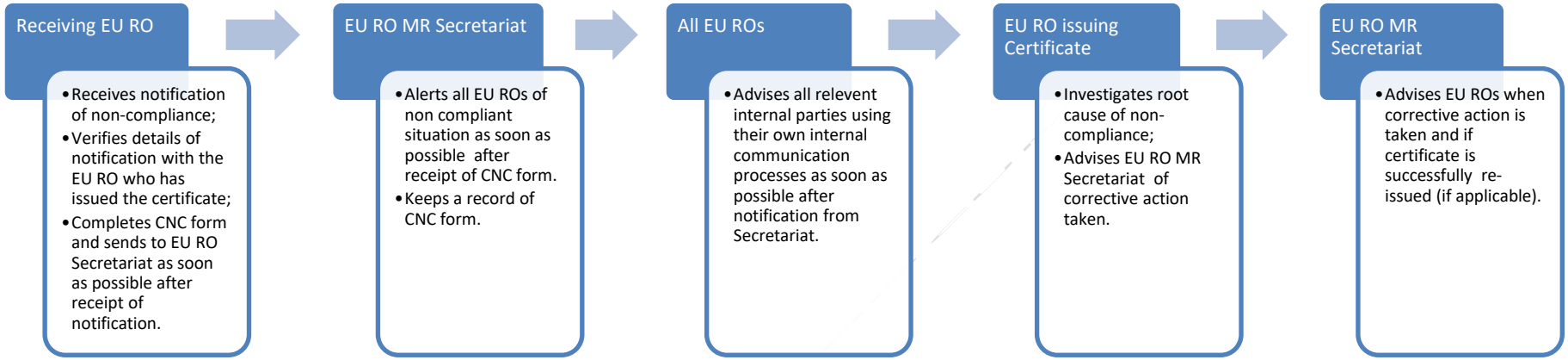
6. An annual review of TIs will be conducted by the EU RO MR Technical Committee in September each year to ensure ongoing relevance and a decision will be taken on each TI to as to whether the related Agreed Technical Requirement should be amended to incorporate the outcome of the TI – see step H) in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

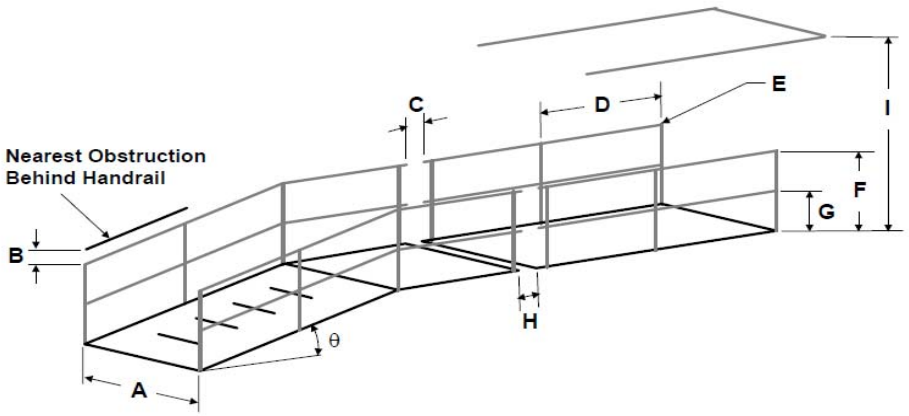
Figure 1 Walkway and Ramp Design

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)

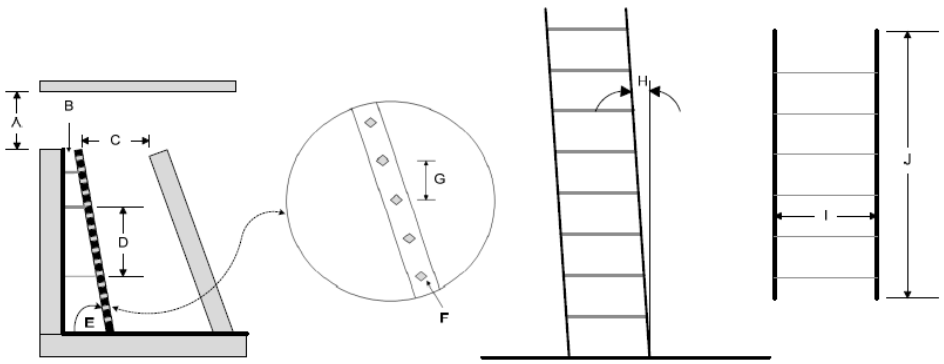


Figure 3 Staggered Vertical Ladder

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.

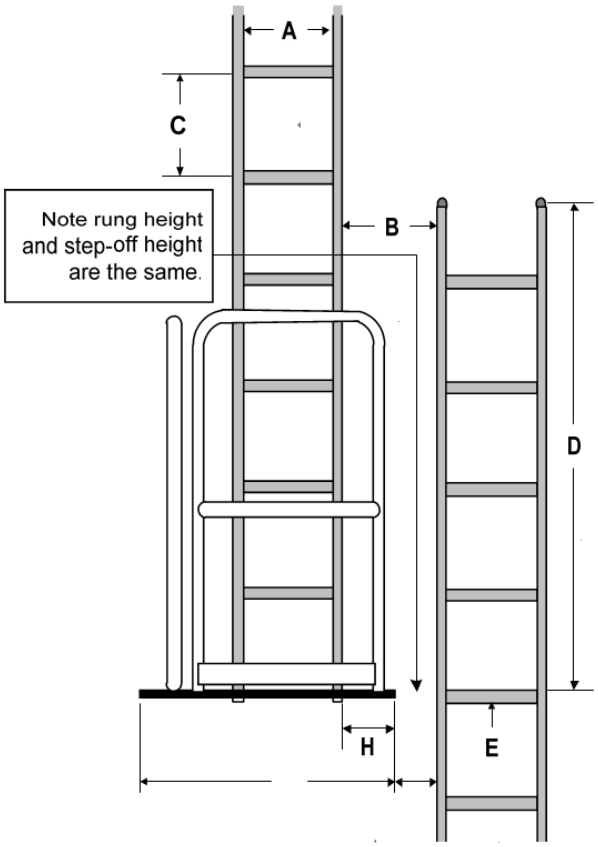


Figure 4 Vertical Ladders to Landings (Side Mount)*

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.

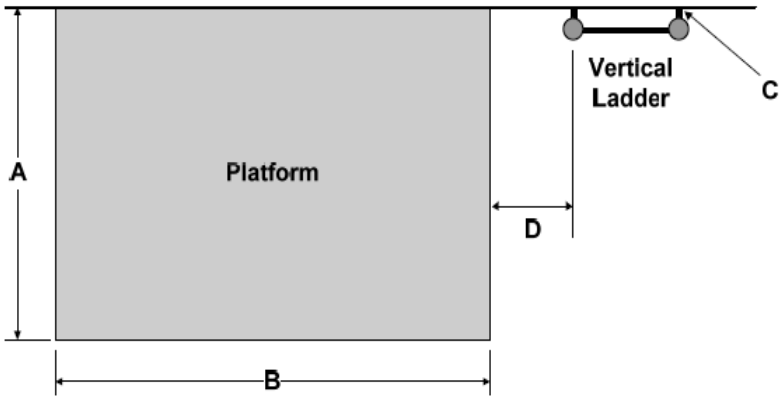
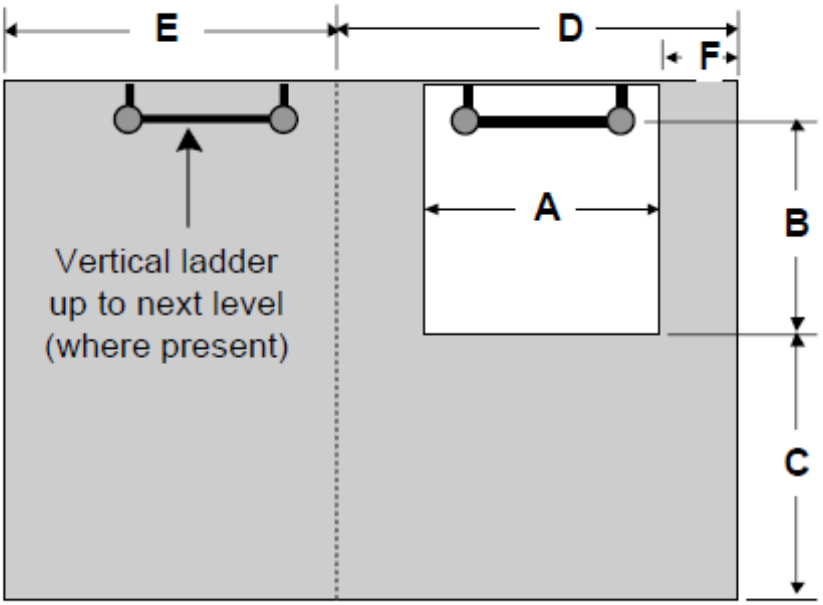


Figure 5 Vertical Ladders to Landings (Ladder through Platform)*

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

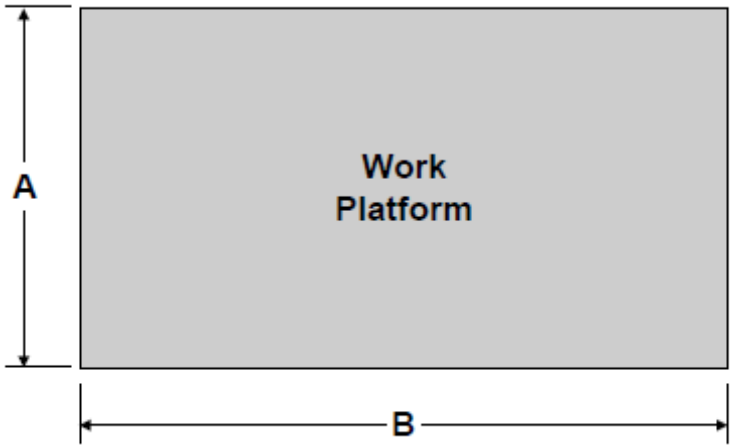


Work Platform

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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Person in charge : Jung J.H

No : 2016-1-E

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

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

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

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

- Below -

1. Definition

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

2. Ice Strengthening

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

2.1. Shell Plating

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

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

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

where K : material factor

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

2.2 Frames and Longitudinals

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

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

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

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

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

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

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

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

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

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

2.3. Stem

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

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

2.4. Fire Pump

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

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

담당 본부장

(Executive Vice President Concerned Division)

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Person in charge: Park Jae-sung

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

To : All Surveyors and whom it may concern

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

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

= Below =

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

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

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

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

(Part 1 Classification and Surveys)

Dec. 2019

- Main Amendments -

(1) Effective date : 1st Jan. 2020 (Date of which application for survey is submitted)

◉ Damage reports of Converted VLOCs which are 25 years of age and above have been steadily increasing, so additional measures are needed to improve the safety of these vessels.

(1) Effective date : 1 Jan. 2020

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 1 CLASSIFICATION **Section 1 ~ 4 〈omitted〉** **Section 5 Certificates and Reports** **502. Interim Certificate of classification 【See Rule】** In application to 502. 2 of the Rules, the term "where a single direct voyage is allowed" means the cases as specified in 901. 5 or 7 of the Rules, etc. 〈newly added〉	**CHAPTER 1 CLASSIFICATION** **Section 1 ~ 4 〈omitted〉** **Section 5 Certificates and Reports** **502. Interim Certificate of classification 【See Rule】** 1. In application to 502. 2 of the Rules, the term "where a single direct voyage is allowed" means the cases as specified in 901. 5 or 7 of the Rules, etc. *(2020)* 2. In addition to the 502. of the Rules, where deemed necessary by the Society, Interim Certificate of Classification will be issued. And the additional cases of issuing the Interim Certificate of Classification are to be in accordance with the separate requirement specified by the Society. *(2020)*
CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME **Section 1 ~ 5 〈omitted〉** **Section 6 Double Skin Bulk Carriers** **601. General 【See Rule】** In application to 601. 1 (2) of the Rules, the term "when necessary" means the cases as specified in Ch 1, 801. 5 of the Guidance. **602. Annual Survey** **1.** In application to 602. 3 (7) of the Rules, the Surveyor is to consider the cases specified in Ch 1, 801. 1 of the Guidance when require the tightness test. 【See Rule】 **2.~ 5. 〈omitted〉** 〈newly added〉	**CHAPTER 3 HULL SURVEYS OF SHIPS SUBJECT TO THE ENHANCED SURVEY PROGRAMME** **Section 1 ~ 5 〈omitted〉** **Section 6 Double Skin Bulk Carriers** **601. General 【See Rule】** In application to 601. 1 (2) of the Rules, the term "when necessary" means the cases as specified in Ch 1, 801. 5 of the Guidance. **602. Annual Survey** **1.** In application to 602. 3 (7) of the Rules, the Surveyor is to consider the cases specified in Ch 1, 801. 1 of the Guidance when require the tightness test. 【See Rule】 **2.~ 5 〈same as the current Guidance〉** 6. In addition to the requirements of Annual Survey specified in 602. of the Rules, ore carriers converted from very large crude oil carrier which are 25 years of age and above are to be subjected to the following surveys. And when considered necessary by the Surveyor, thickness measurements is to be carried out. *(2020)* 【See Rule】 (1) Overall Survey (A) inner bottom space under all cargo holds (B) all wing spaces facing to cargo holds(incl. ballast tanks and void spaces)

Present	Amendments
〈newly added〉	(2) Close-up Survey (A) all wing ballast tanks facing to cargo holds (B) In case there are damages identified to the "main structural members"[1] of the void spaces during Overall Survey, Close-up Survey is to be carried out as follows: (a) all structural members of the spaces in which damages identified (b) other side' void spaces which are similar in structure (C) Survey method Close-up Survey is to be carried out with remote inspection techniques(RIT), temporary scaffolding, inflatable rafts or boats etc. Especially for under deck areas, it should be carried out in accordance with Pt 1, Ch 3, 102. 6. of the Rules. NOTE [1] The "main structural members" mean the following members. (a) Side shell plating and adjacent primary/secondary members (b) Deck plating and adjacent primary/secondary members (c) Bottom plating and adjacent primary/secondary members (d) Inner bottom plating and adjacent primary members (e) Inner side plating and adjacent primary members (f) Bulkhead plating and adjacent primary members (g) Cargo hatch coaming 7. For ore carriers converted from very large crude oil carrier which are 25 years of age and above, Occasional Survey is to be carried out at the interval of six months between Periodical Surveys. (1) Overall Survey (A) inner bottom space under all cargo holds (B) all transverse bulkheads in cargo holds (C) all wing spaces facing to cargo holds(incl. ballast tanks and void spaces) (2) In case there are damages identified to the "main structural members"[1] during Overall Survey, 6. (2) (B) of the Guidances is to be applied.
<hereafter, omitted>	<hereafter, same as current Guidances>

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No : 2023-17-E
Date : 2023. 10. 31

To : All Surveyors and whom it may concern

Subject	9.185 Notice for Amendments to the KR Technical Rules - Rule Pt.1, Ch.1, Sec. 9, 901. 6. Force Majeure - Guidance Pt.7 Annex 7-2 Guidance for Container Securing Arrangements
Application	Refer to Effective date for each KR Technical Rules specified in Par.1 and the attachment

1. Please be informed that 2023 Classification Technical Rules have been amended to reflect the Requests for Establishment/Revision of Classification Technical Rules as below, and you are kindly requested to apply these amendments on the relevant works.

Classification Technical Rules	Effective date	Amendments
Rule Pt.1, Ch.1, Sec. 9. 901.6	On or after 1st Nov. 2023 (Date of which the application for survey is submitted)	IACS PR1C (Addendum Rev.8 to PR1C Rev.6 June 2023) ended on 30 Sep. 2023: In case of postponement due to COVID-19, up to maximum three (3) months is deleted from the agreed period (up to maximum three (3) months)
Guidance Pt.7 Annex 7-2 8.	On or after 31st Oct. 2023 (Date of which the application for survey is submitted)	Pt. 7 Annex 7-2. In the guidelines on container securing arrangements, the route reduction factors have been improved to be automatically calculated using software, and the existing coefficient has been reasonably improved.

2. Furthermore, please be informed that these amendments will be included in 2024 or 2025 edition for Rule and Guidance.

Attachments: Circular_ 9.185(K/E) ---------- each 1 copy. (The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Oct. 2023

- Main Amendments -

(1) Effective date : 1st Nov. 2023 (Date of which the application for survey is submitted)

◉ IACS PR1C (Addendum Rev.8 to PR1C Rev.6 June 2023) ended on September 30, 2023, reflecting this

- In case of postponement of survey due to COVID-19, up to maximum three (3) months is deleted from the agreed period (up to maximum three (3) months)

(1) Effective date : 1st Nov. 2023

(Date of which application for survey is submitted)

Present	Amendments
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 9 Suspension/Withdrawal of Class and Reclassification	**Section 9 Suspension/Withdrawal of Class and Reclassification**
901. Suspension/Reinstatement of class	**901. Suspension/Reinstatement of class**
1. ~ 5. 〈omitted〉	**1. ~ 5. 〈same as the current Rules〉**
6. Force Majeure *(2020)*	**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:	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) 〈omited〉 (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 (up to maximum three (3) months) under the following conditions: *(2023)* (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.	(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 ~~(up to maximum three (3) months)~~ under the following conditions: *(2023)* (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〉	〈herein after, same as the current Rules〉

Amendments of the Guidance

(Circular)

Pt. 7 Ships of Special Services

2023. 10.

Hull Rule Development Team

Background and main contents of the amendments

1. Background of amendments (effective date 2023. 10. 31 the date of which application for survey is submitted)

(1) In the 'Guidance Pt7 Annex 7-2 Guidance for the Container Securing Arrangements', the route-specific reduction factor considered in the acceleration to determine the load acting on the container has been revised.
The reduction factors for representative routes of container ships are currently presented in Table 8.
As there are frequent requests to specify reduction factors for other routes, SeaTrust LS has been updated to automatically calculate the reduction coefficients for arbitrary routes.
The sample ships were expanded from 14 to 33. Accordingly, there have been some changes in the current reduction factor for each route, and these are reflected.

(2) Adjustment of the minimum value standard for the hull roll angle (revised the breadth for small ships from 40m to 32.23m and the minimum roll angle for large ships from 18 deg. to 17 deg.)

(3) Due to the revision, the loads acting on containers have little effect in the case of large ships, but in the case of small ships (width of 40m or less), the loads may be approximately the same or slightly reduced compared to the current level

2. Main Contents: Refer to the amendments

(1) Modification of route reduction factor f_r, f_p, f_h in Table 8

(2) Modification of the minimum roll abgle θ in Table 6

Current	Amend

〈Guidance〉 Pt 7

Annex 7-2 Guidance for the Container Securing Arrangements

8. Determination and application of forces

(1) Symbols and definitions 〈omit〉
(2) Acceleration of ship motion *(2019)*
(3) ~ (6) 〈omit〉

Table 8 Specific sea route reduction factor (2018)

Route	f_r	f_p	f_h
Asia-Europe service	-0.0035B+1.015, max 0.928	0.894	0.927
Pacific service	-0.0058B+1.159, max 1.00	0.906	1
Pacific-Atlantic service	-0.0022B+1.036, max 0.983	0.973	0.996
North Sea-Mediterranean Short Sea service	-0.0033B+1.056, max 0.974	0.945	0.968
North Atlantic service	1	1	1
Asia-South America(West Coast)	-0.0035B+1.046, max 0.959	0.915	0.991
South America(East Coast)-Africa	-0.0014B+0.933, max 0.897	0.867	0.886
Africa-East Asia	-0.0005B+0.933, max 0.921	0.909	0.898
Europe(Rotterdam)-Africa	-0.0019B+0.985, max 0.936	0.931	0.931
Europe(Rotterdam)_South America(Brazil)	-0.0019B+1.005, max 0.957	0.956	0.941
US(NYC)-South America(Brazil)	0.0034B+0.913, max 0.829	0.799	0.842
Asia-Middle East Asia	-0.0072B+1.14, max 0.958	0.791	0.885
Intra Asia	-0.0071B+1.107, max 0.929	0.729	0891

Current	Amend

〈Guidance〉 Pt 7

Annex 7-2 Guidance for the Container Securing Arrangements

8. Determination and application of forces

(1) Symbols and definitions 〈same as current〉
(2) Acceleration of ship motion *(2023)*
(3) ~ (6) 〈same as current〉

Table 8 Specific sea route reduction factor (2023)

Route	f_r	f_p	f_h
Asia-Europe service	-0.00041B+0.8907	0.866	0.902
Pacific service	-0.00146B+0.9709	0.862	0.996
Pacific-Atlantic service	-0.00074B+0.9641	0.915	0.981
North Sea-Mediterranean Short Sea service	-0.00025B+0.9446	0.928	0.954
North Atlantic service	1	1	1
Asia-South America(West Coast)	-0.00090B+0.9452	0.873	0.970
South America(East Coast)-Africa	0.00094B+0.8475	0.831	0.873
Africa-East Asia	0.00087B+0.9034	0.875	0.885
Europe(Rotterdam)-Africa	-0.00009B+0.9118	0.905	0.914
Europe(Rotterdam)_South America(Brazil)	-0.00020B+0.9265	0.916	0.932
US(NYC)-South America(Brazil)	-0.00062B+0.8084	0.760	0.826
Asia-Middle East Asia	-0.0026B+0.8418	0.628	0.851
Intra Asia	-0.0024B+0.8508	0.649	0.865
f_r is not to be less than -0.0045B+0.9735 in any route.			

Current	Amend

Table 6 Ship motions

Motion	Angle of radian	Periods (sec)
Roll	$\theta = f_r \frac{9000(1.25-0.025T_\theta)}{(B+75)\pi}$ but need not exceed 30°(0.524 rad) - if $B < 40\text{m}$, not to be taken less than $f_r \times 22^\circ\ (fr \times 0.384 rad)$ - if $B \geqq 60\text{m}$, not to be taken less than $f_r \times 18^\circ\ (fr \times 0.314 rad)$ (If the B is a median value, θ is determined by linear interpolation)	〈omit〉
Pitch	$\phi = f_p 1350 L^{-0.94}\left\{1.0+\left(\frac{15}{\sqrt{gL}}\right)^{1.6}\right\}$	〈omit〉

9. 〈omit〉

Table 6 Ship motions (2023)

Motion	Angle of radian	Periods (sec)
Roll	$\theta = f_r \frac{9000(1.25-0.025T_\theta)}{(B+75)\pi}$ but need not exceed 30°(0.524 rad) - if $B < 32.26\text{m}$, not to be taken less than $f_r \times 22^\circ\ (fr \times 0.384 rad)$ - if $B \geqq 60\text{m}$, not to be taken less than $f_r \times 17^\circ\ (fr \times 0.297 rad)$ (If the B is a median value, θ is determined by linear interpolation)	〈same as current〉
Pitch	〈same as current〉	〈same as current〉

9. 〈same as current〉

CIRCULAR

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No : 2024-1-E
Date : 2024. 3. 6

To : All Surveyors and whom it may concern

Subject	**9.188 Notice for Amendments to KR Classification Technical Rules**
Application	**Refer to Effective date for each KR Classification Technical Rules specified in Par.1 and the attachments**

1. Please be informed that 2023 Classification Technical Rules have been amended as below/attachments, and you are kindly requested to apply these amendments on the relevant works.

= Below =

Classification Technical Rules	Effective date	Amendments
Rules for the Classification of Steel Ships, Pt 1 (Classification and Surveys)	On or after 1st July 2024 (For Ships contracted for construction)	**IACS UI SC299(New July 2023) reflected** : New requirements of any penetration used for the passage of heat-sensitive piping systems through a watertight bulkhead or deck on a passenger ship newly added.
	On or after 1st Jan. 2025 (For Ships contracted for construction)	**IACS UR L2(Rev.3 Nov 2023) reflected** : UR L2 of 2013 was updated with respect to the amendments made to 2008 INTACT Stability Code.
Rules for the Classification of Steel Ships, Pt 4	On or after 1st Jan. 2024 (For Ships contracted for construction)	**MSC.1/Circ.1619, MSC.1/Circ.1362 Rev.2 and ISO 1969/KS K ISO 1346 reflected** : Nylon rope and polyethylene/polypropylene rope breaking test revised
Guidance for Approval of Manufacturing Process(MP) and Type	On or after 1st Jan. 2024 (For Ships contracted for construction)	**MSC.1/Circ.1619 and KS K ISO1140 reflected** : The acceptance criteria for vinylon and nylon ropes has been amended to comply with Part 4, Chapter 8 of the Rules.

Approval(TA), etc.	On or after 1st July 2024 (For Ships contracted for construction)	**IACS UI SC299(New July 2023) reflected** : Requirements for type approval of watertightness test where materials readily rendered ineffective by heat used for pipe penetrations through watertight bulkheads or decks on passenger ships newly added.

2. Furthermore, please be informed that these amendments will be included in 2024 edition for the "Guidance for Approval of MP and TA, etc." and 2025 edition for the "Rule Pt 1 and Pt 4" on KR Classification Technical Rules which will be published in the first half of 2024 and 2025 respectively.

Attachments: Circular_ 9.188(K/E) ---------- each 1 copy. (The End)

Amendments of the Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

Mar. 2024

- Main Amendments -

(1) Effective date : 1 July 2024 (For ships contracted for construction)

◉ Reflection and follow-up of IACS UI SC299(New July 2023)

- New requirements of any penetration used for the passage of heat-sensitive piping systems through a watertight bulkhead or deck on a passenger ship have been added.

(2) Effective date : 1 Jan. 2025 (For ships contracted for construction)

◉ IACS UR L2(Rev.3 Nov 2023) reflected

- The UR L2 of 2013 was updated with respect to the amendments made to 2008 INTACT Stability Code.

(1) Effective date : 1 July 2024

(For ships contracted for construction)

Present	Amendment
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 1 ~ Section 2 〈omitted〉	**Section 1 ~ Section 2 〈same as the current Rule〉**
Section 3 Classification Survey during Construction *(2022)*	**Section 3 Classification Survey during Construction *(2022)***
301. ~ 305. 〈omitted〉	**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)*	**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) and watertight pipe penetrations(bulkheads or decks) are to be in accordance with the following. *(2024)*
1. Surveys of Watertight Cable Transits *(2021)* 〈omitted〉	**1. Surveys of Watertight Cable Transits *(2021)* 〈same as the current Rules〉**
〈newly added〉	**2. Any penetration used for the passage of heat-sensitive piping systems through a watertight bulkhead or deck on a passenger ship *(2024)*** (1) Any penetration used for the passage of heat-sensitive piping systems through a watertight bulkhead or deck on a passenger ship under SOLAS Ch. II-1 Reg. 13.2.3 shall be tested with the heat-sensitive piping and shall be type approved for watertight integrity specified in **Ch 3, Sec 41** of **Guidance for Approval of Manufacturing Process and Type Approval, Etc.** after fire test specified in **Ch 3, Sec 26 Table 3.26.3** "Pipe and duct penetrations" of the same Guidance. In addition, prototype testing for fire test and watertightness test need not be carried out if the pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division), and there are no openings. Such penetrations shall be suitably insulated by extension of the insulation at the same level of the division. See also SOLAS Ch. II-2 Reg. 9.3.1 with respect to piping. However, the penetration must still comply with the watertight integrity requirement in SOLAS Ch. II-1 Reg. 2.17.

Present	Amendment
〈newly added〉	(2) SOLAS Ch. II-1 Reg. 13.2.3 shall be applicable to heat-sensitive piping systems and shall not be applied to cable penetrations in watertight bulkheads and decks. (3) Above piping penetrations have been installed, and where disrupted have been re-instated, in accordance with the manufacturer's requirements and in accordance with the requirements of Type Approval.
〈hereinafter, omitted〉	〈hereinafter, same as the current Rules〉

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) ~ (35) 〈omitted〉 〈newly added〉 (36) 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)* 〈hereinafter, omitted〉	# CHAPTER 2 PERIODICAL AND OTHER SURVEYS ## Section 1 General 〈same as the current Rules〉 ## Section 2 Annual Survey **201. Due range 〈same as the current Rules〉** **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) ~ (35) 〈same as the current Rules〉 (36) Any penetration used for the passage of heat-sensitive piping systems through a watertight bulkhead or deck on a passenger ship *(2024)* (A) Watertight piping penetrations 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 piping penetrations 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. (37) ~~(36)~~ 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)* 〈hereinafter, same as the current Rules〉

(2) Effective date : 1 Jan. 2025

(For ships contracted for construction)

Present	Amendment
CHAPTER 1 CLASSIFICATION	**CHAPTER 1 CLASSIFICATION**
Section 1 ~ Section 2 〈omitted〉	**Section 1 ~ Section 2 〈same as the current Rules〉**
Section 3 Classification Survey during Construction *(2022)*	**Section 3 Classification Survey during Construction *(2022)***
301. ~ 306. 〈omitted〉	**301. ~ 306. 〈same as the current Rules〉**
307. Stability *(2023)*	**307. Stability *(2023)***
1. 〈omitted〉	**1.** 〈same as the current Rules〉
2. The preparation and approval of stability booklets in above **Par 1** are to demonstrate that their intact stability is adequate for the service intended. Adequate intact stability means compliance with standards laid down by the relevant Administration or those of the Society taking into account the ship's size and type. The level of intact stability for ships with a length of 24 m and above should not be less than that provided by Part A of IMO Res. MSC.267(85)(Adoption of the international code on intact stability, 2008) as applicable to the type of ship being considered.	**2.** The preparation and approval of stability booklets in above **Par 1** are to demonstrate that their intact stability is adequate for the service intended. Adequate intact stability means compliance with standards laid down by the relevant Administration or those of the Society taking into account the ship's size and type. The level of intact stability for ships with a length of 24 m and above should not be less than that provided by Part A of IMO Res. MSC.267(85)(Adoption of the international code on intact stability, 2008) as amended by MSC.319(89), MSC.398(95), MSC.413(97), MSC.414(97), MSC.415(97), MSC.443(99) and MSC.444(99) as applicable to the type of ship being considered.
Where other criteria are accepted by the Administration concerned, these criteria may be used for the purpose of classification. Evidence of approval by the Administration concerned may be accepted for the purpose of classification. *(2020)*	Where other criteria are accepted by the Administration concerned, these criteria may be used for the purpose of classification. Evidence of approval by the Administration concerned may be accepted for the purpose of classification. *(2025)*
〈hereinafter, omitted〉	〈hereinafter, same as the current Rules〉

Amendments of the Rules

(Circular)

Part 4 Hull Equipment

2024.03.

Hull Rule Development Team

Main Amendments

(1) Background of Amendment

1) Breaking test for Nylon ropes has been amended to reflect IACS Rec.10 2.1(Rev.5) and MSC.1/Circ.1619 5.2.8.1.

2) Breaking test for polyethylene rope and polypropylene rope has been amended to reflect industrial standards(ISO 1969/KS K ISO 1346).

(2) Effective date (circular will be issued)

1) for which the building contract is placed on or after 1 January 2024; or

2) in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2024; or

3) the delivery of which is on or after 1 January 2027.

Present	Amendment	Note
CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT **Section 1 ~ Section 5 〈omitted〉** **Section 6 Fibre Ropes** **601. ~ 606. 〈omitted〉** **607. Breaking tests** 【See Guidance】 (2023) Breaking tests for fibre ropes are to be carried out in accordance with the following requirements. However, relevant industry standards may be followed if the breaking test required by industry standard is different from these requirements. Industry standard means international standard(ISO etc.) or standards issued by national association(KS, DIN, JMSA etc.) which are recognized in the country where the ship is built. (1) One specimen is to be taken from each coil of the fibre ropes. Where fibre ropes are continuously manufactured by the same machine with the yarns of the same type and divided into several coils, one specimen may be taken from one coil of the ropes selected by the Surveyor at random. (2) The length of the specimen is not to be less than 30 times the diameter of the hemp rope, but need not exceed one *metre*. (3) Specimens for polyethylene and polypropylene ropes are to be subjected to breaking tests in as wet condition immediately after having been immersed in warm water at 35 ± 2 °C for more than 30 *minutes*. For other fibre ropes than the above ropes, specimens are to be subjected to breaking tests in as dry condition at room temperature. (4) The load at the time of breaking is not to be less than given in industry standard. And breaking test loads of different from industry standards are to be specially considered by the Society. **〈omitted below〉**	**CHAPTER 8 EQUIPMENT NUMBER AND EQUIPMENT** **Section 1 ~ Section 5 〈same as the present〉** **Section 6 Fibre Ropes** **601. ~ 606. 〈omitted〉** **607. Breaking tests** 【See Guidance】 (2023) Breaking tests for fibre ropes are to be carried out in accordance with the following requirements. However, relevant industry standards may be followed if the breaking test required by industry standard is different from these requirements. Industry standard means international standard(ISO etc.) or standards issued by national association(KS, DIN, JMSA etc.) which are recognized in the country where the ship is built. (1) One specimen is to be taken from each coil of the fibre ropes. Where fibre ropes are continuously manufactured by the same machine with the yarns of the same type and divided into several coils, one specimen may be taken from one coil of the ropes selected by the Surveyor at random. (2) The length of the specimen is not to be less than 30 times the diameter of the hemp rope, but need not exceed one *metre*. (3) Nylon(polyamide) ropes are to be subjected to breaking tests in as wet condition. For other fibre ropes than the above ropes, to be subjected to breaking tests in as dry condition at room temperature. (4) The load at the time of breaking is not to be less than given in industry standard. And breaking test loads of different from industry standards are to be specially considered by the Society. **〈same as the present below〉**	- Breaking test for Nylon ropes has been amended to reflect IACS Rec.10 2.1(Rev.5) and MSC.1/Circ.1619 5.2.8.1 - Breaking test for polyethylene rope and polypropylene rope has been amended to reflect industrial standards(ISO 1969/KS K ISO 1346). - Amend wording inconsistencies

Amendments of the Rules

(Circular)

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

2024.03.

Hull Rule Development Team

Main Amendments

(1) Background of Amendment

1) The acceptance criteria for approval of manufacturing process for synthetic fibre ropes has been amended to comply with Part 4, Chapter 8 of the Rules.
   - The breaking load of vinylon and nylon ropes is recognized as 80~90% of the standard value in accordance with current Guidance, but the industrial standards contains the same provisions in the Guidance, resulting in a double deduction, so revision is necessary.
   (Nylon rope requires breaking load in wet condition in accordance with IACS Rec.10(Rev.5) and MSC.1/Circ.1619)

(2) Effective date (circular will be issued)

1) for which the building contract is placed on or after 1 January 2024; or
2) in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 July 2024; or
3) the delivery of which is on or after 1 January 2027.

Present	Amendment	Note

CHAPTER 2 APPROVAL OF MANUFACTURING PROCESS

Section 1 ~ Section 11 〈omitted〉
Section 12 Synthetic Fibre Ropes

1201. ~ 1202. 〈omitted〉

1203. Approval tests

Table 2.12.1 Approval Test Items and Acceptance Criteria for synthetic fibre ropes

<table>
<tr><th>Test item</th><th>Test method</th><th>Acceptance criteria</th></tr>
<tr><td>Construction & Diameter</td><td>Construction and diameter of synthetic fibre ropes are to be measured in accordance with Pt 4, Ch 8, Sec 6 of the Rule.</td><td>To comply with the Pt 4, Ch 8, Sec 6 of the Rule.</td></tr>
<tr><td>Tensile tests in wet and dry conditions</td><td>(1) Tensile tests on three each test specimens are to, in principle, be carried out for each of the test conditions given in Table below and breaking strength and elongation are to be measured. For rope having diameter higher than 60mm, one additional tensile test specimen is to be taken from the rope of maximum diameter.
(2) The gauge length of the test specimen is to be 30 times or more of the rope diameter, however it needs not to exceed 1 meter.
<table>
<tr><th>Kind of rope / Diameter of test rope</th><th>Vinylon rope
polyester rope
nylon rope</th><th>Polyethylene rope
polypropylene rope</th></tr>
<tr><td rowspan="2">12 ~ 24 mm</td><td>Wet condition(1)</td><td>Wet condition(3)</td></tr>
<tr><td>Dry condition(2)</td><td>Dry condition(2)</td></tr>
<tr><td rowspan="2">40 ~ 60 mm</td><td>Wet condition(1)</td><td>Wet condition(3)</td></tr>
<tr><td>Dry condition(2)</td><td>Dry condition(2)</td></tr>
</table>
NOTES:
(1) The test specimen is to be soaked in water at normal temperature for a period of 30 minutes or more, then taken out and subjected to tensile test at room temperature.
(2) The test specimen in dry condition is to be subjected to tensile test at room temperature.
(3) The test specimen is to be soaked in warm water at temperature of 35 ± 2°C for a period of 30 minutes or more, then taken out and immediately subjected to tensile test at room temperature.</td><td>(1) Except on cases with vinylon and nylon in wet condition, respective breaking loads are to satisfy the requirements specified in Pt 4, Ch 8, Sec 6, of the Rules.
(2) The breaking loads of vinylon and nylon in wet conditions are to be 80 % or more and 90 % or more respectively of the values specified in above (1)
(3) Values with respect to elongation are to be for reference only.</td></tr>
</table>

〈see next page〉

Present	Amendment	Note

CHAPTER 2 APPROVAL OF MANUFACTURING PROCESS

Section 1 ~ Section 11 〈same as the present〉
Section 12 Synthetic Fibre Ropes

1201. ~ 1202. 〈same as the present〉

1203. Approval tests

Table 2.12.1 Approval Test Items and Acceptance Criteria for synthetic fibre ropes

<table>
<tr><th>Test item</th><th>Test method</th><th>Acceptance criteria</th></tr>
<tr><td>Construction & Diameter</td><td>Construction and diameter of synthetic fibre ropes are to be measured in accordance with Pt 4, Ch 8, Sec 6 of the Rule.</td><td>To comply with the Pt 4, Ch 8, Sec 6 of the Rule.</td></tr>
<tr><td>Tensile tests in wet and dry conditions</td><td>(1) Tensile tests on three each test specimens are to, in principle, be carried out for each of the test conditions given in Table below and breaking strength and elongation are to be measured. For rope having diameter higher than 60mm, one additional tensile test specimen is to be taken from the rope of maximum diameter.
(2) The gauge length of the test specimen is to be 30 times or more of the rope diameter, however it needs not to exceed 1 meter.
<table>
<tr><th>Kind of rope / Diameter of test rope</th><th>Vinylon rope
polyester rope
nylon rope</th><th>Polyethylene rope
polypropylene rope</th></tr>
<tr><td rowspan="2">12 ~ 24 mm</td><td>Wet condition(1)</td><td>Wet condition(3)</td></tr>
<tr><td>Dry condition(2)</td><td>Dry condition(2)</td></tr>
<tr><td rowspan="2">40 ~ 60 mm</td><td>Wet condition(1)</td><td>Wet condition(3)</td></tr>
<tr><td>Dry condition(2)</td><td>Dry condition(2)</td></tr>
</table>
NOTES:
(1) The test specimen is to be soaked in water at normal temperature for a period of 30 minutes or more, then taken out and subjected to tensile test at room temperature.
(2) The test specimen in dry condition is to be subjected to tensile test at room temperature.
(3) The test specimen is to be soaked in warm water at temperature of 35 ± 2°C for a period of 30 minutes or more, then taken out and immediately subjected to tensile test at room temperature.</td><td>(1) Respective breaking loads are to satisfy the requirements specified in Pt 4, Ch 8, Sec 6, of the Rules.
(2) Values with respect to elongation are to be for reference only.</td></tr>
</table>

- The industrial standards contains the same provisions in the Guidance, resulting in a double deduction, so revision is necessary.

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

Mar. 2024

- Main Amendments -

(1) Effective date : 1 July 2024 (For ships contracted for construction)

◉ IACS UI SC299(New July 2023) reflected

- the requirements for type approval of watertightness test where materials readily rendered ineffective by heat used for pipe penetrations through watertight bulkheads or decks on passenger ships are newly added.

Present	Amendment
# CHAPTER 3 TYPE APPROVAL **Section 1 ~ Section 40 〈omitted〉** 〈newly added〉	# CHAPTER 3 TYPE APPROVAL **Section 1 ~ Section 40 〈same as the current Guidance〉** **Section 41 Watertight bulkheads or deck pipe penetrations on passenger ships *(2024)*** **4101. Application** 1. The requirements of this Section apply to tests and inspection for type approval of watertightness test where materials (PVC, FRP, aluminium alloy, lead, etc) readily rendered ineffective by heat specified in **Pt 8, Annex 8-2** 1.2 of the Guidance are used for pipe penetrations through watertight bulkheads or decks on passenger ships. 2. Where applying 1. above, fire test specified in **Ch 3, Sec 26, Table 3.26.3** "Piping and Duct Penetrations" of this Guidance shall be conducted followed by watertightness test. Therefore, one of the two cases below may be applied. Case 1) Watertightness test on pipe penetrations that have already been type approved as fire test specified in Part 3 of Annex 1 to the 2010 FTP Code : Conduct fire test for the relevant fire rating with the same configuration as the already approved pipe penetration part + watertightness test Case 2) Pipe penetration that is not type approved as fire test : Conduct fire test with required fire protection level + watertightness test 3. It shall be applicable to heat-sensitive piping systems and shall not be applied to cable penetrations in watertight bulkheads and decks. **4102. 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 pipes, etc. (3) Work and maintenance manual

Present	Amendment
〈newly added〉	**4103. Type tests** 1. Approval of pipe penetrations fitted to ensure the watertight integrity of a bulkhead or deck where heat-sensitive materials are used should include a prototype test of watertightness after having undergone the standard fire test appropriate for the location in which the penetrations are to be installed*. 1) The fire tested pipe penetration should then be tested to a test pressure of not less than 1.5 times the design pressure as defined in SOLAS Ch. II-1 Reg. 2.18. The pressure should be applied to the same side of the division as the fire test. 2) The fire tested pipe penetration should be tested for a period of at least 30 minutes under hydraulic pressure equal to the test pressure, but minimum 1.0 bar. There should be no leakage during this test. 3) The fire tested pipe penetration should continue to be tested for a further 30 minutes with the test pressure. The quantity of water leakage is not to exceed a total of 1 litre. 4) The prototype test should be considered valid only for the pipe typology (e.g. thermoplastic and multilayer), pressure classes, the maximum/minimum dimensions tested, and the type and fire rating of the division tested. Note : * Refer to the requirements for A-class division set out in Part 3 of Annex 1 to the 2010 FTP Code 2. The pressure test need not be carried out on the hot penetration arrangement. Ample time may be given to prepare for the pressure test, i.e. dismantling the fire testing equipment and rigging the pressure test equipment. 1) The pressure test should be carried out with the pipe section used in the fire test still in place. 2) Any pipe insulation fitted for the purpose of the fire test may be removed before the pressure test. 3) Prototype testing for fire test and watertightness test need not be carried out if the pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division), and there are no openings. Such penetrations shall be suitably insulated by extension of the insulation at the same level of the division. See also SOLAS Ch. II-2 Reg. 9.3.1 with respect to piping. However, the penetration must still comply with the watertight integrity requirement in SOLAS Ch. II-1 Reg. 2.17.

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Person in charge: PARK Jaesung

No : 2024-2-E
Date : 2024. 7. 11

To : All Surveyors and whom it may concern

Subject	**9.189 Notice for Amendments to KR Technical Rules** **- Guidance Relating to the Rules for the Classification of Steel Ships, Part 8**
Application	**Refer to Effective date for KR Classification Technical Rules specified in Par.1 and the attachment**

1. Please be informed that 2024 Classification Technical Rules have been amended as below/attachments, and you are kindly requested to apply these amendments on the relevant works according to effective date.

= Below =

Classification Technical Rules	Effective date	Amendments
Guidance Relating to the Rules for the Classification of Steel Ships Pt.8 Ch.10	Effective immediately	Suspend the application of Sec. 2 203. 9. (3) : Prior to the implementation of the amendment to IACS UI SC269(rev.1), suspension was preemptively applied only for Sec. 2 203. 9. (3) with potential PSC issues.

2. Furthermore, please be informed that the amendments will be included in 2024 edition of KR Technical Rules which is provided on the website.

Attachments: Circular_ 9.189(K/E) ---------- each 1 copy. (The End)

Amended Guidance to the Rules for Classification of Steel Ships

Part 8 Fire Protection and Fire Extinction

2024.07.

Hull Rule Development Team

Main Amendments

(1) Effective date : effective immediately

Prior to the implementation of the amendment to IACS UI SC269(rev.1), suspension was preemptively applied only for Sec. 2 203. 9. (3) with potential PSC issues, etc.

Present	Amendment	Note
CHAPTER 10 ESCAPE **Section 2 Means of escape** **201. ~ 202. 〈omitted〉** **203. Means of escape from machinery spaces** **1. ~ 8.** 〈omitted〉 **9.** In applying **203. 2** (2) & (3) of the Rules, means of escape from the steering gear space in cargo ships shall satisfy the following requirements. (1) Steering gear spaces which do not contain the emergency steering position need only have one means of escape. (2) Steering gear spaces containing the emergency steering position can have one means of escape provided it leads directly onto the open deck. Otherwise, two means of escape are to be provided but they do not need to lead directly onto the open deck. (3) Escape routes that pass only through stairways and/or corridors are considered as providing a "direct access to the open deck", provided that the escape routes from the steering gear spaces have fire integrity protection equivalent to: *(2018)* - steering gear spaces; or - stairways / corridors, whichever is more stringent. 〈below omitted〉	**CHAPTER 10 ESCAPE** **Section 2 Means of escape** **201. ~ 202. 〈same as the present〉** **203. Means of escape from machinery spaces** **1. ~ 8.** 〈same as the present〉 **9.** In applying **203. 2** (2) & (3) of the Rules, means of escape from the steering gear space in cargo ships shall satisfy the following requirements. (1) Steering gear spaces which do not contain the emergency steering position need only have one means of escape. (2) Steering gear spaces containing the emergency steering position can have one means of escape provided it leads directly onto the open deck. Otherwise, two means of escape are to be provided but they do not need to lead directly onto the open deck. ~~(3) Escape routes that pass only through stairways and/or corridors are considered as providing a "direct access to the open deck", provided that the escape routes from the steering gear spaces have fire integrity protection equivalent to: *(2018)*~~ ~~- steering gear spaces; or~~ ~~- stairways / corridors, whichever is more stringent.~~ 〈below same as the present〉	Suspension of application of para. 3 of IACS UI SC269 (Rev.1) due to possibility for PSC issues.

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Person in charge: PARK Jaesung

No : 2024-3-E
Date : 2024. 7. 19

To : All Surveyors and whom it may concern

Subject	**9.190 Notice for Amendments to KR Classification Technical Rules**
Application	**Refer to Effective date specified in Par.1 and the attachments**

1. Please be informed that 2024 Classification Technical Rules have been amended as below/attachments, and you are kindly requested to apply these amendments on the relevant works.

= Below =

Amended Classification Technical Rules	Effective date	Amendments
Rules for the Classification of Steel Ships, Pt 1 (Classification and Surveys)	On or after 1st Aug. 2024 (Date of which the application for survey is submitted)	Revision of requirements for **Extended Dry-docking (EDD) Interval System**

2. Furthermore, please be informed that these amendments will be included in 2025 edition on KR Classification Technical Rules which will be published in the first half of 2025.

Attachments:
1. Amended Rules for the Classification of Steel Ships, Part 1 ------ 1 copy. (The End)

Amended Rules for the Classification of Steel Ships

(Part 1 Classification and Surveys)

July 2024

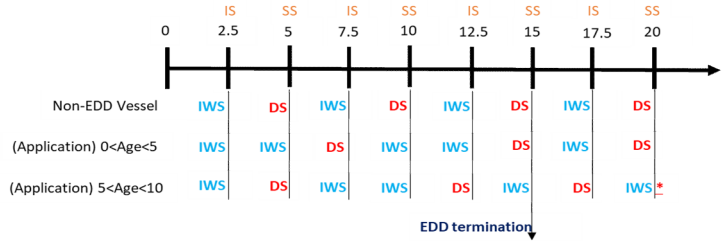
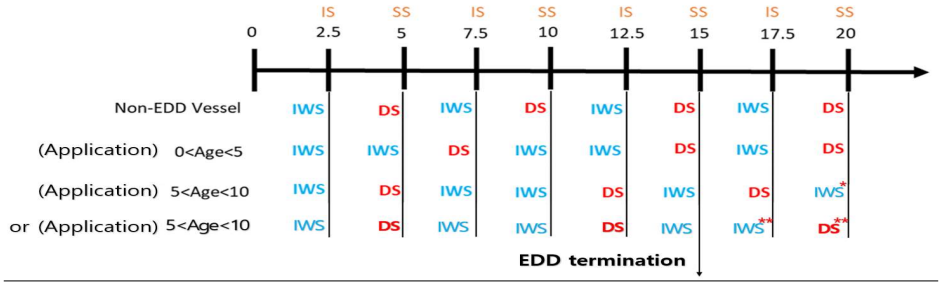
- Main Amendments -

(1) Effective date : 1 Aug. 2024 (Date of which the application for survey is submitted)

◉ Revision of requirements for Extended Dry-docking (EDD) Interval System

(1) Effective date : 1 Aug. 2024

(Date of which application for survey is submitted)

Present	Amendments
CH 2 PERIODICAL AND OTHER SURVEYS **Section 6 Docking Survey** **605. Extended Dry-docking Interval System** **1. General** (1) ~ and **the separate approval by the each relevant flag state is required for the application of Extended Dry-docking Interval System.** (2) 〈omitted〉 (3) In application to **601. 1**, at the request of the Owners, where "deemed appropriate by the Society" considering survey history, damage history and coating conditions, etc. it is possible until the ship reaches 15 years of age to perform the first and second Docking Survey due from the completion date of the Classification Survey during Construction or the completion date of the previous Docking Survey as an In-water Survey, and the third Docking Survey has to be performed in dry-dock or on a slipway within 7.5 years from the completion date of the Classification Survey during Construction or the completion date of the previous Docking Survey. *(2023)* 〈Note : omitted〉 (4) The Owner can apply to join the "Extended Dry-docking Interval System" before the date on which the ship reaches 10 years of age. When the Owner applied to join the "Extended Dry-docking Interval System" after the No.1 Special Survey and the Docking Survey assigned between 10 years to 15 years of age has carried out in dry-dock or on a slipway, the next Docking Surveys can be carried out as Docking Survey and In-water Survey alternately start with In-water Survey. 〈newly added〉 (refer to below figure) *(2023)*  Note : where IS, SS, IWS and DS mean Intermediate Survey, Special Survey, In—water Survey and Docking Survey respectively. 〈newly added〉 * IWS shall be carried out in accordance with **403. 3**, **Ch 2** of the Guidance. 〈newly added〉	**CH 2 PERIODICAL AND OTHER SURVEYS** **Section 6 Docking Survey** **605. Extended Dry-docking Interval System** **1. General** (1) 〈same as the current Rules〉 (2) ~ (3) 〈same as the current Rules〉 (4) The Owner can apply to join the "Extended Dry-docking Interval System" before the date on which the ship reaches 10 years of age. When the Owner applied to join the "Extended Dry-docking Interval System" after the No.1 Special Survey and the Docking Survey assigned between 10 years to 15 years of age has carried out in dry-dock or on a slipway, the No. 3 Special Survey may be carried out as an In-water Survey, and afterwards the first Intermediate docking survey and each Special Survey shall, in principle, be carried out in dry-docking or on a slipway. However, where the requirements of **403. 3. Ch 2** of the Guidance are complied with, the Docking Survey as a part of Special Survey may be replaced by In-water Survey. ~~the next Docking Surveys can be carried out as Docking Survey and In-water Survey alternately start with In-water Survey.~~ In addition, notwithstanding **605. 1** (3), when the Owner applied to join the "Extended Dry-docking Interval System" after the No.1 Special Survey, the "Extended Dry-docking Interval System" may be applied up to the 20 years of age provided that where "Special consideration" is obtained from the Society in advance upon the application of the Owner. (refer to below figure) *(2024)*  Note : 1. Where IS, SS, IWS and DS mean Intermediate Survey, Special Survey, In—water Survey and Docking Survey respectively. 2. In case of "Special consideration", survey records including survey status and survey reports & etc. are to be reviewed to confirm that all requirements of **605. 1.** (1) and 605. 2 are complied with. * IWS shall be carried out in accordance with **403. 3**, **Ch 2** of the Guidance. ** In case the "Extended Dry-docking Interval System" is extended to 20 years of age after "Special consideration".

Present	Amendments
Section 16 Hull Surveys for Liquefied Gas Carriers	**Section 16 Hull Surveys for Liquefied Gas Carriers**
1601. ~ 1603. 〈omitted〉	**1601. ~ 1603. 〈same as the current Rules〉**
1604. Special Survey	**1604. Special Survey**
1. General	**1. General**
(1) ~ (6) 〈omitted〉	(1) ~ (6) 〈same as the current Rules〉
(7) A survey in dry dock is to be a part of the Special Survey. The Overall and Close-up Surveys and thickness measurements, as applicable, of the lower portions of the ballast tanks are to be carried out in accordance with the applicable requirements for Special Surveys, if not already performed.	(7) A survey in dry dock is to be a part of the Special Survey. The Overall and Close-up Surveys and thickness measurements, as applicable, of the lower portions of the ballast tanks are to be carried out in accordance with the applicable requirements for Special Surveys, if not already performed.
Note : Lower portions of the ballast tanks are considered to be the parts below light ballast water line.	Note : Lower portions of the ballast tanks are considered to be the parts below light ballast water line.
〈newly added〉	However, ships subject to the "Extended Dry-docking Interval System" specified in **605.**, this survey in dry dock can be carried out in accordance with **605.** ***(2024)***
〈hereinafter, omitted〉	〈hereinafter, same as the current Rule〉

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Person in charge :KIM Heesung

To :All Surveyors and whom it may concern

No :2024-04-E
Date :2024. 7. 30

Subject	9.191 Notice for Amendment to the KR Technical Rules
Application	Refer to Effective date for each KR Technical Rules specified in Par.1 and the attachment

1. Please be informed that the amendments of KR Technical Rules have been made to reflect IACS Resolutions, IMO Resolutions, etc. and you are kindly requested to apply the amendments on the relevant works according to effective date.

Amended KR Technical Rules	Effective date	Amendments
Rules & Guidance for Classification of Steel Ships Pt 5	For ships contracted for construction on or after 1 January 2025	IACS UR M61 Rev.2 IACS UR P2.1 Rev.3 IACS UR P2.2 Rev.5 IACS UR P2.9 Rev.3
Rules & Guidance for Classification of Steel Ships Pt 7		IACS UR F15 Rev.7
Rules & Guidance for Classification of Steel Ships Pt 5	Submitted for approval from 1 January 2025 and to any renewal of type approval of existing design after 1 January 2025	IACS UR P2.7.3 Rev.3 IACS UR P2.7.4 Rev.11
Guidance for Approval of Manufacturing Process and Type Approval, Etc.		IACS UR P2.11 Rev.6
Rules & Guidance for Classification of Steel Ships Pt 5	Immediately (Refer to effective date in the attachment)	SOLAS II-1/1.3.2 & II-1/12.6.2
Guidance Relating to the Rules for the Classification of Steel Ships Pt 7		MSC.188(79) Rev.2
Guidance for Approval of Manufacturing Process and Type Approval, Etc.		

2. Furthermore, please be informed that the establishment will be included in 2024 edition of KR Technical Rules which is provided on the website.

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

Amended Rules for Classification of Steel Ships

Pt. 5 Machinery Installations - Chapter 6

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (based on contract date for construction) - Circular will be issued

◉ IACS UR M61 Rev.2 : Starting Arrangement of Internal Combustion Engines amendment

◉ IACS UR P2.1 Rev.3 : Clarification of “Application” in relation to IMO instruments concerned

◉ IACS UR P2.2 Rev.5 : Clarification of “Classes of pipes”

(2) Effective date : submitted for approval from 1 January 2025 and to any renewal of type approval of existing design joint after 1 January 2025 - Circular will be issued

◉ IACS UR P2.7.3 Rev.3 : Clarification for small bore instrumentation equipment used for piping systems conveying flammable media

◉ IACS UR P2.7.4 Rev.11 : Limitation on compression type coupling revised.

Amendment	Note
# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 11 Compressed Air System **1101. Compressed air starting devices** 【See Guidance】 **1. Number and capacity of main air reservoirs** *(2023)* (1) Where the main engines are arranged for starting by compressed air, at least two starting air reservoirs of about equal capacity are to be fitted. These reservoirs are to be connected ready for use. (2) The total capacity of air reservoirs is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts altering between Ahead and Astern of each main engine of the reversible type, and not less than 6 consecutive starts of each main non-reversible type engine. (3) Where the auxiliary engines are designed for starting by compressed air, two separate auxiliary air reservoirs which are to be sufficient for at least three starts for each auxiliary engine are to be fitted, or starting air for auxiliary engines is to be supplied by separate piping from main air reservoirs. In case where only one auxiliary reservoir is fitted, starting air pipes are to be connected with main air reservoir. (4) Where the auxiliary engines are designed for starting by the main air reservoirs, the capacity of the main air reservoirs is to be more than sum of the capacity required in (2) and (3) above, and the amount consumed for engine control systems, whistle, etc. (5) For multi-engine installations, the number of starts required for each engine is to be determined as deemed appropriate by the Society. **2. Number and total capacity of air compressors** *(2024)* (1) Where the main engines are designed for starting by compressed air, at least two starting air compressors are to be provided and arranged so as to be able to charge each reservoir. (2) At least one of them is to be driven ~~by a prime mover other than main engines.~~ independent of the main propulsion unit. The capacity of one of the said independently driven compressors or the combined capacity of independently driven compressors shall not be less than 50 % of the total required. Where cylinders are provided with air charging valves by the small engine, the charging valves may be considered as equivalent to an air compressor driven by the main engine. (3) The total capacity of air compressors is to be sufficient to supply air in the reservoirs from atmospheric pressure to the pressure required for the consecutive starts prescribed in **Par 1** within one hour. **3. Emergency air compressors** (1) Where prime movers driving air compressors specified in **Par 2** are arranged for air starting, an independent power driven emergency air compressor is to be provided. (2) The prime movers driving the emergency air compressor are to be capable of starting without compressed air. (3) The capacity of the emergency air compressor is to be sufficient to start the prime movers of the air compressor prescribed in **Par 2.** For this purpose, a small air reservoir for emergency air compressor may be provided. (4) In case of a small installation, a manual air compressor of adequate capacity may be accepted as an emergency air compressor. **4. Arrangement of starting air piping** (1) All discharge pipes from starting air compressors are to be led directly to starting air reservoirs. (2) All starting pipes from the air reservoirs to main or auxiliary engines ~~are~~ ~~to~~ be entirely separate from the said compressor discharge system.	- IACS UR M61 Rev.2 61.1.2 The capacity of one of the said independently driven compressors or the combined capacity of independently driven compressors shall not be less than 50 % of the total required.

Present	Amendment	Note
# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 1 General ### 101. General **1. Application 【See Guidance】** (1) The requirements in this Chapter apply to the materials, design, fabrication, tests and piping arrangement of auxiliaries and piping systems. (2) The requirements in this Chapter may be modified for ships having special limitation for their service and usage and for small ships. **2. Related requirements** In addition to the requirements in this Chapter, the following relevant requirements are to be complied with. (1) For piping systems of ships to be registered as those strengthened for navigation in ice, **Ch 1** of **Guidance for Ships for Navigation in Ice;** For piping systems of the ships for navigation in polar waters, **Ch 2** of **Guidance for Ships for Navigation in Ice;** For piping systems of the vessels for polar and ice breaking service, **Ch 3** of **Guidance for Ships for Navigation in Ice.** (2) For steering gears, **Pt 5, Ch 7;** For windlasses and mooring winches, **Pt 5, Ch 8.** (3) For automatic and remote control systems, **Pt 6, Ch 2.** (4) For pumping arrangements of oil tankers, **Pt 7, Ch 1, Sec. 10;** For drainage of ore holds of ore carriers, **Pt 7, Ch 2 Sec. 2;** For water level detection & alarms and drainage & pumping systems for bulk carriers and single hold cargo ships, **Pt 7, Ch 3 Sec. 14;** For water level detectors on multiple hold cargo ships other than bulk carriers and tankers, **Pt 7, Annex 7-6-1;** For cargo handling facilities and piping systems of liquefied gas carriers and chemical carriers, **Pt 7, Ch 5** and **Ch 6.** *(2023)* 〈Omitted〉	# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 1 General ### 101. General **1. Application 【See Guidance】** (1) The requirements in this Chapter apply to the materials, design, fabrication, tests and piping arrangement of auxiliaries and piping systems. (2) The requirements in this Chapter may be modified for ships having special limitation for their service and usage and for small ships. **2. Related requirements** In addition to the requirements in this Chapter, the following relevant requirements are to be complied with. (1) For piping systems of ships to be registered as those strengthened for navigation in ice, **Ch 1** of **Guidance for Ships for Navigation in Ice;** For piping systems of the ships for navigation in polar waters, **Ch 2** of **Guidance for Ships for Navigation in Ice;** For piping systems of the vessels for polar and ice breaking service, **Ch 3** of **Guidance for Ships for Navigation in Ice.** (2) For steering gears, **Pt 5, Ch 7;** For windlasses and mooring winches, **Pt 5, Ch 8.** (3) For automatic and remote control systems, **Pt 6, Ch 2.** (4) For pumping arrangements of oil tankers, **Pt 7, Ch 1, Sec. 10;** For drainage of ore holds of ore carriers, **Pt 7, Ch 2 Sec. 2;** For water level detection & alarms and drainage & pumping systems for bulk carriers and single hold cargo ships, **Pt 7, Ch 3 Sec. 14;** For water level detectors on multiple hold cargo ships other than bulk carriers and tankers, **Pt 7, Annex 7-6-1;** For cargo handling facilities and piping systems of liquefied gas carriers and chemical carriers, **Pt 7, Ch 5** and **Ch 6.**; For ships using low-flashpoint fuels, **Rules for the Classification of Ships Using Low-flashpoint Fuels** ~~*(2023)*~~*(2024)* 〈Omitted〉	- 2.1.2 of IACS UR P2.1 Rev.3 reflected

〈Amendment〉 - IACS UR P2.1 Rev.3 & P2.2 Rev.5

CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT

Section 1 General

〈Omitted〉

4. Classes of piping systems

(1) For the purpose of testing, type of joint to be adopted, heat treatment and welding procedure, piping systems are subdivided into three classes as indicated in **Table 5.6.1** depending upon the service, design pressure and design temperature of the medium.

(2) Piping systems for other media than specified in **Table 5.6.1** are to be specially considered by the Society depending upon the nature of the mediums and their service conditions.

Table 5.6.1 Classes of Piping Systems ~~*(2018)*~~*(2024)*

Service \ Class of piping	Class I	Class II	Class III
Toxic(7)	O	-	-
corrosive(7)	O	O(With special safeguards(6))	-
Flammable media heated above flash point or with flash point below 60 C(7)	O	O(With special safeguards(6))	-
~~Liquefied Gas(7)~~	~~O~~	~~O(With special safeguards(6))~~	~~-~~
Steam	P>1.6 or T>300	Any pressure-temperature combination not belonging to Class I or III	P≤0.7 and T≤170
Thermal oil			P≤0.7 and T≤150
Fuel oil Lubricating oil Flammable hydraulic oil	P>1.6 or T>150	Any pressure-temperature combination not belonging to Class I or III	P≤0.7 and T≤60
Other media(1)	P>4.0 or T>300	Any pressure-temperature combination not belonging to Class I or III	P≤1.6 and T≤200

NOTES;

(1) Other media : water, air, gases(non-toxic, non-flammable), non-flammable hydraulic oil, Urea for SCR systems (When piping materials selected according to ISO 18611-3:2014 for Urea in SCR systems.)

(2) P = Design Pressure (MPa), T = Design temperature (℃)

(3) Cargo oil pipes belong to Class Ⅲ.

(4) Open ended pipes(drains, overflows, vents, exhaust gas lines, boiler escape pipes) irrespective of T, belong to Class Ⅲ.

(5) Piping systems for *R*717 (NH_3) used as a primary refrigerant belonging to Class Ⅰ, and for *R*22, *R*134*a*, *R*404*A*, *R*407*C*, *R*410*A* and *R*507*A* used as a primary refrigerant belonging to Class Ⅲ.

(6) Safeguards for reducing leakage possibility and limiting its consequences(e.g. double piping, pipe duct ect.)

~~(7) Application is not allowed for below piping and relevant requirements are to be complied with.~~

~~- Cargo piping of vessels carrying liquefied gas in bulk~~

~~- Cargo piping of vessels carrying chemicals in bulk~~

~~- Low-flashpoint fuels piping of ships using low-flashpoint fuels~~

(7) Application is not allowed for below piping system and relevant requirements are to be complied with.

- Chemical cargo piping systems of ships subject to **Pt 7, Ch 6** and shipboard hydro-carbon/chemical process piping system

- Gas cargo/fuel and process piping systems of ships, subject to **Pt 7, Ch 5** and gas fuel piping systems of ships subject to **Rules for the Classification of Ships Using Low-flashpoint Fuels**.

- Piping systems for other low flashpoint fuels defined in SOLAS II-1/2.29.

Present	Amendment	Note
CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT **Section 1 General** **104. Type of connections** 〈Omitted〉 **4. Slip-on threaded joints** 【See Guidance】 (1) Slip-on threaded joints having pipe threads where pressure-tight joints are made on the threads with parallel or tapered threads, are to comply with requirements of a recognized national or international standard. (2) Slip-on threaded joints may be used for outside diameters as stated below except for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur. (A) Threaded joints in CO_2 systems are to be allowed only inside protected spaces and in CO_2 cylinder rooms. (B) Threaded joints for direct connectors of pipe lengths with tapered thread are to be allowed for: (a) Class I, outside diameter not more than 33.7 mm. (b) Class II and Class III, outside diameter not more than 60.3 mm. (C) Threaded joints with parallel thread are to be allowed for Class III, outside diameter not more than 60.3 mm. (D) In particular cases, sizes in excess of those mentioned above may be accepted by the Society if in compliance with *Korean Industrial Standards or equivalent.* 〈Omitted〉	**CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT** **Section 1 General** **104. Type of connections** 〈Omitted〉 **4. Slip-on threaded joints** 【See Guidance】 (1) Slip-on threaded joints having pipe threads where pressure-tight joints are made on the threads with parallel or tapered threads, are to comply with requirements of a recognized national and/or international standard (Standards such as ASME B31.1 and ASME B31.3 may be referenced for the purpose). *(2024)* (2) Slip-on threaded joints may be used for outside diameters as stated below except for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur. (A) Threaded joints in CO_2 systems are to be allowed only inside protected spaces and in CO_2 cylinder rooms. (B) Threaded joints for direct connectors of pipe lengths with tapered thread are to be allowed for: (a) Class I, outside diameter not more than 33.7 mm. (b) Class II and Class III, outside diameter not more than 60.3 mm. (C) Threaded joints with parallel thread are to be allowed for Class III, outside diameter not more than 60.3 mm. (D) In particular cases, sizes in excess of those mentioned above may be accepted by the Society if in compliance with *Korean Industrial Standards or equivalent.* 〈Omitted〉	- IACS UR P2.7.3 Rev.3 reflected

〈Amendment〉 - IACS UR P2.7.4 Rev.11

CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT

Section 1 General

〈Omitted〉

104. Type of connections

〈Omitted〉

5. Mechanical joints *(2017)*

〈Omitted〉

Table 5.6.11 Application of mechanical joints depending upon the class of piping *(2024)*

Type of joints	Classes of piping systems		
	Class Ⅰ	Class Ⅱ	Class Ⅲ
Pipe Unions			
Welded and brazed type	○(OD≤60.3 mm)	○(OD≤60.3 mm)	○
Compression Couplings			
Swage type	○	○	○
Bite type	○~~(OD≤60.3 mm)~~	○~~(OD≤60.3 mm)~~	○
Typical compression type	○~~(OD≤60.3 mm)~~	○~~(OD≤60.3 mm)~~	○
Flared type	○~~(OD≤60.3 mm)~~	○~~(OD≤60.3 mm)~~	○
Press type	-	-	○
Slip-on joints			
Machine grooved type	○	○	○
Grip type	-	○	○
Slip type	-	○	○
Abbreviations ○ : Application is allowed - : Application is not allowed			

Amended Guidance Relating to the Rules for Classification of Steel Ships

Pt. 5 Machinery Installations – Chapter 6

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (based on contract date for construction) - Circular will be issued

◉ IACS UR P2.9 Rev.3 : Requirements for “Pneumatic leak test” added.

(2) Effective date : submitted for approval from 1 January 2025 and to any renewal of type approval of existing design joint after 1 January 2025 - Circular will be issued

◉ IACS UR P2.7.3 Rev.3 : Clarification for small bore instrumentation equipment used for piping systems conveying flammable media

Present	Amendment	Note
CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT **Section 1 General** **104. Type of connections** 〈Omitted〉 **3. Slip-on threaded joints 【See Rule】** In application to **104. 4** of the Rules, threaded pipe joints may be used in pipes having small diameter for gauging devices. 〈Omitted〉	**CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT** **Section 1 General** **104. Type of connections** 〈Omitted〉 **3. Slip-on threaded joints 【See Rule】** ~~In application to **104. 4** of the Rules, threaded pipe joints may be used in pipes having small diameter for gauging devices.~~ In application to **104. 4** of the Rules, slip-on threaded joints may be used for connecting small bore instrumentation equipment (e.g., pressure/temperature sensors) to piping systems conveying flammable media if such connections comply with a recognized national and/or international standard (Standards such as ASME B31.1 and ASME B31.3 may be referenced for the purpose). The use of such threaded joints shall be limited to outside diameters of maximum 25 mm. *(2024)* 〈Omitted〉	- IACS UR P2.7.3 Rev.3 reflected and current Guidance deleted to prevent duplication.

Present	Amendment	Note
CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT **Section 14 Tests and Inspections** 〈Omitted〉 **1405. Tests of piping system on board** 【See Rule】 **1.** In application to **1405.** 1. (2) of the Rules, "tests by hydrostatic pressure" are to be in accordance with the following. (1) In principle, tests by hydrostatic pressure are to be carried out hydrostatic tests using liquid such as water, etc. (2) In general, airtight tests instead of hydrostatic test are not permitted. Where it is impracticable to carry out the required hydrostatic test, airtight tests may be considered. (3) In such case, the procedure for carrying out the airtight test, having regard to safety of personnel, is to be submitted to the Surveyor. ⚓ 〈Omitted〉	**CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT** **Section 14 Tests and Inspections** 〈Omitted〉 **1405. Tests of piping system on board** 【See Rule】 *(2024)* **1.** In application to **1405.** 1. (2) of the Rules, "tests by hydrostatic pressure" are to be in accordance with the following. (1) In principle, tests by hydrostatic pressure are to be carried out hydrostatic tests using liquid such as water, etc. (2) In general, airtight tests instead of hydrostatic test are not permitted. Where it is impracticable to carry out the required hydrostatic test(such as water sensitive systems, etc.), airtight tests may be considered. In certain circumstances, a combined hydrostatic-pneumatic strength test may also be applied, where the system is partially filled with water and the free space above is pressurized with a test gas (typically air or nitrogen). When pneumatic tests cannot be avoided, the safety precautions in IACS Rec. 140, Part F, are to be observed. (3) In such case, the procedure for carrying out the airtight test, having regard to safety of personnel, is to be submitted to the Surveyor. ⚓ 〈Omitted〉	- IACS UR P2.9 Rev.3 reflected with modification according to the result of internal deliberation. - Term of "Pnematic leak testing" used as "air tight test"

Amended Rules for Classification of Steel Ships

Pt. 5 Machinery Installations - Chapter 6

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : ships for which the building contract is placed on or after 1 January 2024 (in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2024) or the delivery is on or after 1 January 2028 - Circular will be issued

◉ Guidance 107.7.(3) moved to Rule 107.8.(2) with correction and addition of application date.

◉ Old contents of 107.8.(2) of Rule is replaced.

Amendment	Note
# CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT ## Section 1 General **107. General requirements for piping arrangement** **8. Watertight bulkheads 【See Guidance】** (1) Valves or cocks such as drain valves, which do not constitute a part of any pipe line are not to be fitted on the collision bulkhead. ~~(2) Except as provided in para. (3), the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw-down valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the valve being located inside the forepeak at the collision bulkhead. The valve, however, may be the fitted on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. Alternatively, for cargo ships, the pipe may be fitted with a butterfly valve suitably supported by a seat or flanges and capable of being operated from above the freeboard deck. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. *(2020)*~~ (2) Except as provided in **107. 8.** (3) of the Rules, the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a remotely controlled valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be normally closed. If the remote control system should fail during operation of the valve, the valve shall close automatically or be capable of being closed manually from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be located at the collision bulkhead on either the forward or aft side, provided the space on the aft side is not a cargo space. The valve shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. *(2024)* (3) If the fore peak is divided to hold two different kinds of liquids, the Society may allow the collision bulkhead to be pierced below the bulkhead deck by two pipes complying with para. (2), provided that the Society is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained. **〈Omitted〉**	- Guidance 107. 7.(3) moved to Rule 107.8.(2) with correction. Effective date related sentence deleted. - Old contencts of 107.8.(2) deleted.

Amended Guidance Relating to the Rules for Classification of Steel Ships

Pt. 5 Machinery Installations – Chapter 6

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : ships for which the building contract is placed on or after 1 January 2024 (in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2024) or the delivery is on or after 1 January 2028 - Circular will be issued

◉ Guidance 107.7.(3) moved to Rule 107.8.(2) with correction and addition of application date.

◉ Old contents of 107.8.(2) of Rule is replaced.

Present	Amendment	Note
CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT **Section 1 General** **107. General requirements for piping arrangement** **7. Watertight Bulkhead 【See Rule】** [Omitted] (2) In application to **107. 8.** (2) of the Rules, ships of less than 500 gross tonnage and engaged in under coastal services may be also loosened as follows. (A) The number of the pipe passing through the collision bulkhead may be not applied. (B) If it is not possible to install a screw down valve, a butterfly valve may be fitted. In this cases, a butterfly valve is to be of type with positive holding arrangements, or equivalents, that will prevent movement of the valve position due to vibration or flow of fluids. (3) In application to **107. 8.** (2) of the Rules, for ships contracted for construction on or after 1 January 2024, except as provided in **107. 8.** (3) of the Rules, the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a remotely controlled valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be normally closed. If the remote control system should fail during operation of the valve, the valve shall close automatically or be capable of being closed manually from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be located at the collision bulkhead on either the forward or aft side, provided the space on the aft side is not a cargo space. The valve shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. *(2024)* 〈Omitted〉	**CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT** **Section 1 General** **107. General requirements for piping arrangement** **7. Watertight Bulkhead 【See Rule】** [Omitted] (2) In application to **107. 8.** (2) of the Rules, ships of less than 500 gross tonnage and engaged in under coastal services may be also loosened as follows. (A) The number of the pipe passing through the collision bulkhead may be not applied. (B) If it is not possible to install a screw down valve, a butterfly valve may be fitted. In this cases, a butterfly valve is to be of type with positive holding arrangements, or equivalents, that will prevent movement of the valve position due to vibration or flow of fluids. (3) ~~In application to **107. 8.** (2) of the Rules, for ships contracted for construction on or after 1 January 2024, except as provided in **107. 8.** (3) of the Rules, the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a remotely controlled valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be normally closed. If the remote control system should fail during operation of the valve, the valve shall close automatically or be capable of being closed manually from a position above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The valve shall be located at the collision bulkhead on either the forward or aft side, provided the space on the aft side is not a cargo space. The valve shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. *(2024)*~~ **107. 8.** (2) of the Rules is applied to ships one of the followings. *(2024)* (A) Ships for which the building contract is placed on or after 1 January 2024 (in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 July 2024) (B) Ships the delivery of which is on or after 1 January 2028	- Guidance 107. 7.(3) moved to Rule 107.8.(2) with correction. - Old contencts of 107.8.(2) replaced. - Clarification for application date added according to the internal opinion.

Amended Rules for Classification of Steel Ships

Pt. 7 Ships of Special Services

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (based on contract date for construction) - Circular will be issued

◉ IACS UR F15 Rev.7 : Reinforced thickness of ballast and cargo oil piping revision

〈Amendment〉 - IACS UR F15 Rev.7

CHAPTER 1 OIL TANKERS

Section 10 Piping Systems and Venting Systems for Oil Tankers

1002. Cargo oil pumps and piping systems

〈Omitted〉

4. Separation of cargo oil pumps and cargo oil pipes *(2024)* 【See Guidance】

(1) Cargo oil pipes are to be entirely separated from other pipes, except where permitted in **1002. 2** (2) and **1003. 1** and **2.**

(2) Cargo oil pipes are not to be led through fuel oil tanks nor engine room and accommodation spaces where sources of vapour ignition are normally present. In addition, these pipes are not to be led to spaces forward the collision bulkhead or after the front bulkhead of the engine room.

(3) Cargo oil pipes on the weather deck are to be arranged sufficiently apart from the accommodation spaces.

(4) Where a ship is equipped with bow and/or stern loading and unloading of cargo oil outside the cargo area, the connections of the cargo lines leading to the cargo hose connection therein are to be of welded joints except valve connections and the cargo lines are to be clearly identified and segregated by following means of (A) or (B) situated in the cargo area. The open ends of the cargo lines are to be provided with a blank flange at the bow and/or stern end connections.

(A) Two valves which can be secured in the closed position and provided that the efficiency of the segregation can be checked

(B) One valve together with another closing appliances providing an equivalent standard of segregation such as a removable spool piece or spectacle flange

(5) Cargo oil pipes and similar pipes to cargo oil tanks are not to pass through ballast tanks. However, these pipes may pass through the ballast tanks provided that these pipes in ballast tanks are of short length with sufficient thickness in accordance with Table 5.6.2 of Pt.5, Ch.6 and the connections of these pipes are of welded joints or flanged joints which have no risk of leakage. Expansion bends only are permitted in these lines within ballast tanks. "Flanged joints which have no risk of leakage" means welded flange joints rated at least PN10 or one pressure rating higher than required design pressure, whichever is greater. "Expansion bends" means expansion loops such as an omega bend ('Ω') in piping system to counteract excessive stresses or displacement caused by thermal expansion or hull deformation which could be fabricated from straight lengths of pipe.

~~(6) Notwithstanding preceeding (5), for oil tankers other than double hull tankers, cargo oil pipes may pass through the ballast tanks provided that the connections of these pipes are of welded joints or flanged joints which have no risk of leakage. Expansion bends only, not glands, are permitted in these lines within ballast tanks.~~

~~(7)~~(6) Connection between cargo piping and ballast piping referred to above is not permitted except for emergency discharge as specified in the Unified Interpretation to Regulation 1.18 of MARPOL Annex I.

~~(8)~~(7) In spite of the (7), provision may be made for emergency discharge of the segregated ballast by means of a connection to a cargo pump through a portable spool piece. In this case nonreturn valves should be fitted on the segregated ballast connections to prevent the passage of oil to the ballast tanks. The portable spool piece should be mounted in a conspicuous position in the pump room and a permanent notice restricting its use should be prominently displayed adjacent to it. Shut-off valves shall be provided to shut off the cargo and ballast lines before the spool piece is removed.

〈Omitted〉

〈Amendment〉 - IACS UR F15 Rev.7

CHAPTER 1 OIL TANKERS

Section 10 Piping Systems and Venting Systems for Oil Tankers

1002. Cargo oil pumps and piping systems

〈Omitted〉

7. Piping in cargo oil tanks *(2024)* 【See Guidance】

(1) Pipes other than cargo oil pipes, cargo oil heating pipes, ballast pipes of cargo tanks and pipes permitted in (2) to (4) are not to pass through cargo oil tanks nor to have any connection to these spaces.

(2) Pipes for remote control of cargo oil piping systems, and vapour discharge pipes, tank cleaning pipes and sounding devices of cargo oil tanks may be led to cargo oil tanks.

(3) Scupper pipes, sanitary pipes, etc. may be led through cargo oil tanks subject to the approval by the Society.

~~(4) Ballast pipes and other pipes such as sounding and vent pipes to ballast tanks are not to pass through cargo oil tanks. However, these pipes may pass through the cargo oil tanks provided that these pipes in cargo oil tanks are of short length and the connections of these pipes are of welded joints or flanged joints which have no risk of leakage.~~

~~(5) Notwithstanding preceeding (4), for oil tankers other than double hull tankers, ballast pipes of ballast tanks adjacent to a cargo oil tanks may pass through cargo oil tanks provided that the connections of these pipes are of welded joints or flanged joints which have no risk of leakage. Expansion bends only, not glands, are permitted in these lines within cargo oil tanks.~~

(4) Ballast pipes are not to pass through cargo oil tanks. However, these pipes may pass through the cargo oil tanks provided that these pipes in cargo oil tanks are of short length with sufficient thickness in accordance with **Table 5.6.2** of **Pt.5, Ch.6** and the connections of these pipes are of welded joints or flanged joints which have no risk of leakage. Expansion bends only are permitted in these lines within ballast tanks. "Flanged joints which have no risk of leakage" means welded flange joints rated at least PN10 or one pressure rating higher than required design pressure, whichever is greater. "Expansion bends" means expansion loops such as an omega bend ('Ω') in piping system to counteract excessive stresses or displacement caused by thermal expansion or hull deformation which could be fabricated from straight lengths of pipe. Ballast overboard discharge pipes passing through cargo oil tanks are to comply with **Pt.7, Ch.1, Sec.10, 1002.6.(3)** of the **Guidance.**

Amended Guidance Relating to the Rules for Classification of Steel Ships

Pt. 7 Ships of Special Services

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan. 2025 (based on contract date for construction) - Circular will be issued

◉ IACS UR F15 Rev.7 : Reinforced thickness of ballast and cargo oil piping revision

〈Amendment〉 - IACS UR F15 Rev.7

CHAPTER 1 OIL TANKERS

Section 10 Piping Systems and Venting Systems for Oil Tankers

1002. Cargo oil pumps and cargo oil piping systems, pipings in cargo oil tank, etc.

〈Omitted〉

4. In application to **1002. 4.** (5) ~~and (6)~~ of the Rules, where at the request of the owner, cargo piping and the valve control piping are located above the double bottom, the vessel will be assigned with the notation **PCP**(Protected Cargo Piping). This applies also to cargo piping and valve control piping installed in pipe tunnel or duct keel. *(2024)*

Amended Guidance to the Rules for Classification of Steel Ships

Pt. 7

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Amendment for Annex 7-6 (Circular document will be issued)

◉ Effective date

1) Ships for contractred on or after 1 January 2024 : Revised in accordance with MSC.188(79) Rev.2, Circular document will be issued

(2) Amendment for Annex 7-6-1 (Circular document will be issued)

◉ Effective date

1) Ships for contractred on or after 1 January 2024; or

2) Ships for delivered on or after 1 January 2028

Amendment	Note

Annex 7-6 Water Level Detection & Alarms and Drainage & Pumping Systems for Bulk Carriers and Single Hold Cargo Ships

I. Water level detection & alarms

1. General

(1) The plans containing details on installation, welding and electrical equipment of the water ingress alarm system specified in this Annex to be submitted to the Society for approval.
After installation on board, this system is to be tested and inspected by the attending Surveyor.

(2) Any water level detection & alarm is to be approved by the Society in accordance with the requirements of the relevant regulations.

(3) In order to avoid the inappropriate application of provisions of chapters II-1, III, IX, XI-1 and XII to certain dedicated ship types, the following cargoes are excluded from the scope of cargoes deemed, for the purpose of determining ship type, to be dry cargoes carried in bulk;
(A) woodchips; and
(B) cement, fly ash and sugar,
provided that loading and unloading is not carried out by grabs heavier than 10 tonnes, power shovels and other means which frequently damage cargo hold structures. *(2019)*

2. Definitions

(1) **Water level detector** means a system comprising sensors and indication devices that detect and warn of water ingress in cargo holds and other spaces as required in **Ch 3, 1403. 1** and **3** of the Rule.

(2) **Sensor** means a unit fitted at the location being monitored that activates a signal to identify the presence of water at the location in **Ch 3, 1403. 1** and **3** of the Rule.

(3) **Pre-alarm level** means the lower level(0.5 m, single hold cargo ships : not less than 0.3 m) at which the sensor(s) in the cargo hold space will operate.

(4) **Main alarm level** means the higher level(0.15D and above, however not exceed the maximum 2 m, single hold cargo ships : not more than 0.15D) at which the sensor(s) in the cargo hold space will operate or the sole level in spaces other than cargo holds

(5) **Overriding device** means a device to make keeping the current function of an equipment, though a set alarm signal in it would be taken place.

(6) **Visual indication** means indication by activation of a light or other device that is visible to the human eye in all levels of light or dark at the location where it is situated.

(7) **Audible indication** means an audible signal that is detectable at the location where it is signalled.

(8) **Depth of ship** means the distance from bottom of cargo hold to hatch coaming. (See Fig **1**)

Amendment	Note

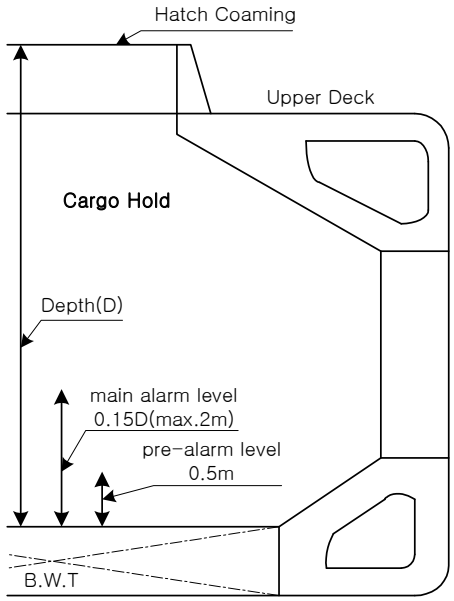

Fig 1 Depth of ship(D)

3. Installation requirements

(1) Bulk Carriers

(A) For cargo holds

(a) In each cargo hold, giving audible and visual alarms, one when the water level above the inner bottom in any hold reaches a height of 0.5 m and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m. On bulk carriers to which **SOLAS Reg.XII/9.2** applies, detectors with only the latter alarm need be installed.

(b) The water level detectors are to be fitted in the aft end of the cargo hold. For cargo holds which are used for water ballast, an alarm overriding device may be installed. The visual alarms are to clearly discriminate between the two different water levels detected in each hold. The illustrations for application and location of installation are showing in **Fig 2** to **Fig 5.**

(c) The sensors may be installed inside of stools, where the ship has stools in cargo hold. In this case, the character of each sensor is to be considered in conjunction with installation.

(d) In case where the direct contact type detectors will be used, the inspection holes or the equivalent means are to be provided to remove the cargo/water mixture. The mesh size of filter element on inspection holes is to be decided by considering of the diameter of cargo particles and provided a spare filter element for each detector. Any filter element fitted to detectors is to be capable of being cleaned before new loading.

Amendment	Note

(B) In any ballast tank forward of the collision bulkhead required, giving an audible and visual alarm when the liquid in the tank reaches a level not exceeding 10% of the tank capacity. An alarm overriding device may be installed to be activated when the tank is in use.

(C) In any dry or void space other than a chain cable locker, any part of which extends forward of the foremost cargo hold, giving an audible and visual alarm at a water level of 0.1 m above the deck. Such alarms need not be provided in enclosed spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume.

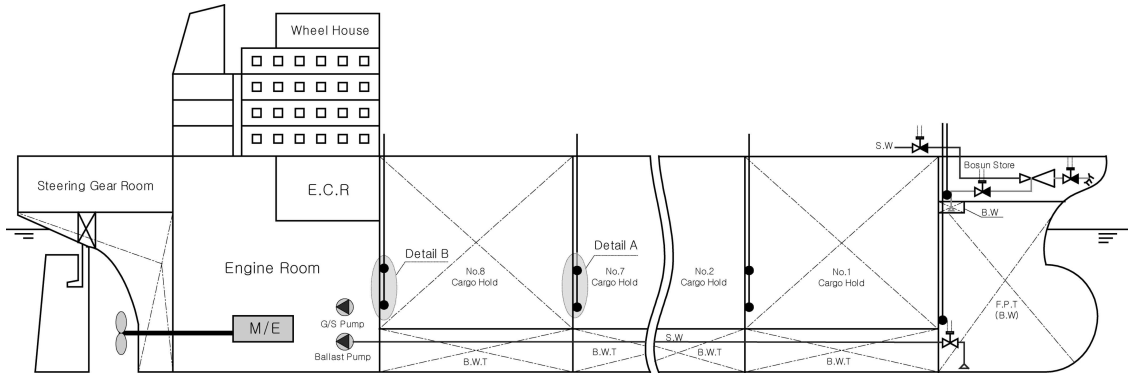

Fig 2 Installation position of water level detector

Amendment	Note

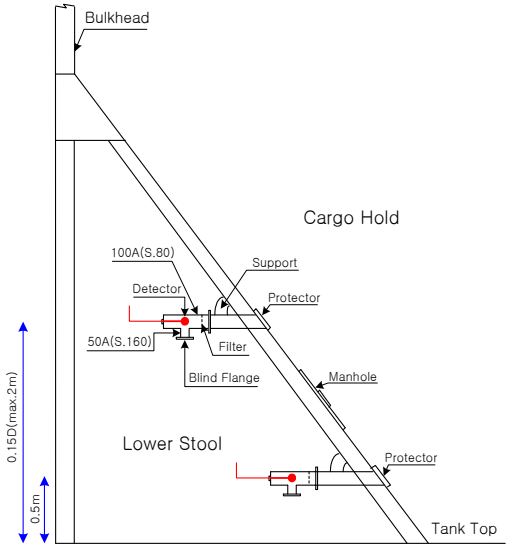

Fig 3 (Detail A)

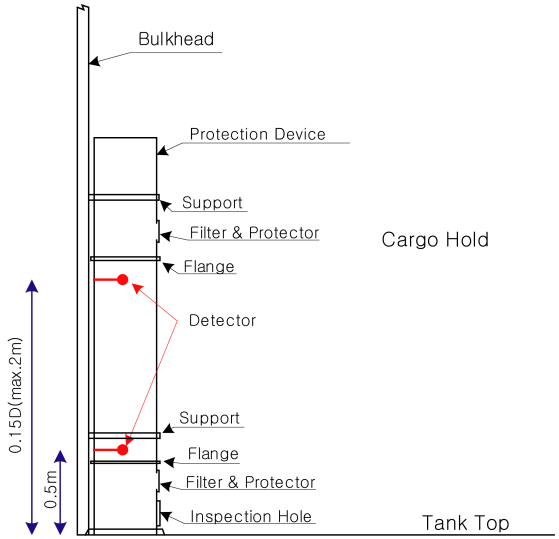

Fig 4 (Detail A)

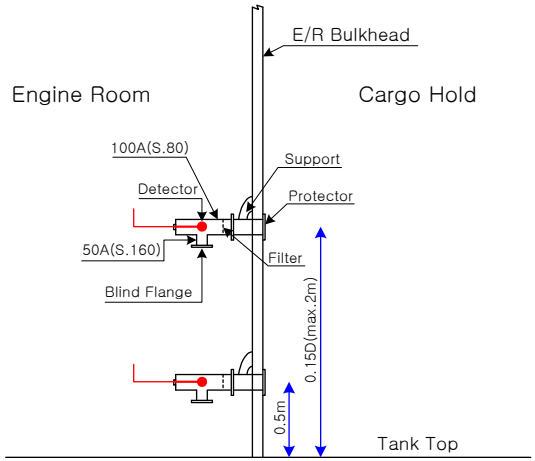

Fig 5 (Detail B)

Amendment	Note
(2) Single Hold Cargo Ships (A) Those are to be fitted in such space with water level detectors which give an audible and visual alarm at the navigation bridge when the water level above the inner bottom in the cargo hold reaches a height of not less than 0.3 m, and another when such level reaches not more than 15 % of the mean depth of the cargo hold. (B) Those are to be fitted at the aft end of the hold(above its lowest part where the inner bottom is not parallel to the designed waterline). Where webs or partial watertight bulkheads are fitted above the inner bottom, additional detectors are to be fitted. **4. Detector system requirements** (1) General (A) This detecting system is to provide a reliable indication of water reaching a preset level. The audible and visual alarms are to be suitable for location on the navigation bridge. Here, one sensor capable of detecting both preset levels (pre-alarm level and main alarm level) is allowed. (B) Protection of the enclosures of electrical components installed in cargo holds, ballast tanks and dry spaces are to be satisfied the requirements of **IP68** in accordance with **(KS C) IEC 60529.** (C) Protection of the enclosures of electrical components installed above ballast and cargo spaces are to be satisfied the requirements of **IP56** in accordance with **(KS C) IEC 60529.** (D) The water level detector system is to be capable of being supplied with electrical power from two independent electrical supplies as follows. Failure of the primary electrical power supply of them is to activate an alarm, both visual and audible. (a) The electrical power supply is to be from two separate sources, one is to be the main source of electrical power and the other is to be the emergency source, unless a continuously charged dedicated accumulator battery is fitted, having arrangement, location and endurance equivalent to that of the emergency source (18h). The battery supply may be an internal battery in the water level detector system. (b) The changeover arrangement of supply from one electrical source to another need not be integrated into the water level detector system. (c) Where batteries are used for the secondary power supply, failure alarms for both power supplies are to be provided. (E) Equipment which is to be used in refrigerated cargo spaces should satisfy the requirements of a suitable industry standard covering the relevant service temperatures. *(2024)* (2) For cargo holds An alarm, both visual and audible, is to be activated each when the level of water reaches the pre-alarm level or main alarm level in the cargo hold being monitored. The visual alarm is to identify the cargo hold and the audible main alarm is not to be the same as that for the pre-alarm level. (3) For compartments other than cargo holds An alarm, both visual and audible, is to be activated when the level of water in the space being monitored is detected on sensor. The characteristics of the visual and audible alarm is to be the same as those for the main alarm level in a cargo hold.	Appendix 2.1.3 of MS C.188(79) added

Amendment	Note
5. Functional requirements (1) Means of detecting water level The method of detecting water level may be by direct or indirect means. A direct means determines the presence of water by physical contact of the water with detection device and indirect means of detection include devices such as the air purge or ultrasonic type sensor. (2) Functional requirements (A) The sensors should be capable of being located in the aft part of the hold or above its lowest point in such ships having an inner bottom not parallel to the designed waterline, or, in the case of bulk carriers complying with SOLAS regulation XII/12, in the aft part of each cargo hold or in the lowest part of the spaces other than cargo holds to which that regulation applies. *(2024)* ~~(A)~~(B) The system of detecting water level is to be capable of continuous operation while the ship is at sea. ~~(B)~~(C) Detection equipment is to be suitably corrosion resistant for all intended cargoes. Detection equipment includes the sensor, any filter and protection arrangements for the detector installed in cargo holds and other spaces as required by **Ch 3, 1403. 1** and **3** of the Rule. ~~(C)~~(D) The detector indicating the water level is to be capable of activating to an accuracy of ±100 mm. ~~(D)~~(E) The part of the system which has circuitry in the cargo area, is to be certified intrinsically safe type and at least a **IIB T3** in accordance with **IEC 60079-11:2011** Where a ship is designed only for the carriage of cargoes that cannot create a combustible or explosive atmosphere then the requirement for intrinsically safe circuitry is not to be insisted upon, provided the operational instructions included in the Manual specifically exclude the carriage of cargoes that could produce a potential explosive atmosphere. Any exclusion of cargoes is to be consistent with the ship's cargo book and any certification relating to the carriage of specifically identified cargoes. The maximum surface temperature of equipment installed within cargo spaces is to be appropriate for the combustible dusts and explosive gasses likely to be encountered. Where the characteristics of the dust and gases are unknown, the maximum surface temperature of equipment is not to exceed 85 deg. C. Where detector systems include intrinsically safe circuits, plans of the arrangements are to be submitted and approved. *(2022)* ~~(E)~~(F) Detectors serving a cargo hold is to be capable of being functionally tested in situation when the hold is empty using either direct or indirect methods. (3) Installation of sensors (A) The sensors are to be located in a protected position that is communication with the aft part of the cargo hold such that position of the sensor detects the level that is representative of the levels in the actual hold space. These sensors are to be located either as close to the centerline as practicable, or at both the port and starboard sides of the cargo hold. (B) The detector installation should not inhibit the use of any sounding pipe or other water level gauging device for cargo holds or other spaces and detectors and equipment are to be installed where they are accessible for survey, maintenance and repair. (C) Electrical cables and any associated equipment installed in cargo holds are to be protected from damage by cargoes or mechanical handling equipment associated with bulk carrier operations, such as in tubes of robust construction or in similar protected locations. (D) The sensors should be located at the height specified in the regulations. These heights are to be measured from the upper surface of the inner bottom. For bilge level sensors in SOLAS regulation II-1/25-1.3, if the bottom of the bilge well is below the upper surface of the inner bottom, the heights of those sensors are to be measured from the bottom of the bilge well. *(2024)* (F) When a lining or insulation is fitted, if the lining or insulation is not constructed to a watertight standard, then the height is to be measured from the upper surface of the inner bottom. If the lining or insulation is tested as watertight, then the heights may be measured from the upper surface of the lining/insulation. *(2024)*	Annex 3.1.2 of MSC.188(79) added Appendix 2.2.2, 2.2.2.1 and 2.2.3 of MSC.188(79) added

Amendment	Note
6. Alarm system requirements (1) The visual and audible alarms are to be suitable for location on the navigation bridge. These alarms are to be complied with the requirements of primary alarm in the **Code on Alerts and Indicators, 2009.** The pre-alarm, as a primary alarm, is to indicate a condition that requires prompt attention to prevent an emergency condition and the main alarm, as an emergency alarm, is to indicate that immediate actions are to be taken to prevent danger to human life or to the ship. (2) Visual indication using a light of a distinct colour, or digital display that is clearly visible in all expected light levels, which does not seriously interfere with other activities necessary for the safe operation of the ship. The visual indication is to be capable of remaining visible until the condition activating it has returned below the level of the relevant sensor. The visual indication is not to be capable of being extinguished by the operator. In case of the system with a flickering function, that flicker is to be capable of being muted by the operator, but, at that time, the visual indication is not to be extinguished. (3) In conjunction with the visual indication for the same sensor, the system is to be capable of providing audible indication and alarms in the space in which the indicator is situated. The audible indication is to be capable of being muted by the operator. (4) Time delays may be incorporated into the alarm system to prevent spurious alarms due to sloshing effects associated with ship motions. (5) The system may be provided with a capability of overriding indication and alarms for the detection systems installed only in tanks and holds that have been designed for carriage of water ballast. An override visual indication capability should be provided throughout deactivation of the water level detector for the holds or tanks. However, where such an override capability is provided, cancellation of the override condition and reactivation of the alarm should automatically occur after the hold or tank has been de-ballasted to a level below the lowest alarm indicator level. (6) Notwithstanding the provisions of (5) above, The water ingress alarm system is not to be capable of overriding the alarm of the spaces (e.g., dry spaces, cargo holds, etc.), that are neither designed nor intended to carry water ballast. (A) Enabling the facility to override alarms is to be customized for each specific ship prior to the commissioning tests witnessed by the Surveyor. In this case, the related drawings are to be submitted and approved before the work is commenced. (B) A "Caution Plate", which prohibits personnel from overriding an alarm to any hold, is not an acceptable alternative to the above provisions. (7) Alarms are to continuously monitor the system and activate a visual and audible alarm on detecting a fault. The audible alarm is to be capable of being muted by manual operation but the visual indication should remain active until the malfunction is cleared. The alarm for malfunction is distinguishable from the alarm for water level detecting, but it may be substituted the system fail alarm. Here, faults associated with the system means faults such as open circuit, short circuit, loss of power supplies and CPU failure, etc. (8) Alarm systems are to be complied with the requirements of **(KS C) IEC 60092-504**. A test switch for visual indication and audible alarm is to be fitted on alarm panel and the switch is to be returned to the off position automatically after any use.	

Amendment	Note
7. System test requirements (1) Alarm system (A) The visual indication is not to be extinguished by the operator. (B) It is to be set at a level that alerts operators and tested, but does not interfere with the safe operation of the ship. (C) That they are distinguishable from other alarms. (2) Water level detectors (A) After installation on board, a functionality test for detectors is to be carried out. The test is to be represented the presence of water at the detectors for every level monitored, but simulation methods may be used where the direct use of eater is impracticable. (B) Each detector alarm should be tested to verify that the pre-alarm(0.5 m, single hold cargo ships : not less than 0.3 m) and main alarm levels[0.15 D (max. 2 m), single hold cargo ships : not more than 0.15 D] operate for every space where they are installed and indicate correctly. Also, the fault monitoring arrangements should be tested as far as practicable. (C) Records of testing of alarm systems should be retained on board. **8. Manuals** (1) Documented operating and maintenance procedures for water level detection containing the following informations are to be kept on board and readily accessible and the procedures are to be written in working language of the master and officers: - A description of the equipment for detection and alarm arrangements - Evidence that the equipment has been type tested - Line diagrams of the detection and alarm system showing the positions of equipment. - Installation instructions for setting, securing, protecting and testing. - List of cargoes for which the detector is suitable for operating in a 50% seawater slurry mixture - Procedures to be followed in the event of equipment not functioning correctly. - Maintenance requirements for equipment and system. (2) Manuals for bilge alarm systems used as water level detection systems are to contain the following information in addition to (1) above : (see 2.(3) of Annex 7-6-1) : *(2024)* (A) Procedure for switching to the alternative arrangements provided for occasions when the bilge alarm system cannot be used as a water level detection system; and (B) List of cargoes for which alternative provisions are to be used.	Appendix 4.2 of MSC. 188(79) added

Amendment	Note
Annex 7-6-1 Water Level Detectors on Multiple Hold Cargo Ships other than Bulk Carriers and Tankers *(2023)* **1. Application** (1) Multiple hold cargo ships other than bulk carriers and tankers constructed on or after 1 January 2024[1] shall be fitted with water level detectors[2] in each cargo hold intended for dry cargoes. Water level detectors are not required for cargo holds located entirely above the freeboard deck. (2) The water level detectors required by paragraph (1) shall: (A) give audible and visual alarms at the navigation bridge, one when the water level above the bottom of the cargo hold reaches a height of not less than 0.3 m, and another at a height not less than 15% of the depth of the cargo hold but not more than 2 m; and (B) be fitted at the aft end of the cargo holds. For cargo holds which are occasionally used for water ballast, an alarm overriding device may be installed. The visual alarms shall clearly discriminate between the two different water levels detected in each hold. (3) As an alternative to the water level detector at a height of not less than 0.3 m as per sub-paragraph (2). (A), a bilge level sensor[2] serving the bilge pumping arrangements required by SOLAS II-1 regulation 35-1 and installed in the cargo hold bilge wells or other suitable location is considered acceptable, subject to: (A) the fitting of the bilge level sensor at a height of not less than 0.3 m at the aft end of the cargo hold; and (B) the bilge level sensor giving audible and visual alarm at the navigation bridge which is clearly distinctive from the alarm given by the other water level detector fitted in the cargo hold. (4) Water level detectors and bilge level sensor (stated in (3)) are to be complied with the performance standards, installation and testing requirements of **Pt. 7, Annex 7-6 "I. Water level detection & alarms" of the Guidance**. *(2024)* **2. Bilge alarms used as water level detectors *(2024)*** (1) Bilge alarms may be used as water level detectors provided that they meet the performance standards, installation and testing requirements set out in **Pt. 7, Annex 7-6 "I. Water level detection & alarms" of the Guidance** and type approved by this Societ in accordance with the requirements of the relevant regulations. (2) Some cargoes require the bilge pumping system to be protected to prevent the spread of contaminated or potentially dangerous fluids. (3) Where the cargo hold bilge well will be completely sealed when specific cargoes are carried, and the bilge well therefore cannot be used for the entry of ingress water to the detector(s), a suitable alternative detection point or points are to be provided. (4) If the bilge well is used for when specific cargoes are carried, the bilge well is not to be completely sealed in order to allow water ingress for activating the detectors. *** Footnotes:** 1. **"constructed on or after 1 January 2024"** means ships (**SOLAS Reg. II-1/1.3.2**): .1 for which the building contract is placed on or after 1 January 2024; or .2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2024; or .3 the delivery of which is on or after 1 January 2028. ~~2. For the performance standards, installation and testing requirements, Refer to Resolution **MSC.188(79)/Rev.2** as may be amended.~~ ⚓	Related documents revised and footnote moved into the regulation and related department opinion reflected. Annex 5 of MSC.188(79) added and related department opinion reflected.

Amended Guidance for Approval of Manufacturing Processand TypeApproval, Etc

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : submitted for approval from 1 January 2025 and to any renewal of type approval of existing design joint after 1 January 2025 - Circular will be issued

◉ IACS UR P2.11 Rev.6 : Test requirements for Mechanical Joint revised.

〈Amendment〉 - IACS UR P2.11 Rev.6

Section 18 Mechanical Joints

1801. General

The requirements of this Section apply to tests and inspection for the approval of mechanical joints in accordance with the requirements in **Pt 5, Ch 6, 104. 5** (1) of the Rules.

1802. Data to be submitted

The following reference data are to be submitted to the Society in addition to those specified in **102.**

(1) Complete description of the product
(2) Typical sectional drawings with all dimensions necessary for evaluation of joint design
(3) Complete specification of materials used for all components of the assembly
(4) Initial information
  (A) Maximum design pressures (pressure and vacuum)
  (B) Maximum and minimum design temperatures
  (C) Conveyed media
  (D) Intended services
  (E) Maximum axial, lateral and angular deviation, allowed by manufacturer
  (F) Installation details

1803. Type tests

1. Test items

Testing requirements for mechanical joints are to be as indicated in **Table 3.18.1**

Table 3.18.1 Test items for mechanical joints ~~*(2017)*~~*(2024)*

Test items		Types of mechanical joints			Notes and references
		Compression couplings and pipes unions	Slip-on joints		
			Grip type & Machine grooved type	Slip type	
1	Tightness test	○	○	○	**Table 3.18.2**
2	Vibration (fatigue) test,	○	○	-	**Table 3.18.2**
3	Pressure pulsation test~~1~~[1)]	○	○	-	**Table 3.18.2**
4	Burst pressure test	○	○	○	**Table 3.18.2**
5	Pull-out test	○	○	-	**Table 3.18.2**
6	Fire endurance test	○[3)]	○	○	**Table 3.18.2** (If required in **Pt 5, Ch 6, 104. 5**(5) of the Rules)
7	Vacuum test	○[3)]	○	○	**Table 3.18.2** (for suction lines only)
8	Repeated assembly test	○[2)]	○	-	**Table 3.18.2**

Abbreviations : ○ : test is required.
- : test is not required.

Footnotes
1) for use in all Class I and II systems and those Class III systems where pressure pulsation other than water hammer is expected.
2) ~~except press type and swage type.~~ except permanent joint type (e.g., press and swage type).
3) except joints with metal-to-metal tightening surfaces.

Amended Guidance to the Rules for Classification of Steel Ships

Guidance for Approval of Manufacturing Process and Type Approval, etc.

2024. 7.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : Ships for contracted on or after 1 January 2024; or Ships for delivered on or after 1 January 2028
(Circular document will be issued)

◉ Revised in accordance with MSC.188(79) Rev.2

Amendment	Note
Section 29 Water Level Detection and Alarm System **2901. Application** The requirements in this Section apply to tests and inspections for the type approval of water level detector and visual and audible alarm system (hereinafter called detector system) in accordance with the requirements of **Pt 7 Ch 3, 1403. 1.** and 3. of the Rules and Pt 7 Annex 7-6 I. and Annex 7-6-1 of the Guidance *(2024)* **2902. Data to be submitted** The following reference data are to be submitted to the Society in addition to those specified in **102.** (1) Specifications of the detector system including any limitation regarding the type of cargoes for the guarantee of performance (2) Construction drawings and explanatory documents of the working principle of the detector system (3) Technical documents of the detector system including the manual specified in **Pt 7 Annex 7-6 I. 8.** of the Guidance **2903. Construction and Function** The construction and the function of the detector system is to satisfy the following requirements. (1) To be able to adequately withstand ship vibration, ship motions, trim and heel. (2) To be able to withstand the most severe pressure and temperature expected during working conditions and, for parts in contact with the liquid, to have adequate compatibility between the device and the liquid considered. (3) The construction in addition to the above is also to be as follows: (a) To be such that maintenance and inspection can be carried out easily and safely (b) To have appropriate devices installed to prevent metal fittings from coming loose. (4) The construction and function specified in **Pt 7 Annex 7-6 I. 4.** through **6.** of the Guidance are to be provided. (5) For the systems provided with override devices, the function specified in **Pt 7 Annex 7-6 I. 6.** (5) of the Guidance is to be provided.	Referenced document and numbering changed due to the revision of Annex 7-6 and 7-6 of Rule Pt.7.

Amendment	Note
2904. Type test **1.** The approval test is to include the following items (1) through (5) depending on the application and the type of the detector system. (1) In addition to conformity with the requirements in **2903,** confirmation of whether the test sample complies with the designated specifications for finishing, construction, dimensions and parts or not (2) Pressure test of the test specimen for a period in accordance with the following (a) through (c). The test pressure is to be a design pressure but not less than the pressure equivalent to seawater head of maximum depth of the space where the parts are fitted. (a) The submerged test period for electrical components intended to be installed in ballast tanks and cargo tanks used as ballast tanks is to be not less than 20 days. (b) The submerged test period for electrical components intended to installed dry spaces and cargo holds not intended to be used as ballast tanks is to be not less than 24 hours. (c) Where a detector and/or cable connecting device (e.g. junction box, etc) is installed in a space adjacent to a cargo hold (e.g. lower stool, etc.) and the space is considered to be flooded under damage stability calculations, the detectors and equipment are to satisfy the requirements of IP68 for a water head equal to the hold depth for a period of 20 days or 24 hours on the basis of whether or not the cargo hold is intended to be used as a ballast tank as described in (a) and (b) above. (3) Confirmation whether the test sample performs as specified or not, under the regular installed condition, inclining conditions of 22.5 degrees in transverse direction and 10 degrees in longitudinal direction at the following temperature: (a) Parts installed outside the cargo hold: normal temperature (b) Parts installed inside the cargo hold: maximum and minimum working temperature (Where this temperature is expected within the range between 0℃ and 60℃, room temperature may be used)	

Amendment	Note
(4) For the detector system installed in cargo holds, confirmation whether the test specimen detects seawater as specified or not, by merging in a test mixture of fine materials of each intended cargoes in seawater (a solution of sodium chloride having a specific gravity of 1.025 g/cm^3 may be accepted as an alternative to seawater) in accordance with the followings: (a) the test container for the cargo/water mixture is to be dimensioned so that its height and volume are such that the sensor and any filtration fitted can be totally submerged for the repeated functionality tests. (b) the sensor and any filtration fitted that are to be arranged in the container as they would be installed in accordance with the installation instructions submitted. (c) The pressure in the test mixture container is to be not more than 0.02 MPa at the sensor and any filter arrangement. The pressure may be realised by pressurisation or by using a container of sufficient height. (d) When the test mixture is pumped into the test mixture container, the test mixture is to be kept in homogenized condition during the test and the effect of the pumping is not to affect the operation of the sensor and filter arrangements. (e) The concentration of fine materials in a test mixture is to be of minimum 50 % by weight. In general, the type of test mixture may be limited to the followings. The smallest and largest particle size together with the density of the dry mixture used in this test is to be ascertained and recorded in the test records and the manuals required by **Pt 7, Annex 7-6 I. 8.** of the Guidance (i) Minimum one type of fine mineral (dust of iron ore, coal, sand, etc. with particle size of, in general, less than 0.1 mm) (ii) Minimum one type of grain (barleycorn, wheat, corn, etc. with particle size of, in general, greater than 3 mm) (f) The cargo/water mixture is to be pumped into the test container to a predetermined level that submerges the detector and the operation of the alarm observed. (g) The test container is then to be drained and the de-activation of the alarm condition observed. (h) The test container and sensor with any filter arrangement are to be allowed to dry without physical intervention. (i) A sequence from immersion to detection is to be repeated minimum 10 times (a period of one sequence of the test is not to be less than 30 seconds as a standard) without cleaning any filtration arrangements. (j) Satisfactory alarm activation and de-activation at each of the ten consecutive tests will demonstrate satisfactory type testing. (5) For the electrical parts of the devices, testing as given in the following (a) through (j). However the type tests are to comply with the requirements in **2304. 2** and, in case the explosion-protected construction is required, type tests also are to comply with the requirements in **Pt 6, Ch 1, 201. 1.,** (2) of the Guidance. (a) electrical power supply failure test (b) power supply variation test (c) dry heat test (d) damp heat test (e) cold test (for water ingress detectors) (f) vibration test. (g) insulation resistance test (h) high voltage test (i) inclinations tests(if the detectors contain moving parts). (j) EMC tests(if the detector is capable of producing electromagnetic noise) (6) Equipment which is to be used in refrigerated cargo spaces should satisfy the requirements of a suitable industry standard covering the relevant service temperatures. *(2024)* **2.** Additional tests other than those of the preceding **1.** may be requested, where deemed necessary by the Society.	Appendix 2.1.3 of MS C.188(79) added